

Village of Ossining

Phase II Storm Water Management Program Plan Supplements



Prepared by:

December 2009



VILLAGE OF OSSINING

PHASE II STORM WATER MANAGEMENT PROGRAM PLAN SUPPLEMENTS

In Accordance With The

NYSDEC SPDES GENERAL PERMIT FOR STORMWATER DISCHARGE FROM MS4S

GP-0-08-002

PREPARED BY:

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DECEMBER 2009

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TABLE OF CONTENTS

Section		Title	Page	
S.0	SUMMARY			
	S .1	Introduction	S-2	
	S.2	Federal Storm Water Regulations	S-3	
	S .3	New York State General Permit Requirements	S-3	
	S.4	Village Initial Phase II Storm Water Management Program Document	S-4	
	S.5	Storm Water Management Program Responsibilities	S-5	
	S.6	Revised Storm Water Management Program Requirements	S-6	
		S.6.1 Annual Reporting	S-6	
		S.6.2 Storm Water Management Program Evaluation	S-7	
		S.6.3 Third Party Certifications	S-8	
		S.6.4 Impaired Water Bodies	S-9	
1.0	MCM	#1: PUBLIC EDUCATION AND OUTREACH	1-1	
	1.1	Phase II Program Requirements	1-1	
	1.2	Village Phase II Plan Components	1-2	
		1.2.1 Public Education and Outreach Topics	1-2	
		1.2.2 Public Education and Outreach Strategies	1-3	
		1.2.3 Partnership	1-4	
		1.2.4 Recordkeeping, Reporting and Evaluation	1-4	
2.0	MCM	#2: PUBLIC INVOLVEMENT/PARTICIPATION	2-1	
	2.1	Phase II Program Requirements	2-1	
	2.2	Village Phase II Plan Components	2-2	
		2.2.1 Public Involvement/Participation Opportunities	2-2	
		2.2.2 Local Storm Water Public Contact	2-3	
		2.2.3 Public Presentation and Availability of Documentation	2-3	
		2.2.4 Partnership	2-5	

Section			<u>Title</u>	Page				
		2.2.5	Recordkeeping, Reporting and Evaluation	2-6				
3.0	MCM	#3: IL	LICIT DISCHARGE DETECTION AND ELIMINATION	3-1				
	3.1	Phase	II Program Requirements	3-1				
	3.2	Villag	e Phase II Plan Components	3-3				
		3.2.1	IDDE Written Procedures	3-3				
		3.2.2	Mapping	3-4				
		3.2.3	Outfall Reconnaissance Inventory	3-4				
		3.2.4	Illicit Discharges to Storm Sewers Local Law	3-5				
		3.2.5	Education and Training	3-6				
		3.2.6	Partnerships	3-6				
		3.2.7	Recordkeeping, Reporting and Evaluation	3-6				
4.0	MCM	#4: C	ONSTRUCTION SITE STORM WATER					
	RUNC)FF C(ONTROL	4-1				
	4.1	Phase	II Program Requirements	4-1				
	4.2	Villag	e Phase II Plan Components	4-3				
		4.2.1	Storm Water Management and Erosion and					
			Sediment Control Local Law	4-3				
		4.2.2	Written Procedures	4-4				
		4.2.3	SWPPP Review	4-5				
		4.2.4	MS4 SWPPP Acceptance Form	4-5				
		4.2.5	Construction Site Storm Water Compliance Inspections	4-6				
		4.2.6	Training and Education	4-7				
		4.2.7	Village Sponsored Construction Projects	4-8				
		4.2.8	Partnerships	4-8				
		4.2.9	Recordkeeping, Reporting and Evaluation	4-8				
5.0	MCM	#5: P	OST-CONSTRUCTION					
	STORM WATER MANAGEMENT							
	5.1	Phase	II Program Requirements	5-1				
	5.2	Villag	e Phase II Plan Components	5-3				
		5.2.1	Storm Water Management and Erosion and					
			Sediment Control Local Law	5-3				
		5.2.2	Structural and Non-Structural Post-Construction					
			Storm Water Management Practices	5-4				
		5.2.3	SWPPP Review	5-4				
		5.2.4	MS4 SWPPP Acceptance Form	5-5				

		5.2.5	Post-Construction Storm Water Management	
			Practices Inventory	5-5
		5.2.6	Long-Term Operation and Maintenance	5-6
		5.2.7	Post-Construction Storm Water Management	
			Practices Inspections	5-7
		5.2.8	Partnerships	5-7
		5.2.9	Recordkeeping, Reporting and Evaluation	5-7
6.0	МСМ	#6: P0	OLLUTION PREVENTION/GOOD HOUSEKEEPING	
	FOR	MUNI	CIPAL OPERATIONS	6-1
	6.1	Phase	II Program Requirements	6-1
	6.2	Villag	e Phase II Plan Components	6-3
		6.2.1	Pollution Prevention and Good Housekeeping	
			Policies and Procedures	6-3
		6.2.2	Self-Assessment	6-4
		6.2.3	Employee Training	6-5
		6.2.4	Multi-Sector General Permit	6-6
		6.2.5	Partnerships	6-6
		6.2.6	Recordkeeping, Reporting and Evaluation	6-6
7.0	STOR	M WA	TER MANAGEMENT PROGRAM PLAN	
	SUPP	LEME	NTAL DOCUMENTS	7-1
8.0	REVI	SIONS	AND UPDATES	8-1

List of Appendices

AcronymsA
Storm Water Management Program Annual Report and Municipal Compliance Certification FormsB
Generic Municipal Organization ChartC
NYSDEC Storm Water Assessment and Design Modeling ToolsD

List of Supplemental Documents

Village of Ossining Initial Phase II Storm Water Management Program

NYSDEC SPDES General Permit for Stormwater Discharges from MS4s

NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity

CASQA Municipal Stormwater Program Effectiveness Assessment Guidance

Documentation of Public Outreach Efforts

Documentation of Public Comments

Storm Water Management Program Staff Development/Training Programs

Local Law-Illicit Discharges to Storm Sewers

Village Outfall Maps

Village MS4 System Maps

Village Storm Sewer Shed Maps

Village of Ossining Written Procedures for MCM 3: Illicit Discharge Detection and Elimination

CWP/USEPA Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessment

Outfall Reconnaissance Inventory Field Sheets

Local Law-Storm Water Management and Erosion and Sediment Control

Village of Ossining Written Procedures for MCMs 4 & 5: Construction Site Storm Water Runoff Control and Post-Construction Storm Water Management

Village of Ossining SWPPP Guidance Document for Construction Site Owners/Operators

Submitted/Approved Construction Site SWPPPs

SWPPP Review Letters

List of Supplemental Documents (continued)

Village Active Construction Sites Inventory

Post-Construction Storm Water Management Practices Inventory

Village Conducted Storm Water Compliance Construction Site Inspection Reports

New York State Construction Stormwater Inspection Manual

New York State Standards and Specifications for Erosion and Sediment Control

New York State Stormwater Management Design Manual

NYSDEC Municipal Pollution Prevention and Good Housekeeping Program Assistance

Operation and Maintenance Schedules

Village of Ossining Best Management Practices for Municipal Facilities and Operations

Pollution Prevention and Good Housekeeping Log Sheets

Documentation of Self-Assessments

APPENDIX A

ACRONYMS

APPENDIX B

STORM WATER MANAGEMENT PROGRAM ANNUAL REPORT AND MUNICIPAL COMPLIANCE CERTIFICATION FORMS

APPENDIX C

GENERIC MUNICIPAL ORGANIZATION CHART

APPENDIX D

NYSDEC STORM WATER ASSESSMENT AND DESIGN MODELING TOOLS

S.0 SUMMARY

This document presents the Village of Ossining (the Village) Storm Water Management Program (SWMP) Plan Supplements to the Village SWMP Plan document entitled *Initial Phase II Storm Water Management Program*. The *Initial Phase II Storm Water Management Program* was developed in 2003 in support of the Village's filing of a Notice of Intent (NOI) to be covered under the January 2003 New York State Department of Environmental Conservation (NYSDEC) State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Municipal Separate Storm Sewer Systems (MS4s) (GP-02-02). GP-02-02 was replaced with the May 2008 NYSDEC SPDES General Permit for Stormwater Discharges from MS4s (GP-0-08-002). GP-0-08-002 revised and increased the clarity of the NYSDEC's expectations of permitted MS4s.

The purpose of this SWMP Plan Supplements Document is to provide compliance with the requirements of GP-0-08-002. This will enable the Village to meet the following goals:

- Reduce the discharge of pollutants from the Village to the maximum extent practicable (MEP).
- Protect water quality.
- Satisfy the appropriate water quality requirements of the Environmental Conservation Law (ECL) and the Clean Water Act (CWA).

This SWMP Plan Supplements Document will assist the Village in interpreting, accessing, recording, reporting and implementing the many Village programs designed to reduce the impacts of storm water discharges on receiving waters. The SWMP Plan Supplements Document and associated materials provide resources to assist Village staff in complying with, locating and updating the various components of the Village SWMP and SWMP Plan.

This Summary provides an introduction to the relevant regulations and requirements of the Village's SWMP. Sections 1 through 6 address the requirements and components of each of the six minimum control measures (MCMs) as defined by GP-0-08-002. Within each section is a

discussion of the MCM requirements, a summary of the existing program and SWMP components.

The SWMP Supplemental Documents provided as appendices to this SWMP Plan Supplements Document or as separate standalone documents contain general and Villagespecific reference materials important to the overall understanding and compliance with the Phase II SWMP requirements, including: annual reporting; maps; storm water staff; ordinances; educational materials; recordkeeping/documentation; inspection forms/log sheets; procedures; technical guidance; and manuals.

S.1 Introduction

Polluted storm water runoff is a leading cause of water quality degradation throughout New York State. Storm water runoff is part of the natural hydrologic cycle, which can be significantly altered through urban development. Water quality is affected when human activities introduce pollutants to naturally clean storm water runoff. The sources of pollutants in storm water runoff can include urban streets, lawns, driveways, parking lots, gas stations, construction sites, marinas, trash, sand/salt, commercial areas, maintenance yards, and transportation activities.

Common pollutants in storm water runoff in New York include oil and grease from roadways, pesticides and fertilizers from lawns, pathogens from animal waste, sediment from construction sites, and carelessly discarded trash, such as cigarette butts, paper wrappers, and plastic bottles. These pollutants have impaired the waterways of New York State, thereby interfering with the habitat for fish, shellfish and other wildlife, and limiting the enjoyment of many of the other benefits that our water resources provide.

The aim of the Village's SWMP is to reduce these impacts of storm water runoff in order to improve water quality, enhance recreational enjoyment of waterways, and to make seafood safer to eat. This is done by controlling pollutants in storm water discharges within the Village's jurisdiction to the waters of the United States to the MEP. A number of federal and state regulations have helped to shape the Village SWMP and are described in more detail below.

S.2 Federal Storm Water Regulations

In 1972, Congress passed the Federal Water Pollution Control Act, also referred to as the Clean Water Act (CWA), establishing the regulations for the control of the discharge of pollutants to waters of the United States from a point source. The United States Environmental Protection Agency (USEPA) and authorized states are delegated under the CWA to issue National Pollutant Discharge Elimination System (NPDES) permits for the discharge of pollutants from a point source.

The Water Quality Act of 1987 amended the CWA to require implementation of a comprehensive program for addressing storm water discharges. This created the NPDES framework for regulating storm water discharges from municipal, construction and industrial sources. This two-phased NPDES Stormwater Program was established to specifically target discharges into surface waters. Phase I of the NPDES Stormwater Program promulgated in 1990 and regulates storm water discharges from medium and large MS4s and eleven categories of industrial activity, including construction activity disturbing five or more acres of land. Phase II of the NPDES Stormwater Program promulgated in 1999 and encompasses construction activity disturbing between one and five acres of land and the small MS4 communities. Under the CWA, the MS4 is not only limited to the system of underground conveyance pipes, but also includes roads, drainage systems, gutters and ditches.

S.3 New York State General Permit Requirements

The NYSDEC, as the Phase II NPDES permit issuing authority for New York State, issued the SPDES General Permit for Stormwater Discharges from MS4s (GP-02-02) in January 2003. The Village stated their intention to implement a SWMP in accordance with the requirements of GP-02-02 in their NOI. Under GP-02-02, the Village was required to fully

develop and implement its Phase II SWMP by January 2008. As required by GP-02-02, the Village Phase II SWMP addresses the following six MCMs:

- MCM #1: Public Education and Outreach
- MCM #2: Public Involvement/Participation
- MCM #3: Illicit Discharge Detection and Elimination (IDDE)
- MCM #4: Construction Site Storm Water Runoff Control
- MCM #5: Post-Construction Storm Water Management
- MCM #6: Pollution Prevention/Good Housekeeping for Municipal Operations

In May 2008, NYSDEC issued the 2-year GP-0-08-002 to replace the expired GP-02-02. Coverage for the Village, originally authorized under GP-02-02, was automatically continued when GP-0-08-002 was renewed. Under GP-0-08-002, the Village will continue to fully implement the Phase II SWMP that was developed over the previous 5 years. The SWMP Plan Supplements presented within this document are in accordance with the updated requirements of the May 2008 NYSDEC SPDES General Permit for Stormwater Discharges from MS4s (GP-0-08-002).

S.4 Village Initial Phase II Storm Water Management Program Document

In compliance with GP-02-02, the Village prepared the 2003 *Initial Phase II Storm Water Management Program* document to detail management practices, activities and other techniques the Village developed, planned and implemented to reduce storm water pollutant discharges from the MS4 to the MEP. The Village *Initial Phase II Storm Water Management Program* contains important information regarding the Village's storm water compliance efforts, including:

- Village NOI for coverage under the SPDES General Permit for Stormwater Discharges from MS4s
- Village setting Location, topography, soils, water resources, population, zoning, land use, and community resources

- Village storm sewer system Function, design, construction, and outfalls
- Discharges Typical wet-weather and dry-weather sources, water quality impacts, bacterial in storm water, nutrients, sediments, and other debris
- Activities, practices and measurable goals to reduce the discharge of pollutants for each of the required six MCMs
- Non-structural and structural practices to reduce the impacts of storm water
- Initial Phase II program requirements
- Implementation schedules
- Intermunicipal cooperation
- Monitoring, evaluations and recordkeeping
- Village Storm Water Management Program Annul Report (SWMPAR) and Municipal Compliance Certification (MCC) Forms For reporting years 1 through 5

S.5 Storm Water Management Program Responsibilities

The Village Engineer is designated as the Village Storm Water Management Officer (SMO). The SMO is responsible for delegating the responsibilities of the development, implementation and enforcement of the Village SWMP. Typically, the supervisor of a Village facility or operation will be responsible for implementing and monitoring the applicable elements of the SWMP to the particular activities being performed. The Generic SWMP Organization Chart in Appendix C will be updated as necessary.

Village employees will be encouraged to contribute ideas for operations and maintenance improvements on an ongoing basis. This means that teamwork and participation from various levels within the Village are essential. A team environment facilitates interaction of diverse perspectives, creative problem solving, innovative thinking and a supportive atmosphere.

S.6 Revised Storm Water Management Program Requirements

The basic structure and content of the GP-0-08-002 requirements are similar to the federal permit requirements that apply to other MS4s nationwide under the USEPA CWA. Revisions to GP-0-08-002, as compared to GP-02-02, include additions and clarifications for the SWMP, including the updates contained within this SWMP Plan Supplements Document in addition to annual reporting requirements, SWMP evaluation requirements, third party certifications, and impaired water bodies requirements. GP-0-08-002 also contains additions, clarifications and reporting requirements for each of the six MCMs listed above, which are further discussed in Sections 1 through 6 of this SWMP Plan Supplements Document.

S.6.1 <u>Annual Reporting</u>

The SWMPAR is a summary of the storm water related activities performed throughout the reporting period within the Village's jurisdiction. The SWMPARs for the 2004 through the 2008 reporting periods can be found in the Village SWMP files and/or in Section 7.0 of the Village *Initial Phase II Storm Water Management Program*. The SWMPARs submitted after the 2008 reporting year can be located in the Village SWMP files/storm water information repository and/or Appendix B of this SWMP Plan Supplements Document.

The annual reporting period for the SWMP will continue to run from March 10th through March 9th of each year. Beginning with the SWMPAR and MCC due in 2009, the Village will submit, as necessary, the following information:

- Compliance with permit conditions
- Results of information collected and analyzed
- Evaluation of SWMP effectiveness
- Planned storm water activities
- Coordinated efforts
- Summary of the public comments received on the SWMP and intended responses

- Information specified for each MCM
- Any changes made to the SWMP

The Village will submit the SWMPAR to NYSDEC no later than June 1 of each reporting year, as a failure to submit the SWMPAR and MCC form will constitute a permit violation. The Village MCC form will be signed by either a principal/chief executive officer, ranking elected official, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

- Authorization is made in writing by a principal/chief executive officer, ranking elected official;
- The authorization is submitted to NYSDEC; and
- The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity (e.g. superintendent) or an individual or position having overall responsibility for environmental matters.

S.6.2 Storm Water Management Program Evaluation

NYSDEC requires the Village to conduct an annual effectiveness evaluation of its program compliance, the appropriateness of its identified best management practices (BMPs), and progress towards achieving its identified measurable goals, which will include reducing the discharge of pollutants to the MEP. The Village will collect and report on the specific information on each of the six MCMs discussed in Sections 1 through 6. NYSDEC encourages the Village to collect additional information that will help evaluate the effectiveness of each component of the SWMP.

Effectiveness evaluation is a fundamental component for developing and implementing a successful SWMP. Collection of information over time will facilitate the evaluation of the SWMP by allowing the examination of trends in the information collected. A well developed and executed evaluation can provide the Village with information on whether the SWMP is

achieving the intended outcomes. The Village will revise the SWMP if the annual evaluation shows that the SWMP is not reducing discharges to the MEP.

As applicable, the Village will refer to the NYSDEC-endorsed guidance document published by the California Stormwater Quality Association (CASQA) entitled *Municipal Stormwater Program Effectiveness Assessment Guidance*. The Village will use this guidance document to assist in conducting program effectiveness evaluations. This guidance document uses a range of assessment methods and describes how to use these methods based on program specific desired outcomes and goals.

S.6.3 Third Party Certifications

NYSDEC requires the Village to obtain a third party certification statement if it relies upon any third party entity to develop or implement any portion of its SWMP. Third party entities would include a non-government, commercial entity that receives payment from the Village for services provided. The following is a list of example services that the Village may contract that would require a third party certification statement:

- Creation of SWMP policies or procedures
- Illicit discharge identification and track down
- Road maintenance
- Snow removal
- Storm sewer system cleaning
- Street sweeping

The Village will, through a signed certification statement, contract or agreement, provide adequate assurance that the third parties comply with the storm water permit requirements applicable to the work performed by the third party. The certification statement, contract or other agreement will include:

- Adequate assurance that the third party will comply with the permit requirements
- Identification of the activities that the third party entity will be responsible for
- Name and title of the person providing the signature
- Name, address and telephone number of the third party entity
- Description of the location of the work performed
- Date the certification statement, contract or other agreement is signed

The following is the example language for the third party certification statement that is provided by NYSDEC in GP-0-08-002:

"I certify under penalty of law that I understand and agree to comply with the terms and conditions of the Village of Ossining storm water management program and agree to implement any corrective actions identified by the Village of Ossining or a representative. I also understand that the Village of Ossining must comply with the terms and conditions of the New York State Pollutant Discharge Elimination System general permit for storm water discharges from the municipal separate storm sewer systems and that it is unlawful for any person to directly or indirectly cause or contribute to a violation of water quality standards. Further, I understand that any noncompliance by the Village of Ossining will not diminish, eliminate, or lessen my own liability."

S.6.4 Impaired Water Bodies

The NYSDEC Section 303(d) List of Impaired/TMDL Waters identifies those waters that do not support appropriate uses and that may require the development of a Total Maximum Daily Load (TMDL) or other restoration strategy. Storm water is one of a number of sources of pollutants that can result in the impairment of surface water bodies. Appendix 2 of GP-0-08-002 lists those stream segments in New York State that are 303(d) listed water bodies as a result of pollutants in storm water runoff and that fall under the Phase II MS4 storm water requirements. The Village does not discharge to any of these water bodies.

If a TMDL is approved in the future by the USEPA for any water body or watershed into which the Village discharges, the Village will review the applicable TMDL to see if it includes requirements for control of storm water discharges. The Village will then modify the SWMP to ensure that the reduction of the pollutant of concern (POC) specified in the TMDL is achieved. Modifications will be considered for each of the six MCMs. The Village will then assess their progress and evaluate the effectiveness of the SWMP in ensuring no net increased discharge of the POC to the impaired water body. This assessment will be conducted for only the portions of the Village discharging to the impaired water body. The NYSDEC has provided guidance for the Village to use during the modeling of pollutant loading, *Storm Water Assessment and Design Modeling Tools* (see Appendix D). If the modeling shows increases in loading of the POC, the Village will modify and update the SWMP to reduce the pollutant loading to meet the no net increase requirements of the TMDL.

1.0 MCM #1: PUBLIC EDUCATION AND OUTREACH

1.1 Phase II Program Requirements

Public Education and Outreach is the first of six MCMs that the Village is required to include in its SWMP to meet the conditions of GP-0-08-002. An informed and knowledgeable community is vital to the success of a SWMP. As the public learns of the collective and individual efforts that can be implemented to protect and improve local water bodies, momentum for greater support and compliance can be achieved.

An informed public means greater support for the SWMP and greater understanding of the reasons why storm water pollution prevention is necessary and important. The public is more likely to comply with the SWMP as they become aware of the personal responsibilities expected of the community, including the individual actions residents and businesses can take to protect or improve water quality.

GP-0-08-002 (Part VII.A.1.) requires the Village to perform the following minimum measures:

- Develop and implement an ongoing public education and outreach program designed to describe to Village employees, businesses, the general public and target audiences the sources of storm water pollution, impacts of storm water discharges, and steps the public can take to reduce pollutants in storm water runoff and non-storm water discharges to ensure the reduction of POCs in storm water discharges to the MEP.
- Record, periodically assess and modify as necessary the Village's Public Education and Outreach activities.
- Describe in the SWMPAR the following information:
 - The types of Public Education and Outreach Activities performed during the reporting period.
 - The specific audiences targeted during the reporting period.
 - Any results of the Public Education and Outreach program (for example, number of people attended, amount of materials distributed, etc.).

- The effectiveness of program, BMP and measurable goal assessment.

1.2 Village Phase II Plan Components

Due to the approach of the Phase II storm water requirements, the Village has a great deal of flexibility in choosing exactly how to satisfy the MCM #1: Public Education and Outreach program. The Village's approach to this MCM under GP-0-08-002 will be to build on and expand the established and ongoing SWMP activities and BMPs. This will be the most cost-effective means for the Village to continue to work towards reducing water quality impacts from storm water runoff within the Village's jurisdiction.

1.2.1 Public Education and Outreach Topics

The Village's Public Education and Outreach program will continue to be tailored to describe topics related the impacts of storm water discharges on local water bodies, pollutants of concern and their sources, and the steps that can be taken to reduce pollutants in storm water runoff and non-storm water discharges. The storm water topics incorporated into the Village's Public Education and Outreach program will continue to include, but will not be limited to:

- General storm water management information
- Pesticide and fertilizer application
- Pet waste management
- Recycling
- Trash management
- Yard waste management
- Vehicle washing
- Vehicle maintenance
- Water conservation
- Household hazardous waste disposal

- IDDE
- Septic system maintenance
- Construction sites
- Infrastructure maintenance
- Winter road maintenance
- Green infrastructure
- Low impact development
- Riparian corridor protection and restoration
- Wetland protection

1.2.2 Public Education and Outreach Strategies

The Village will continue to utilize and build upon the various measurable goals, activities and techniques that are described in detail in the Village's NOI, *Initial Phase II Storm Water Management Program* document and SWMPARs for reporting years 1 through 5. These activities and techniques encourage the general public, residents and businesses to utilize storm water management practices that will reduce pollutants in storm water runoff and non-storm water discharges. As applicable, the Village will also utilize and incorporate storm water educational information provided by the USEPA, NYSDEC, Westchester County, or regional environmental, public interest, or trade organizations into the Village's Public Education and Outreach program.

The measurable goals, activities and techniques encompassing the Village's Public Education and Outreach program will continue to include, but will not be limited to:

- Village storm water information repository
- Village web page
- Direct mailings

- Posted signs
- Storm water kiosks with printed materials
- E-mail list-serves
- Public events
- TV programs

The Village will document the public outreach efforts implemented in the Village SWMP files/storm water information repository as necessary.

1.2.3 Partnership

A key element in the Village's Public Education and Outreach program is the existing partnership with Westchester County. The Village plans to continue its partnership with Westchester County, which creates, supplies and updates storm water public education and outreach materials to the general public, residents and businesses.

As necessary, the Village will search out additional potential partnerships with governmental entities, academic groups, conservation committees, environmental organizations, civic groups, industrial/commercial agencies, or others who can develop storm water pollution prevention educational materials and perform outreach activities to Village residents and businesses.

1.2.4 <u>Recordkeeping, Reporting and Evaluation</u>

Each of the measurable goals, activities and techniques for the Village's Public Education and Outreach program has or will have a mechanism in place to track and maintain records. To facilitate annual reporting, copies of printed materials, logs sheets, web pages, etc. will be filed with the Village SWMP files as applicable. The Village will continue to evaluate and report on the existing Public Education and Outreach program on an annual basis in the SWMPAR to determine if the SWMP requires revision. As applicable, the Village will refer to the NYSDEC-endorsed *CASQA Municipal Stormwater Program Effectiveness Assessment Guidance* document. Recommended revisions will be adopted and implemented as appropriate and consistent with Village resources and priorities.

2.0 MCM #2: PUBLIC INVOLVEMENT/PARTICIPATION

2.1 Phase II Program Requirements

Public Involvement/Participation is the second of six MCMs that the Village is required to include in its SWMP to meet the conditions of GP-0-08-002. Residents and businesses that are given the opportunity to participate in the development and decision making processes of the SWMP are more likely to take an active role in storm water pollution prevention activities.

The Village recognizes that the public is a valuable intellectual source of input and assistance for the SWMP. An involved community provides broader public support and wide-ranging base of expertise and economic benefits. The community can also be a good reference and contact to develop relationships other regional, state and federal environmental programs.

GP-0-08-002 (Part VII.A.2.) requires the Village to perform the following minimum measures:

- Develop and implement a Public Involvement/Participation program that provides SWMP access and stewardship activities for key individuals and groups who are interested in or affected by the SWMP to ensure the reduction of POCs in storm water discharges to the MEP.
- Seek specific types of input from key individuals and groups to support the development and implementation of the SWMP.
- Identify a local storm water public contact.
- Present the draft SWMPAR before June 1 of each year in a format that is open to the public and where the public can ask questions about and make comments on the draft SWMPAR. This can be done at a public meeting or on the internet. If the draft SWMPAR is presented on the internet and a public meeting is requested by two or more persons, the Village is required to hold a public meeting only once per year.
- Provide a public notice regarding the draft SWMPAR presentation in accordance with the State Open Meetings Law or other local public notice requirements. GP-0-08-002 does not require a specified time frame for public comments.

- Make the final SWMPARs, the Village *Initial Phase II Storm Water Management Program* document, and this SWMP Plan Supplements Document and related documentation available for public inspection and review.
- Record, periodically assess and modify as necessary the Village's Public Involvement/Participation activities
- Describe in the SWMPAR the following information:
 - The types of Public Involvement/Participation opportunities provided during the reporting period.
 - Any results of the Public Involvement/Participation program (for example number of people participating in events, the number of calls to a water quality hotline, etc.).
 - Draft SWMPAR presentation information including the date, time, number of attendees, and how the draft SWMPAR was made available for comment.
 - A summary of public comments, intended responses and changes made to the SWMP.
 - The effectiveness of program, BMP and measurable goal assessment.

2.2 Village Phase II Plan Components

The Village's approach to MCM #2: Public Involvement/Participation program under GP-0-08-002 will be to build on and expand the established and ongoing SWMP measurable goals, activities and BMPs, which are described in detail in the Village's NOI, *Initial Phase II Storm Water Management Program* document and SWMPARs. Building upon the existing SWMP is an efficient process that will allow the Village to continue to work towards reducing water quality impacts from storm water runoff within the Village's jurisdiction while minimizing costs.

2.2.1 <u>Public Involvement/Participation Opportunities</u>

The Village's Public Involvement/Participation program incorporates stewardship activities that help to reduce POCs from storm water discharges to the MEP. The storm water

public involvement and participation opportunities comprising the Village's SWMP will continue to include, but will not be limited to:

- Cleanup events
- Storm water hotlines
- Environmental Advisory Council

These activities and techniques encourage the general public, residents and businesses to become involved in storm water management and environmental stewardship events that will help to reduce pollutants in storm water runoff and non-storm water discharges.

2.2.2 Local Storm Water Public Contact

Acknowledging that there will be public interest regarding the SWMP implementation and compliance, the Village designated the Village Planner as the Village's local storm water public contact. Village residents and businesses can direct questions concerning the SWMP and other storm water related issues to the Village Planner. Any changes to the Village local storm water public contact will be announced as necessary.

2.2.3 Public Presentation and Availability of Documentation

To fulfill the public presentation requirements of GP-0-08-002, the Village will conduct a review of the Village's SWMP in April and May of each year in order to prepare a draft SWMPAR for public review. The draft SWMPAR and attachments will be prepared on the forms required and provided by NYSDEC. The draft SWMPAR will then be posted on the Village website and available at the Department of Planning before June 1st of each year in a format that is accessible to Village residents and businesses. The Village will comply with the requirement to hold an open public meeting if it is requested by two or more persons in the Village. If requested, the Village will hold a storm water public meeting no more than once per year.

The Village public will be provided the opportunity to ask questions about and make comments on the draft SWMPAR for a period after it is posted for public review or the public meeting is held. The Village will accept comments submitted to the local storm water public contact over the phone, in writing or via email. The Village will document public comments received on the SWMP and SWMPAR in Village SWMP files/storm water information repository as necessary. Public comments will be evaluated and incorporated into the Village SWMP as appropriate. Comments received after the final SWMPAR is submitted to NYSDEC will be taken into account and reported in the following year's SWMPAR.

To solicit public input on the SWMP and SWMPAR, the Village will make the following documentation available for public inspection and review at the Village storm water information repository:

- SWMP Plan Supplements Document
- Village Initial Phase II Storm Water Management Program document
- Draft SWMPAR before June 1st of each year
- Final SWMPARs (Appendix B)
- Applicable local laws
- Inter-municipal agreements and other legal authorities
- Organization chart (Appendix C)
- Staff development programs
- Policy, procedures, and materials for each minimum measure
- Outfall and MS4 system maps
- Storm water management practice selection and measurable goals
- Operation and maintenance schedules
- Documentation of public outreach efforts
- Documentation of public comments

• Submitted construction site Storm Water Pollution Prevention Plans (SWPPPs) and review letters and construction site inspection reports

In accordance with the minimum requirements of GP-0-08-002, the Village will provide public notice regarding the annual draft SWMPAR presentation in accordance with the State Open Meetings Law and local public notice requirements. The public notice will contain the following information:

- The webpage URL of the draft SWMPAR.
- The opportunity for public comment.
- The date the draft SWMPAR will be available on the internet.
- The duration of availability of the draft SWMPAR on the internet.

If a public meeting is requested and is scheduled to be held, the Village will include the following information in the public notice:

- The placement of the draft SWMPAR on the agenda of the public meeting.
- The opportunity for public comment.
- The date and time of the public meeting.
- The availability of the draft SWMAPR for prior review prior to the public meeting.

2.2.4 Partnership

As with the Village Public Education and Outreach program, a key element in the Public Involvement/Participation program is the existing partnership with Westchester County. The Village plans to continue its partnership with Westchester County, which includes members of the public in the development and implementation of the SWMP by reaching out to professionals in trades related to storm water, members of the general public, and voters to improve water quality.

As necessary, the Village will search out additional potential partnerships with governmental entities, academic groups, conservation committees, environmental organizations, civic groups, industrial/commercial agencies, or others that provide environmental stewardship activities targeted towards surface water quality improvements. The Village will encourage public participation in these environmental stewardship events hosted by other organizations through the dissemination of information regarding the events as appropriate.

2.2.5 <u>Recordkeeping, Reporting and Evaluation</u>

Each of the measurable goals, activities and techniques for the Village's Public Involvement/Participation program has or will have a mechanism in place to track and maintain records. To facilitate annual reporting, copies of logs sheets, volunteer monitoring, etc. will be filed with the Village SWMP files as applicable.

The Village will continue to evaluate and report on the existing Public Involvement/Participation program on an annual basis in the SWMPAR to determine if the SWMP requires revision. As necessary, the Village will refer to the NYSDEC-endorsed *CASQA Municipal Stormwater Program Effectiveness Assessment Guidance* document. Recommended revisions will be adopted and implemented as appropriate and consistent with Village resources and priorities.

3.0 MCM #3: ILLICIT DISCHARGE DETECTION AND ELIMINATION

3.1 Phase II Program Requirements

Illicit Discharge Detection and Elimination (IDDE) is the third of six MCMs that the Village is required to include in its SWMP to meet the conditions of GP-0-08-002. NYSDEC regulations define an "illicit discharge" as any discharge to the MS4 that is not entirely composed of storm water with some exceptions. These exceptions are identified in GP-0-08-002 and include discharges from landscape irrigation, residential car washing, and fire-fighting activities. Examples of prohibited illicit discharges include sanitary sewage, garage drain effluent, and waste motor oil. However, an illicit discharge could be any other non-permitted discharge which the Village or NYSDEC has determined to be a substantial contributor of pollutants to the storm sewer system and surface waters.

Illicit discharges are considered "illicit" because the storm sewer system is not designed to accept, process, or treat anything but clean storm water runoff. The result of illicit discharges is untreated contaminated flow directly entering surface waters. Illicit discharges contribute high levels of pollutants, including heavy metals, toxics, oil and grease, solvents, nutrients, viruses, and bacteria to receiving water bodies. Pollutant levels from these illicit discharges can be high enough to considerably impair receiving water quality and threaten aquatic, wildlife, and human health.

Recognizing the adverse effects illicit discharges can have on receiving waters, GP-0-08-002 (Part VII.A.3.) requires the Village to perform the following minimum measures:

- Develop, implement and enforce a program to detect and eliminate illicit discharges into the MS4.
- Develop and maintain a map showing the location of outfalls and surface waters of the State that receive discharges from those outfalls.
- Develop and maintain a map of the preliminary boundaries of the Village's storm sewer sheds by March 9, 2010.

- Field verify outfall locations.
- Conduct an outfall reconnaissance inventory (ORI), as described in the Center for Watershed Protection (CWP) and the USEPA publication entitled *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessment.* The ORI must address every outfall within the Village's jurisdiction at least once every five years. Reasonable progress towards completing the ORI is expected in each year.
- Continue to prohibit, through the Village code, illicit discharges into the MS4 and implement appropriate enforcement procedures and actions.
- Certify, through the Village attorney, that the Village Illicit Discharges to Storm Sewers Local Law effectively assures implementation of the State's model IDDE law.
- Develop and implement a program to detect and address non-storm water discharges, including illegal dumping, to the Village's MS4, which includes procedures for:
 - Identifying priority areas of concern.
 - Identifying and locating illicit discharges.
 - Eliminating illicit discharges.
 - Documenting actions.
- Record, periodically assess and modify as necessary the Village's IDDE activities.
- Describe in the SWMPAR the following information:
 - Number and percent of outfalls mapped.
 - Number of illicit discharges detected and eliminated.
 - Percent of outfalls for which an ORI has been performed.
 - Status of system mapping.
 - Activities in and results from informing Village employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste.
 - Certification that the Village Illicit Discharges to Storm Sewers Local Law is equivalent to the State's model IDDE law.
 - The effectiveness of program, BMP and measurable goal assessment.

3.2 Village Phase II Plan Components

The Village's approach to MCM #3: IDDE program under GP-0-08-002 will be to build on and expand the established and ongoing SWMP measurable goals, activities and BMPs, which are described in detail in the Village's NOI, *Initial Phase II Storm Water Management Program* document and SWMPARs. Building upon the existing SWMP is an efficient process that will allow the Village to continue to work towards reducing water quality impacts from storm water runoff within the Village's jurisdiction while minimizing costs.

3.2.1 IDDE Written Procedures

The aim of the Village's IDDE program is to improve surface water quality by identifying, eliminating, reducing and preventing the discharge of pollutants throughout the Village. The Village has prepared the *Written Procedures for MCM 3: IDDE* document, which was developed in an effort to make identifying problem areas and illicit discharge identification, inspection, elimination, enforcement, penalization and recordkeeping processes more effective and efficient. The *Written Procedures for MCM 3: IDDE* document is intended to assist Village employees in providing thorough and systematic processes that will improve storm water pollution prevention.

Detecting and eliminating illicit discharges are complex tasks. Given the variable nature of illicit discharges and connections, it is difficult to establish rigid procedures to proactively correct all of them. There is no single approach to take, but rather a variety of ways to get from detection to elimination. The Village will follow the procedures for illicit discharge detection and elimination described in the Village's *Written Procedures for MCM 3: IDDE* document and the CWP/USEPA *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessment.*

As necessary, the Village will proactively target land uses or sewer sheds that have a high potential for illicit discharges. These land uses or sewer sheds may include, but are not limited to auto recyclers, building maintenance, churches, commercial carwashes, commercial laundry/dry cleaners, construction vehicle washouts, cross-connections, distribution centers, food processing facilities, garbage truck washouts, hospitals, landscaping (irrigation), marinas, outdoor fluid storage, parking lot maintenance, printing, residential car washing, restaurants, schools, septic maintenance, swimming pools, vehicle fueling, and vehicle maintenance/repair shops.

3.2.2 Mapping

The Village will continue to maintain its map showing the location of outfalls and the names and location of waters of the United States that receive discharges from those outfalls. In addition, the Village will complete the preliminary boundaries of the Village's storm sewer shed map by March 9, 2010. Mapping efforts will include the review of exiting documents, maps and guidance from NYSDEC to delineate the boundaries of the storm sewer shed. The Village will store the outfall, MS4 and storm sewer shed maps with the Village SWMP files/storm water information repository as necessary.

Outfalls will be field verified as necessary. According to NYSDEC, an "outfall" is defined as any point where a MS4 discharges to either surface waters of the State or to another MS4. Outfalls include discharges from pipes, ditches, swales, and other points of concentrated flow. However, areas of non-concentrated (sheet) flow which drain to surface waters of the State or to another MS4 are not considered outfalls under the NYSDEC definition.

3.2.3 Outfall Reconnaissance Inventory

Dry weather discharges can be a significant contributor of pollutants to illicit discharges. Long-term, regular inspection of outfalls will be a primary part of the Village's IDDE program. The Village is required under GP-0-08-002 to conduct an ORI that addresses every outfall within the Village's jurisdiction at least once every five years. ORI is a field screening technique designed to inventory and measure storm drain outfalls and find and correct continuous and intermittent discharges without an in-depth laboratory analysis. The Village will follow the procedures for the ORI described in the Village's *Written Procedures for MCM 3: IDDE*
document, the CWP/USEPA Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessment, and using the NYSDEC definition of an outfall.

3.2.4 Illicit Discharges to Storm Sewers Local Law

The Village has adopted the Illicit Discharges to Storm Sewers Local Law to prohibit polluted storm water discharges from entering the Village's storm drain system, watercourses, outlets or channels. This law provides the Village with the authority to make inspections to enforce the provisions of the law. The Village attorney has certified that the Village Illicit Discharges to Storm Sewers Local Law is effectively assuring implementation of the State's model IDDE law.

If the Village uncovers a violation, the Village will attempt to resolve the problem with the least intrusive method and at the lowest public expense possible. Enforcement will be consistent with existing Village laws, codes and/or policies as well with new laws, codes and/or policies that are developed. The escalation enforcement approach as defined the Village Illicit Discharges to Storm Sewers Local Law will be followed. Voluntary compliance will be considered for first-time, minor offenders. More serious violations or continued non-compliance may warrant a more aggressive, enforcement-oriented approach. Cases may be referred to the County, NYSDEC or the USEPA as deemed appropriate by the Village.

The Village will employ a combination of structural, educational and enforcement methods for removing illicit discharges as necessary. In addition, the Village will follow the sequential process for eliminating illicit discharges presented in the CWP/USEPA *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessment*, which focuses on identifying responsible parties and enforcement procedures. The ultimate responsibility for removing the source of a discharge will generally be that of either the property owner of the Village/utility (e.g., primary owner/operator of the MS4).

3.2.5 Education and Training

Information on the Village's IDDE program, including this SWMP Plan Supplements Document and associated materials, will be made available to Village staff, including personnel responsible for in-house and contracted services. The Village SWMP will include a staff training component regarding ways to detect and eliminate illicit discharges. It is important that Village employees lead by example with regard to the IDDE program. Information on staff development and training programs will be updated, revised and filed in the Village SWMP files/storm water information repository as necessary.

3.2.6 Partnerships

As necessary, the Village will search out potential partnerships with governmental entities, academic groups, conservation committees, environmental organizations, civic groups, industrial/commercial agencies, or others that provide IDDE support.

3.2.7 <u>Recordkeeping, Reporting and Evaluation</u>

Each of the measurable goals, activities and techniques for the Village's IDDE program has or will have a mechanism in place to track and maintain records. To facilitate annual reporting, copies of inspection forms, field sheets, logs sheets, etc. will be filed with the Village SWMP files as applicable.

The Village will continue to evaluate and report on the existing IDDE program on an annual basis in the SWMPAR to determine if the SWMP requires revision. As necessary, the Village will refer to the NYSDEC-endorsed *CASQA Municipal Stormwater Program Effectiveness Assessment Guidance* document. Recommended revisions will be adopted and implemented as appropriate and consistent with Village resources and priorities.

4.0 MCM #4: CONSTRUCTION SITE STORM WATER RUNOFF CONTROL

4.1 Phase II Program Requirements

Construction Site Storm Water Runoff Control is the fourth of six MCMs that the Village is required to include in its SWMP to meet the conditions of GP-0-08-002. Polluted storm water runoff from construction sites is a noteworthy cause of water quality degradation throughout New York State. Pollutants commonly discharged from construction sites include sediment, solid and sanitary wastes, phosphorous (fertilizer), nitrogen (fertilizer), pesticides, oil and grease, concrete truck washout, construction chemicals, and construction debris.

Of these pollutants, sediment is usually the main pollutant of concern. Sediment runoff rates from active construction sites are typically 1,000 to 2,000 times greater than those of undisturbed forested lands. During a short period of time, construction sites can contribute more sediment to streams than can be deposited naturally during several decades. The resulting siltation, and the contribution of other pollutants from construction sites, has resulted in fish and wildlife habitat degradation, costly dredging projects, and limited enjoyment of the many recreational, aesthetic and economic benefits that water resources provide.

GP-0-08-002 (Part VII.A.4.) and Village Law require the Village to perform the following minimum measures:

- Develop, implement, and enforce a program that provides equivalent protection to the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-08-001 or as updated).
- Continue to require, through the Village code, the preparation of SWPPPs for each applicable land disturbing activity.
- Document the equivalence of the Village Storm Water Management and Erosion and Sediment Control Local Law to one of the versions of the NYSDEC Sample Local Laws for Stormwater Management and Erosion and Sediment Control.
- Describe procedures for:

- SWPPP review to ensure consistency with State and local sediment and erosion control requirements.
- Receipt and follow up on complaints or other information submitted by the public regarding construction site storm water runoff.
- Construction site storm water compliance inspections and enforcement of erosion and sediment control measures.
- Review all required SWPPPs for construction sites.
 - Ensure that the individuals performing SWPPP reviews on behalf of the Village are adequately trained.
- Utilize the "SWPPP Acceptance Form" created by NYSDEC when notifying construction site owners/operators that their SWPPP has been accepted and approved by the Village.
- Inspect all construction sites where a SWPPP has been created.
 - Ensure that the individuals performing the construction site storm water compliance inspections on behalf of the Village are adequately trained.
- Educate construction site owners/operators, design engineers, Village staff and other individuals to whom the Construction Site Storm Water Runoff Control regulations apply.
- Ensure that construction site operators have received erosion and sediment control training before they do work within the Village's jurisdiction.
- Establish and maintain an inventory of active construction sites, including the location of the site and owner/operator contact information.
- Record, periodically assess and modify as necessary the Village's Construction Site Storm Water Runoff Control activities.
- Describe in the SWMPAR the following information:
 - Number of SWPPPs reviewed.
 - Number and type of enforcement actions.
 - Percent of active construction sites inspected once.
 - Percent of active construction sites inspected more than once.
 - Number of construction sites authorized for disturbances of one acre or more.

- The effectiveness of program, BMP and measurable goal assessment.

4.2 Village Phase II Plan Components

The Village's approach to MCM #4: Construction Site Storm Water Runoff Control program under GP-0-08-002 will be to build on and expand the established and ongoing SWMP measurable goals, activities and BMPs, which are described in detail in the Village's NOI, *Initial Phase II Storm Water Management Program* document and SWMPARs. Building upon the existing SWMP is an efficient process that will allow the Village to continue to work towards reducing water quality impacts from storm water runoff within the Village's jurisdiction while minimizing costs.

The Village's Construction Site Storm Water Runoff Control program addresses storm water runoff from regulated construction activities. The aim of this program is to contribute to the improvement of surface water quality by reducing and preventing the contamination of storm water at its source at the construction site, before it has the opportunity to pollute the runoff flow and affect water quality. The Village's Construction Site Storm Water Runoff Control program will provide equivalent protection to the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-08-001 or as updated), unless more stringent requirements are contained within GP-0-08-002.

4.2.1 Storm Water Management and Erosion and Sediment Control Local Law

The Village has adopted the Storm Water Management and Erosion and Sediment Control Local Law, which provides the Village with the authority to require owners/operators of construction sites within the Village's jurisdiction to submit a SWPPP for review and approval by the Village. The Village has documented the equivalence of the Village Storm Water Management and Erosion and Sediment Control Local Law to one of the versions of the NYSDEC Sample Local Laws for Stormwater Management and Erosion and Sediment Control. The Storm Water Management and Erosion and Sediment Control Local Law also provides the Village the authority to make inspections to enforce the provisions of the law. If the Village uncovers a violation, the Village will attempt to resolve the problem with the least intrusive method and at the lowest public expense possible. Any enforcement action will be consistent with existing Village laws, codes and/or policies as well with new laws, codes and/or policies that are developed.

The escalation enforcement approach as defined the Village Storm Water Management and Erosion and Sediment Control Local Law will be followed. The Village will attempt to negotiate a reasonable amount of time for the responsible party to correct the violation. Voluntary compliance will be considered for first-time, minor offenders. More serious violations or continued non-compliance may warrant a more aggressive, enforcement-oriented approach. Cases may be referred to the County, NYSDEC or the USEPA as deemed appropriate by the Village. The Village will employ a combination of non-monetary penalties (e.g., stop work orders), fines, imprisonment, and/or permit denials for non-compliance as necessary. Enforcement actions may include notices of violation, stop work orders, criminal actions, termination of contracts, administrative fines, civil penalties or administrative orders.

4.2.2 Written Procedures

The Village has prepared the Written Procedures for MCMs 4&5: Construction Site Storm Water Runoff Control and Post-Construction Storm Water Management document, which was developed as a tool for the Village to use during SWPPP reviews, construction site inspections, receipt of and response to public comments/complaints, and the enforcement and penalization of violators. The Written Procedures for MCMs 4&5: Construction Site Storm Water Runoff Control and Post-Construction Storm Water Management document is intended to assist Village employees in providing thorough and systematic processes that will improve storm water pollution prevention control measures during and after construction activities.

4.2.3 <u>SWPPP Review</u>

The Village will review SWPPPs for applicable construction projects as they are submitted. The main objective of the SWPPP review is to verify that the applicant has a plan that incorporates consideration of potential water quality impacts and is consistent with New York State and local erosion and sediment control requirements. The preferred approach for the Village is to integrate submission and review of SWPPPs into existing local land use/building permitting processes (e.g., site plan review). The Village will use the step-by-step procedure for SWPPP review described in the Village's *Written Procedures for MCMs* 4&5: Construction Site Storm Water Runoff Control and Post-Construction Storm Water Management document.

The Village will delegate responsibilities of the SWPPP review process to qualified individuals. The Village will ensure that the individuals performing SWPPP reviews on behalf of the Village are adequately trained and understand the most recent and applicable New York State and local storm water requirements. Information on staff development and training programs will be updated, revised and filed in the Village SWMP files/storm water information repository as necessary.

For submitted SWPPPs that only require the erosion and sediment control component, the individual conducting the SWPPP review for the Village will be knowledgeable in the principles and practices of erosion and sediment control. Refer to GP-0-08-001 or as updated for the required SWPPP components according to project type.

4.2.4 MS4 SWPPP Acceptance Form

The Village will issue the project applicant a completed MS4 SWPPP Acceptance Form once the applicant adequately addresses the Village's comments generated from the SWPPP review process and the Village deems the SWPPP acceptable. The MS4 SWPPP Acceptance Form has been provided by NYSDEC for use by the Village. One approved copy of the SWPPP will be returned to the applicant along with the completed MS4 SWPPP Acceptance Form. A second copy of both documents will be filed at the Village. Once the SWPPP is approved and the MS4 SWPPP Acceptance Form is submitted, the Village will add the project to its Active Construction Sites Inventory, which will include information on the project such as the location of the site and owner/operator contact information. The Village will maintain and update the Active Construction Sites Inventory as necessary.

4.2.5 Construction Site Storm Water Compliance Inspections

GP-0-08-002 and Village Law require the Village to conduct construction site storm water compliance inspections for all construction sites where a SWPPP has been created. The purpose of the Village compliance inspection program is to reduce the discharge of pollutants from construction sites into the MS4 and surface waters during regulated soil disturbing activities. Village-conducted construction site storm water compliance inspections include both erosion and sediment compliance measures and post-construction site storm water management practices. The Village will follow the procedures for construction site storm water compliance inspection management practices with the New York State Construction Stormwater Inspection Manual and the Village's Written Procedures for MCMs 4&5: Construction Site Storm Water Runoff Control and Post-Construction Storm Water Management document.

The Village will delegate responsibilities of the construction site storm water compliance inspections to qualified individuals who are adequately trained and understand the most recent and applicable New York State and local storm water requirements. An adequately trained inspector is a person that is licensed or certified in the principles and practices of storm water management and treatment, such as a licensed Professional Engineer (PE), Certified Professional in Erosion and Sediment Control (CPESC), Landscape Architect (LA) or an individual that has received erosion and sediment control inspector training by a NYSDEC sponsored or approved training course. Information on staff development and training programs will be updated, revised and filed in the Village SWMP files/storm water information repository as necessary. Inspectors working on behalf of the Village will use the *New York State Construction Stormwater Inspection Manual* while conducting the construction site storm water compliance inspections.

4.2.6 Training and Education

Information on the Village's Construction Site Storm Water Runoff Control program, including this SWMP Plan Supplements Document, submitted SWPPPs and associated materials, will be made available, as necessary, to construction site owners/operators, design engineers, Village staff, the public, regulators, and other individuals to whom the Construction Site Storm Water Runoff Control regulations apply. The Village has prepared the *SWPPP Guidance Document for Construction Site Owners/Operators*, which was developed as a tool and basic guide for construction projects within the Village's jurisdiction. The *SWPPP Guidance Document for Construction Site Owners/Operators* includes educational/training information about the Village's construction storm water requirements, when construction storm water requirements apply, to whom they apply, the procedures for submission of SWPPPs, construction site inspections, and other procedures associated with control of construction site storm water runoff. Information on staff development and training programs will be updated, revised and filed in the Village SWMP files/storm water information repository as necessary.

The Village will ensure that construction site operators have received erosion and sediment control training before they do work within the Village's jurisdiction by May 2010. The preliminary review of a submitted SWPPP will including checking for erosion and sediment control certificates of completion or other such proof of erosion and sediment control required training for all construction site operators working on the project. Small home site construction that has an Erosion and Sediment Control Plan developed in accordance with the *New York Standards and Specifications for Erosion and Sediment Control* is exempt from this requirement. Construction site operators may obtain training from NYSDEC or other qualified entities (such as Soil and Water Conservation Districts). The Village is not required to provide this training for construction site operators or provide notice of upcoming sediment and erosion control training.

4.2.7 <u>Village Sponsored Construction Projects</u>

If the Village proposes a construction project that will disturb one acre or greater of land, the Village will apply for and comply with the applicable requirements of the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Sites GP-0-08-001 or as updated. The Village will be responsible for preparing the SWPPP and NOI prior to the commencement of construction activity. The Village will refer GP-0-08-001 and the Village *SWPPP Guidance Document for Construction Site Owners/Operators* to determine the applicable construction site inspections) according to project type. The Village may delegate the responsibility of the SWPPP preparation and regular construction site inspections to the contractor or consultant. However, the Village is responsible for ensuring that the NOI is submitted to NYSDEC as well as oversee the contractor's activities related to the construction site storm water requirements during land disturbing activities.

4.2.8 Partnerships

As necessary, the Village will search out potential partnerships with governmental entities, academic groups, conservation committees, environmental organizations, civic groups, industrial/commercial agencies, or others that provide construction site storm water runoff control support.

4.2.9 <u>Recordkeeping, Reporting and Evaluation</u>

Each of the measurable goals, activities and techniques for the Village's Construction Site Storm Water Runoff Control program has or will have a mechanism in place to track and maintain records. To facilitate annual reporting, copies of inspection forms, field sheets, logs sheets, public complaint/comment reports etc. will be filed with the Village SWMP files as applicable. The Village will continue to evaluate and report on the existing Construction Site Storm Water Runoff Control program on an annual basis in the SWMPAR to determine if the SWMP requires revision. As necessary, the Village will refer to the NYSDEC-endorsed *CASQA Municipal Stormwater Program Effectiveness Assessment Guidance* document. Recommended revisions will be adopted and implemented as appropriate and consistent with Village resources and priorities.

5.0 MCM #5: POST-CONSTRUCTION STORM WATER MANAGEMENT

5.1 Phase II Program Requirements

Post-Construction Storm Water Management is the fifth of six MCMs that the Village is required to include in its SWMP to meet the conditions of GP-0-08-002. Due to the nature of the construction activity requirements of GP-0-08-002, many of the program elements of MCM #5: Post-Construction Storm Water Management are similar to those of MCM #4: Construction Site Storm Water Runoff Control. Consequently, there may be some redundancy found in the Post-Construction Storm Water Management program requirements and components.

Runoff from developed areas can significantly affect water quality of receiving waters through an increase in the quantity of water delivered to the water body and type and quantity of pollutants in storm water runoff. Developed areas have more impervious surfaces (e.g., buildings, parking lots, roads), which interrupt the natural and gradual percolation of water through vegetation and soil. Water collected from impervious surfaces is routed to the MS4 where large volumes of runoff quickly flow to the nearest receiving water. Storm water runoff in developed areas will also pick up pollutants such as sediment, pathogens, oil and grease, pesticides, heavy metals, and nutrients, which can adversely affect water quality. Postconstruction storm water management is necessary to prevent erosion, scouring, downstream flooding, loss of aquatic habitat, and property damage.

GP-0-08-002 (Part VII.A.5.) and Village law require the Village to perform the following minimum measures:

- Develop, implement, and enforce a program that provides equivalent protection to the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-08-001 or as updated).
- Continue to require, through the Village code, post-construction runoff controls for each applicable new development and re-development project.

- Document the equivalence of the Village Storm Water Management and Erosion and Sediment Control Local Law to one of the versions of the NYSDEC Sample Local Laws for Stormwater Management and Erosion and Sediment Control.
- Include a combination of structural management practices and/or non-structural management practices to reduce the discharge of pollutants to the MEP.
- Describe procedures for:
 - SWPPP review to ensure consistency with State and local post-construction storm water requirements.
 - Inspection and maintenance of post-construction management practices.
 - Procedures for enforcement and penalization of violators.
- Review all required SWPPPs for construction sites.
 - Ensure that the individuals performing SWPPP reviews on behalf of the Village are qualified professionals or under the supervision of a qualified professional.
- Utilize the "SWPPP Acceptance Form" created by NYSDEC when notifying construction site owners/operators that their SWPPP has been accepted and approved by the Village.
- Establish and maintain an inventory of post-construction storm water management practices within the Village's jurisdiction.
- Ensure adequate long-term operation and maintenance of management practices.
- Develop, implement, and provide adequate resources to inspect development and redevelopment sites and enforce and penalize violators.
- Record, periodically assess and modify as necessary the Village's Construction Site Storm Water Runoff Control activities.
- Describe in the SWMPAR the following information:
 - Number of SWPPPs reviewed.
 - Number and type of enforcement actions.
 - Number and type of post-construction storm water management practices inventoried.
 - Number and type of post-construction storm water management practices inspected.

- Number and type of post-construction storm water management practices maintained.
- Regulatory mechanism status.
- Report on effectiveness of program, BMP and measurable goal assessment.

5.2 Village Phase II Plan Components

The Village's approach to MCM #5: Post-Construction Storm Water Management program under GP-0-08-002 will be to build on and expand the established and ongoing SWMP measurable goals, activities and BMPs, which are described in detail in the Village's NOI, *Initial Phase II Storm Water Management Program* document and SWMPARs. Building upon the existing SWMP is an efficient process that will allow the Village to continue to work towards reducing water quality impacts from storm water runoff within the Village's jurisdiction while minimizing costs.

The Village's Post-Construction Storm Water Management program addresses storm water runoff from new development and redevelopment projects to the Village's MS4. The aim of this program is to contribute to the improvement of surface water quality by reducing and preventing the contamination of storm water at its source, before it has the opportunity to pollute the runoff flow and affect water quality. The Village's Post-Construction Storm Water Management program will provide equivalent protection to the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-08-001 or as updated), unless more stringent requirements are contained within GP-0-08-002.

5.2.1 Storm Water Management and Erosion and Sediment Control Local Law

As discussed in Section 4.2.1, the Village has adopted the Storm Water Management and Erosion and Sediment Control Local Law, which requires post-construction runoff controls from regulated new development and re-development projects according to GP-0-08-001 or as updated. Post-construction runoff controls from new development and re-development projects must meet New York State's most up-to-date technical standards.

5.2.2 <u>Structural and Non-Structural Post-Construction Storm Water Management</u> <u>Practices</u>

NYSDEC encourages the Village to implement green infrastructure practices at a site level and to revise local laws with provisions precluding types of construction practices that are designed to minimize or reduce pollutant loadings. The Village Post-Construction Storm Water Management program will include a combination of structural management practices and/or non-structural management practices as necessary to reduce the discharge of pollutants to the MEP. Structural management practices include, but are not limited to, practices from the *NYSDEC Stormwater Management Design Manual* or equivalent. Non-structural management practices include, but are not limited to, comprehensive plans, open space preservation programs, Low Impact Development (LID), Better Site Design (BSD), green infrastructure practices, and land use regulations.

5.2.3 <u>SWPPP Review</u>

As discussed in Section 4.2.3, the Village will review SWPPPs for applicable construction projects as they are submitted. The main objective of the SWPPP review is to verify that the applicant has a plan that incorporates consideration of potential water quality impacts and is consistent with New York State and local post-construction storm water requirements.

The Village will delegate responsibilities of the SWPPP review process to qualified individuals. For submitted SWPPPs with the additional post-construction storm water management practices component, the individual conducting the SWPPP review for the Village will be a qualified professional or under the supervision of a qualified professional. A qualified professional means an individual that is licensed or certified in the principles and practices of storm water management and treatment, such as a licensed PE, CPESC, licensed LA or an individual that has received erosion and sediment control inspector training by a NYSDEC sponsored or approved training course. Upcoming NYSDEC sponsored or approved training

courses can be found on the NYSDEC Stormwater Website. Refer to GP-0-08-001 or as updated for the required SWPPP components according to project type.

5.2.4 MS4 SWPPP Acceptance Form

As discussed in Section 4.2.4, the Village will issue the project applicant a completed MS4 SWPPP Acceptance Form once the applicant adequately addresses the Village's comments generated from the SWPPP review process and the Village deems the SWPPP acceptable.

5.2.5 Post-Construction Storm Water Management Practices Inventory

The Village will continue to maintain its inventory of post-construction storm water management practices within the Village's jurisdiction as the practices are constructed. Types of post-construction storm water management practices can include but are not limited to alternative practices, filter systems, infiltration basins, open channels, ponds and wetlands. The inventory includes the following categories of post-construction storm water management practices as applicable:

- Privately owned/operated practices discharging to the Village's MS4 installed after March 10, 2003.
- Practices owned by the Village.
- Those practices found to cause or contribute to water quality standard violations.

As the post-construction storm water management practices are constructed, the inventory will be updated with the following information:

- Location of practice (street address or coordinates).
- Type of practice.
- Maintenance needed per the *NYSDEC Stormwater Management Design Manual*, SWPPP or other provided documentation.

• Dates and type of maintenance performed to date.

5.2.6 Long-Term Operation and Maintenance

The Village Storm Water Management and Erosion and Sediment Control Local Law has a mechanism to ensure adequate long-term operation and maintenance of the post-construction storm water management practices identified in the Village's inventory. Where postconstruction storm water management practices are to be operated and maintained by a private entity, the developer, prior to the start of construction, is required to provide the Village an irrevocable letter of credit to ensure proper operation and maintenance of all practices both during and after construction and until the practices are removed from operation.

Proper operation and maintenance includes, but is not limited to, the following:

- A preventive/corrective maintenance program for all critical facilities and systems of treatment and control (or related appurtenances) which are installed or used by the owner or operator.
- Written procedures for operation and maintenance.
- Written procedures for training new maintenance personnel.
- Discharges from the practices must not exceed the design criteria or cause or contribute to water quality standard violations.

The applicant or developer must execute a maintenance easement agreement that is binding on all subsequent landowners served by the post-construction storm water management practices. The easement must provide for access to the practices at reasonable time for periodic inspection by the Village to ensure that the facility is maintained in proper working condition. The Village reserves the right to approve formal maintenance agreements for post-construction storm water management practices binding on all subsequent landowners and recorded as a deed restriction on the property prior to the final plan approval. Under the Village Storm Water Management and Erosion and Sediment Control Local Law, if the developer or landowner fails to properly operate and maintain the practices, the Village may draw upon the account to cover the costs of proper operation and maintenance, which may include engineering and inspection costs.

5.2.7 Post-Construction Storm Water Management Practices Inspections

The long-term operation and maintenance program for post-construction storm water management practices includes inspections as necessary to ensure that practices are performing properly per the *NYSDEC Stormwater Management Design Manual*, SWPPP, or other maintenance information. GP-0-08-002 does not require the Village to collect storm water samples nor perform specific chemical analysis on post-construction storm water management practices.

The Village conducted inspections by trained staff of each post-construction storm water management practice will be established as necessary. When any new post-construction storm water management practice is installed on private property or when any new connection is made between private property and the Village MS4, the landowner must grant the Village the right to enter the property at reasonable times and in a reasonable manner for the purpose of inspections.

5.2.8 Partnerships

As necessary, the Village will search out potential partnerships with governmental entities, academic groups, conservation committees, environmental organizations, civic groups, industrial/commercial agencies, or others that provide post-construction management support.

5.2.9 <u>Recordkeeping, Reporting and Evaluation</u>

Each of the measurable goals, activities and techniques for the Village's Post-Construction Storm Water Management program has or will have a mechanism in place to track and maintain records. To facilitate annual reporting, copies of inspection forms, field sheets, logs sheets, etc. will be filed with the Village SWMP files as applicable.

The Village will continue to evaluate and report on the existing Post-Construction Storm Water Management program on an annual basis in the SWMPAR to determine if the SWMP requires revision. As necessary, the Village will refer to the NYSDEC-endorsed *CASQA Municipal Stormwater Program Effectiveness Assessment Guidance* document. Recommended revisions will be adopted and implemented as appropriate and consistent with Village resources and priorities.

6.0 MCM #6: POLLUTION PREVENTION/GOOD HOUSEKEEPING FOR MUNICIPAL OPERATIONS

6.1 Phase II Program Requirements

Pollution Prevention/Good Housekeeping for Municipal Operations is the last of six MCMs that the Village is required to include in its SWMP to meet the conditions of GP-0-08-002. The Village Pollution Prevention/Good Housekeeping for Municipal Operations program is a key element of the Village's overall SWMP. While this measure is meant primarily to improve or protect receiving water quality by altering operations, it also can result in a cost savings for the Village because proper and timely maintenance of equipment and infrastructure can help avoid repair costs from damage caused by age and neglect.

The NYSDEC requires the Village to ensure a reduction in the amount and type of pollution that contribute or potentially contribute POCs to the Village MS4. The operations and facilities may include, but are not limited to: street maintenance; winter road maintenance; MS4 maintenance; vehicle and fleet maintenance; park and open space maintenance; municipal building maintenance; solid waste management; or right-of-way maintenance.

Pollutant source controls through sensible pollution prevention and good housekeeping programs can help to improve water quality by preventing pollutants from entering surface waters, before they can cause environmental problems. The aim of the Village's Pollution Prevention/Good Housekeeping for Municipal Operations program is to improve the water quality of surface waters by reducing and preventing the contamination of storm water at its source, before it has an opportunity to pollute the runoff flow, enter the conveyance system and affect water quality.

GP-0-08-002 (Part VII.A.6.) requires the Village to perform the following minimum measures:

• Address Village operations and facilities that contribute or potentially contribute POCs to the MS4.

- Perform a self-assessment of Village operations addressed by the SWMP at a minimum frequency of once every three years.
- Determines management practices, policies, procedures, etc. that will be developed and implemented to reduce or prevent the discharge of pollutants.
- Prioritize pollution prevention and good housekeeping efforts based on geographic area, potential to improve water quality, facilities or operations most in need of modification or improvement, and Village capabilities.
- Include an employee pollution prevention and good housekeeping training program.
- Require third party entities performing contracted services to meet permit requirements.
- Comply with the NYSDEC SPDES Multi-Sector General Permit (MSGP) for Stormwater Discharges Associated with Industrial Activities (GP-0-06-002) for Village operations and facilities that would otherwise be subject to the MSGP.
- Record, periodically assess and modify as necessary the Village's Pollution Prevention and Good Housekeeping program.
- Describe in the SWMPAR the following information:
 - The Village operations and facilities that the pollution prevention and good housekeeping program assessed.
 - Acres of parking lot swept.
 - Miles of street swept.
 - Number of catch basins inspected and cleaned where necessary.
 - Post-construction control storm water management practices inspected and cleaned where necessary.
 - Pounds of phosphorus applied in chemical fertilizer.
 - Pounds of nitrogen applied in chemical fertilizer.
 - Pounds of pesticides/herbicides applied as pure product.
 - Staff training events
 - Number of staff trained.
 - Report on effectiveness of program, BMP and measurable goal assessment.

6.2 Village Phase II Plan Components

The Village's approach to MCM #6: Pollution Prevention/Good Housekeeping for Municipal Operations program under GP-0-08-002 will be to build on and expand the established and ongoing SWMP measurable goals, activities and BMPs, which are described in detail in the Village's NOI, *Initial Phase II Storm Water Management Program* document and SWMPARs. Building upon the existing SWMP is an efficient process that will allow the Village to continue to work towards reducing water quality impacts from storm water runoff within the Village's jurisdiction while minimizing costs.

The scope of the Village operations encompassed by the Pollution Prevention/Good Housekeeping for Municipal Operations program focuses on activities at Village owned or operated facilities (e.g., buildings, parks, public works facilities, infrastructure) and operations throughout the Village that are the ordinary responsibilities of municipal departments (e.g., street maintenance, storm water drainage system maintenance). Included in this scope are operations and maintenance undertaken by private contractors and third parties that serve Village programs, facilities, operations and responsibilities. However, this scope does not include pollution prevention and good housekeeping practices within private residential or commercial properties, unless there is a direct connection to the Village program responsibilities.

6.2.1 Pollution Prevention and Good Housekeeping Policies and Procedures

Pollution prevention and good housekeeping policies and procedures are already in place in many of the Village's facilities. These activities are being performed either under direct control of the Village or are contracted or shared with other public entities. Any operations that collect, store or release sediments, wastes or other potential pollutants are important elements of storm water management and will be addressed in the comprehensive Pollution Prevention/Good Housekeeping for Municipal Operations program. The NYSDEC recommends a coherent approach to setting priorities, policies and procedures, record keeping and training for operations related to the Pollution Prevention/Good Housekeeping for Municipal Operations program. The NYSDEC Phase II regulations require that MS4s utilize federal and state standards, guidelines and requirements in the implementation of its SWMP. The Village has prepared the *Best Management Practices for Municipal Facilities and Operations* guidance document, which is designed to be utilized by the Village as a comprehensive list of BMPs that can be referenced and/or adopted, as appropriate, for the activities and operations undertaken within the Village's jurisdiction. The BMPs provided in the *Best Management Practices for Municipal Facilities and Operations* guidance document are based on federal and state-approved BMPs, but also include supplemental measures, policies and practices being successfully implemented in storm water jurisdictions throughout the country. In addition, the Village refers to the management practices identified in the *NYSDEC Municipal Pollution Prevention and Good Housekeeping Assistance Document* and other guidance materials available from the USEPA, State and other organizations.

6.2.2 <u>Self-Assessment</u>

The self-assessment of the Village's Pollution Prevention/Good Housekeeping for Municipal Operations program is performed to determine the sources of pollutants potentially generated by the Village's operations and facilities and to identify the Village operations and facilities that need to be included in the Pollution Prevention/Good Housekeeping for Municipal Operations program, if it is not done already.

The goal of the self-assessment is to identify both the strengths and potential gaps that need to be addressed for compliance with GP-0-08-002. The Village will perform a self-assessment of its potentially polluting operations and facilities at a minimum frequency of once every three years. The self-assessment program addresses contracted or shared operations, as well as those under direct Village control.

The self-assessment program considers the status of policies and procedures, resources (staff and equipment) and training for operation categories. NYSDEC does not require the results of the self-assessment to be submitted. However, the Village will benefit from the self-

assessment because it will help determine if the necessary steps are being taken and adequate staff and resources are available to achieve compliance. Assistance for tracking the established policies and procedures and activities performed are presented in the *NYSDEC Municipal Pollution Prevention and Good Housekeeping Program Assistance* document.

6.2.3 Employee Training

Employee training programs are essential to teach employees about storm water management, pollution prevention and BMPs. Well-trained employees can reduce human errors that lead to accidental releases or spills. The goal of the Village employees training program is to instill personnel with a thorough understanding of the Village SWMP and Pollution Prevention/Good Housekeeping for Municipal Operations program, including BMPs, processes and materials they are working with, safety hazards, practices for preventing discharges and procedures for responding quickly and properly to toxic and hazardous material incidents. Information on staff development and training programs will be updated, revised and filed in the Village SWMP files/storm water information repository as necessary.

Typically, Village employee training is handled as on-the-job training during operations or field activities. However, the Village will provide official training sessions or classroom seminars to employees on an as-needed basis. The Village will consider providing both general and targeted employee pollution prevention and good housekeeping training. The Village recognizes that it is important to train Village staff, regardless of field responsibilities, about general storm water awareness. In addition, Village employees who are directly involved in potentially polluting activities will receive targeted BMP training tailored to their responsibilities as necessary. This will increase the likelihood that receiving waters and the storm drain system will be protected.

Perceptions vary, so training materials will be presented in a number of different ways as necessary. Instruction methods can include a combination of verbal and visual aids, group discussions and practical applications. Employees can be taught through:

- Posters, employee meetings, courses, workshops, conferences, webcasts, videos, bulletin boards, paycheck inserts and email notices about storm water management, potential contaminant sources and prevention of contamination in surface water runoff.
- Field training and on-the-job programs that show areas of potential storm water contamination and associated pollutants, followed by a discussion of site-specific BMPs by trained personnel.

6.2.4 Multi-Sector General Permit

Facilities owned and operated by the Village are required to address the minimum storm water requirements in the Village-wide SWMP. According to the NYSDEC SPDES MSGP for Stormwater Discharges Associated with Industrial Activities (GP-0-06-002), an industrial facility that is owned and operated by a municipality covered by the GP-0-08-002 may not need coverage under a separate MSGP provided that the municipality has implemented an operations and maintenance plan for the facility in accordance with the requirements of GP-0-08-002. For those facilities that would otherwise be covered under GP-0-06-002, Village is required to also perform monitoring and record keeping in accordance with Part IV. of GP-0-06-002. NYSDEC requires the discharge monitoring reports to be attached to the SWMPAR.

6.2.5 Partnerships

As necessary, the Village will search out additional potential partnerships with governmental entities, academic groups, conservation committees, environmental organizations, civic groups, industrial/commercial agencies, or others who develop storm water pollution prevention/good housekeeping guidance documents or support.

6.2.6 <u>Recordkeeping, Reporting and Evaluation</u>

Each of the measurable goals, activities and techniques for the Village's Pollution Prevention/Good Housekeeping for Municipal Operations program has or will have a mechanism in place to track and maintain records. To facilitate annual reporting, copies of inspection forms, self-assessments, logs sheets, etc. will be filed with the Village SWMP files as applicable. Pollution Prevention and Good Housekeeping Log Sheets will be filed in the Village SWMP files/storm water information repository or in the *Best Management Practices for Municipal Facilities and Operations* guidance document. The Village will update these forms as necessary.

The Village will continue to evaluate and report on the existing Pollution Prevention/Good Housekeeping for Municipal Operations program on an annual basis in the SWMPAR to determine if the SWMP requires revision. As applicable, the Village will refer to the NYSDEC-endorsed *CASQA Municipal Stormwater Program Effectiveness Assessment Guidance* document. Recommended revisions will be adopted and implemented as appropriate and consistent with Village resources and priorities.

7.0 STORM WATER MANAGEMENT PROGRAM PLAN SUPPLEMENTAL DOCUMENTS

The SWMP Supplemental Documents, which are provided as appendices to this SWMP Plan Supplements Document or as separate standalone documents, contain general and Villagespecific reference materials important to the overall understanding and compliance with the Phase II SWMP requirements. A number the appendices and supplements are designed with additional spaces to allow the SWMP Plan to be updated as activities are completed, as policies change, or as additional information becomes available.

The following supplemental information and documents are provided as appendices to this SWMP Plan Supplements Document:

- Acronyms Appendix A
- Storm Water Management Program Annual Report and Municipal Compliance Certification Forms – Appendix B
- Storm Water Management Program Organization Chart Appendix C
- NYSDEC Storm Water Assessment and Design Modeling Tools Appendix D

The following supplemental information and documents are provided as separate standalone documents or files and are stored with the Village SWMP files/storm water information repository:

- Village of Ossining Initial Phase II Storm Water Management Program
- NYSDEC SPDES General Permit for Stormwater Discharges from MS4s
- NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity
- CASQA Municipal Stormwater Program Effectiveness Assessment Guidance
- Documentation of Public Outreach Efforts
- Documentation of Public Comments

- Storm Water Management Program Staff Development/Training Programs
- Local Law Illicit Discharges to Storm Sewers
- Village Outfall Maps
- Village MS4 System Maps
- Village Storm Sewer shed Maps
- Village of Ossining Written Procedures for MCM 3: Illicit Discharge Detection and Elimination
- CWP/USEPA Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessment
- Outfall Reconnaissance Inventory Field Sheets
- Local Law Storm Water Management and Erosion and Sediment Control
- Village of Ossining Written Procedures for MCMs 4&5: Construction Site Storm Water Runoff Control and Post-Construction Storm Water Management
- Village of Ossining SWPPP Guidance Document for Construction Site Owners/Operators
- Submitted/Approved Construction Site SWPPPs
- SWPPP Review Letters
- Village Active Construction Sites Inventory
- Post-Construction Storm Water Management Practices Inventory
- Village Conducted Storm Water Compliance Construction Site Inspection Reports
- New York State Construction Stormwater Inspection Manual
- New York State Standards and Specifications for Erosion and Sediment Control
- New York State Stormwater Management Design Manual
- NYSDEC Municipal Pollution Prevention and Good Housekeeping Program Assistance
- Operation and Maintenance Schedules

- Village of Ossining Best Management Practices for Municipal Facilities and Operations
- Pollution Prevention and Good Housekeeping Log Sheets
- Documentation of Self-Assessments

The above documentation will be made readily available to Village staff, the public and regulators (e.g., NYSDEC and USEPA staff). Relevant portions of this SWMP Plan Supplements Document, primarily the policies and procedures, will be made available to appropriate Village management and staff involved in the SWMP. For example:

- Technical standards and associated technical assistance documents and manuals for storm water controls will be available to police officers, review engineers and planning boards.
- Relevant local laws will be available to the Planning Department.
- Available storm water outfall and sewer system mapping will be available to the Department of Public Works.
- Catch basin cleaning schedule will be available to the Department of Public Works.

8.0 REVISIONS AND UPDATES

As stated previously, the SWMP Plan Supplements presented within this document are in accordance with the updated requirements of the May 2008 NYSDEC SPDES General Permit for Stormwater Discharges from MS4s (GP-0-08-002). This permit replaced the initial SPDES General Permit for Stormwater Discharges from MS4s (GP-02-02), which was revised to increase clarity of NYSDEC's expectations of permittees. Under the two-year permit term of GP-0-08-002, the Village is required to continue to implement and enforce the SWMP that was developed under the initial five-year permit term of GP-02-02.

The nature of the SWMP is an iterative and adaptive program. As a result, the information found in this SWMP Plan Supplements Document is designed to evolve with the progress, updates and changes made to the SWMP and SWMP Plan. The continued reevaluation of SWMP elements and BMPs will be very important as the nationwide effort to reduce storm water pollution progresses and new regulations, tools, guidance manuals, standards, supplemental measures, policies and BMPs are produced or implemented.

As a result of the two-year permit term of GP-0-08-002 and the adaptive nature of the SWMP, the Village's SWMP Plan Supplements presented within this document will be further developed and updated as appropriate. The SWMP will be reviewed and updated according to the Phase II General Permit requirements as necessary. The SWMP will be revised to incorporate any new or modified BMPs or measurable goals.

The Village SWMP updates may involve, but are not limited to the following:

- Implementation schedules.
- Implementation responsibilities.
- Incorporation of new information regarding the Phase II program from USEPA, NYSDEC or other regulatory storm water jurisdictions.
- Recommendations and comments received from NYSDEC on the SWMP and SWMPAR.

- Comments or complaints received from the public on the SWMP or SWMPAR.
- Outfall, MS4 and storm sewer shed maps.
- Identification of new water quality problems.
- Evaluation of ordinances or other regulatory mechanisms.
- Enforcement activities.
- Self-assessments.
- Training programs, events, materials or approaches.
- Intermunicipal cooperative arrangements or sharing of responsibilities.
- Additional activities to be performed for one or more of the six MCMs.

APPENDIX A

ACRONYMS

APPENDIX A

ACRONYMS

- BMP Best Management Practice
- BSD Better Site Design
- CASQA California Stormwater Quality Association
- CPESC Certified Professional in Erosion and Sediment Control
- CWA Clean Water Act
- CWP Center for Watershed Protection
- ECL Environmental Conservation Law
- IDDE Illicit Discharge Detection and Elimination
- LA Landscape Architect
- LID Low Impact Development
- MCC Municipal Compliance Certification
- MCM Minimum Control Measure
- MEP Maximum Extent Practicable
- MS4 Municipal Separate Storm Sewer System
- MSGP Multi-Sector General Permit
- NOI Notice of Intent
- NPDES National Pollutant Discharge Elimination System
- NYSDEC New York State Department of Environmental Conservation
- ORI Outfall Reconnaissance Inventory
- PE Professional Engineer
- POC Pollutant of Concern

- POTW Publicly-Owned Treatment Works
- SPDES State Pollutant Discharge Elimination System
- SWMP Storm Water Management Program
- SWMPAR Storm Water Management Program Annul Report
- SWPPP Storm Water Pollution Prevention Plan
- TMDL Total Maximum Daily Load
- USEPA United States Environmental Protection Agency

APPENDIX B

STORM WATER MANAGEMENT PROGRAM ANNUAL REPORT AND MUNICIPAL COMPLIANCE CERTIFICATION FORMS



VILLAGE OF OSSINING DEPARTMENT OF PLANNING

P.O. Box 1166 Ossining, N.Y. 10562

Valerie Monastra, AICP Village Planner

Phone (914) 762.6232 Fax (914) 762.6208

May 28, 2009

MS4 Permit Coordinator Division of Water 625 Broadway 4th Floor Albany, NY 12233-3505

RE: Village of Ossining 2008-2009 Municipal Compliance Certification Form and Storm Water Management Plan Annual Report

Dear Sir or Madam:

In accordance with NYSDEC Phase II Storm Water Regulations and SPDES General Permit No. GP-0-08-002, we are attaching one completed hard copy of our Municipal Compliance Certification Form and Storm Water Management Program Annual Report for the 2008-2009 permit year.

If there are any questions, please do not hesitate to contact me.

Very truly yours,

Valerie M. Monastra Village Planner

VMM/bf
MS4 Annual Report Cover Page

MCC form for period ending March 9, 2 0 0 9

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MS4 Annual Report Cover Page

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Cover Page 2 of 3

MS4 Annual Report Cover Page

MCC form for period ending March 9, 2 0 0 9

Required Forms

- > Municipal Compliance Certification
- > Water Quality Trends
- > Minimum Measure 1
- > Minimum Measure 2
- > Minimum Measure 3
- > Minimum Measure 4
- > Minimum Measure 4 and 5
- > Minimum Measure 5
- > Minimum Measure 6
- > MS4s in impaired watersheds included in GP-0-08-002 Part IX must also complete the form *Additional Watershed Improvement Strategy Best Management Practices*.

Reporting Requirements

- * Permittees submitting an annual report for an individual MS4 must complete and submit all required forms.
- * Joint reports may be submitted by permittees with legally binding agreements as follows:
 - <u>Each</u> MS4 contributing to a joint report must submit a Municipal Compliance Certification (MCC) form with an original signature. The MCC forms must be attached to the report.
 - > A coalition may submit information on behalf of its members as follows:
 - 1. Submit one form for each of the Minimum Measures (and if required, Additional Watershed Improvement Strategy Best Management Practices) on behalf of all the MS4s in the coalition, or
 - 2. Complete some of the required forms on behalf of all the MS4's in the coalition and for other Minimum Measures, attach completed forms from each of the MS4s.

For example, a joint report for a coalition including four permitted MS4s may contain one form for *each* of the Minimum Measures 1-5, representing the combined work of all four participating MS4s, and *in addition*, include four separate Minimum Measure 6 forms and four separate Additional Watershed Improvement Strategy Best Management Practices forms provided by each of the participating permittees.

The Department will *not* accept a report form from a participating MS4 *in addition to* a combined report form submitted for the same Minimum Measure.

Instructions for completing forms

These forms may be completed on a computer or by hand. If completing the forms by hand, fill in circles completely and print clearly.

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MS4 Municipal Compliance Certification(MCC) Form

MCC form for period ending March 9, 2 0 0 9

Name	of MS4	Village of Ossining
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Each MS4 must submit an MCC form.

Section 1 - MCC Identification Page

Indicate whether this MCC form is being submitted to certify endorsement or acceptance of:

• An Annual Report for a single MS4

O A Joint Report

Joint reports may be submitted by permittees with legally binding agreements.

If Joint Report, enter coalition name:

<u> </u>	 	 	 	 	 	l	 		 	 [L	 		

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MS4 Municipal Compliance Certification(MCC) Form

MCC form for period ending March 9, 2 0 0

Name of MS4 Village of Ossining

SPDES ID N Y R 2 0 A 0

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Section 2 - Contact Information

Provide contact information for *all* of the following contacts:

- 1. The Principal Executive Officer, Chief Elected Official or other qualified individual (per GP-0-08-002 Part VI.J).
- 2. The Local Stormwater Public Contact (required per GP-0-08-002 Part VII.A.2.c.).
- 3. The Stormwater Management Program (SWMP) Coordinator (Individual responsible for coordination/implementation of SWMP).
- 4. Report Preparer (Consultants may provide company name in the space provided).

Submit a separate sheet for each contact.

For each contact, select all that apply:

- Signatory Authority (choose one of the following)
 - Executive Officer or Ranking Elected Official
 - O Duly Authorized Representative
- Local Stormwater Public Contact
- O Stormwater Management Program (SWMP) Coordinator
- Report Preparer

First Name	MI Last Name
L i n d a	
Title	
V i l l a g e M a n a g e r	
Address	
16 Croton Avenue	
City	State Zip
City Ossining	State Zip N Y 1 0 5 6 2 -
City O s s i n i n g eMail	State Zip N Y 1 0 5 6 2 -
City O s s i n i n g eMail 1 c o o p e r @ v i 1 1 a g e c	State Zip N Y 1 0 5 6 2 - f o s s i n g . o r g
City O s s i n i n g eMail 1 c o o p e r @ v i 1 1 a g e c Phone	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$

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MS4 Municipal Compliance Certification(MCC) Form

MCC form for period ending March 9, 2 0 0

Name of MS4 Village of Ossining

SPDES IDNYR20A

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Section 2 - Contact Information

Provide contact information for *all* of the following contacts:

- 1. The Principal Executive Officer, Chief Elected Official or other qualified individual (per GP-0-08-002 Part VI.J).
- 2. The Local Stormwater Public Contact (required per GP-0-08-002 Part VII.A.2.c.).
- 3. The Stormwater Management Program (SWMP) Coordinator (Individual responsible for coordination/implementation of SWMP).
- 4. Report Preparer (Consultants may provide company name in the space provided).

Submit a separate sheet for each contact.

For each contact, select all that apply:

- Signatory Authority (choose one of the following)
 - O Executive Officer or Ranking Elected Official
 - Duly Authorized Representative
- Local Stormwater Public Contact
- Stormwater Management Program (SWMP) Coordinator
- Report Preparer

First Name	MI Last Name
V a l e r i e	M o n a s t r a
Title	
V i l l a g e P l a n n e r	
Address	
1 0 1 R o u t e 9 A	
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City	State Zip
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MS4 Municipal Compliance Certification(MCC) Form

MCC form for period ending March 9, 2 0

Name of MS4 Village of Ossining

 SPDES ID

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Section 2 - Contact Information

Provide contact information for *all* of the following contacts:

- 1. The Principal Executive Officer, Chief Elected Official or other qualified individual (per GP-0-08-002 Part VI.J).
- 2. The Local Stormwater Public Contact (required per GP-0-08-002 Part VII.A.2.c.).
- 3. The Stormwater Management Program (SWMP) Coordinator (Individual responsible for coordination/implementation of SWMP).
- 4. Report Preparer (Consultants may provide company name in the space provided).

Submit a separate sheet for each contact.

For each contact, select all that apply:

○ Signatory Authority (choose one of the following)

- O Executive Officer or Ranking Elected Official
- O Duly Authorized Representative
- O Local Stormwater Public Contact
- O Stormwater Management Program (SWMP) Coordinator
- Report Preparer

First Name	MI Last Name
Title	
Dvirka and Barti	1 u c c i C o n s u 1 t i n g
Address	
4 W e s t R e d O a k L	a n e S u i t e 3 1 5
City	State Zip
White Plains	N Y 1 0 6 0 4 -
eMail	
eMail	
eMail eMail Phone	County

	SPDES ID
Name of MS4 Village of Ossining	N Y R 2 0 A 0 0
Section 3 - Partner Information - Submit a separate sheet for	r each partner.
Did your MS4 work with partners/coalition to complete some or all permit period?	t requirements during this reporting
If Yes, complete information below. If No, proceed to Section 4 - Certification Statement.	•Yes OI
Partner/CoalitionName	
Westchester County	
Partner/Coalition Name (con't.)	SPDES Partner ID - If applicat
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Address	

Partner/C	oaliti	ionl	Jam	e			_													_										
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MS4 Municipal Compliance Certification (MCC) Form MCC form for period ending March 9, 2 0 0 9

> SPDES ID N Y R 2

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O No

Watershed Improvement Strategy Best Management Practices required for MS4s in impaired 0 watersheds included in GP-0-08-002 Part IX.

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	MS4 Municipal Compliance Certification(MCC) Form	
• •	MCC form for period ending March 9, 2 0 0 9	
	SPDES ID	
Name of MS4	4 Village of Ossining N Y R 2) A 0 0 5

Section 4 - Certification Statement

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

This form must be signed by either a principal executive officer or ranking elected official, or duly authorized representative of that person as described in GP-0-08-002 Part VI.J.

First Name	MI	Last Name	
Linda		Cooper	
Title			
V i l l a g e M a n a g e r			
Signature			
The G. Corpor		Date 0 5 / 2 8 / 2 0 0	9

Send completed form and any attachments to the DEC Central Office at:

MS4 Permit Coordinator Division of Water 4th Floor 625 Broadway Albany, New York 12233-3505

MCC Page 4

MS4 Annual Report Form This report is being submitted for the reporting period ending March 9, 2 0 0 9 If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank. SPDES ID Village of Ossining NYR2 0 A 0 0 5 Name of MS4/Coalition Water Quality Trends The information in this section is being reported (check one): • On behalf of an individual MS4 \bigcirc On behalf of a coalition How many MS4s are contributed to this report? 1. Has this MS4/Coalition produced any reports documenting water quality trends related to stormwater? ○ Yes No If Yes, choose one of the following O Report(s) attached to the annual report \bigcirc Web Page(s) where report(s) is/are provided below Please provide specific address of page where report(s) can be accessed - not home page. URL URL URL URL URL

This report is being submitted for the reporting period ending March 9, 2 0 0 9

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition Village of Ossining

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Minimum Control Measure 1. Public Education and Outreach

The information in this section is being reported (check one):

• On behalf of an individual MS4

 \bigcirc On behalf of a coalition

How many MS4s contributed to this report?

	1.	Targeted	Public	Education	and C) utreach	Best	Managemen	t Practice
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Check all topics that were included in Education and Outreach during this reporting period:

Construction Sites

• General Stormwater Management Information

Household Hazardous Waste Disposal

Illicit Discharge Detection and Elimination

Infrastructure Maintenance

 \bigcirc Smart Growth

○ Storm Drain Marking

• Green Infrastructure/Better Site Design/Low Impact Development

- Pesticide and Fertilizer Application
- Pet Waste Management
- Recycling
- Riparian Corridor Protection/Restoration
- Trash Management
- Vehicle Washing
- Water Conservation
- Wetland Protection

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2. Specific audiences targeted during this reporting period:

• Residential O Developers

• Businesses • General Public

- Restaurants Industries
- Other:



MM 1 Page 1 of 4.

This report is being submitted for the reporting period ending March 9, 2 0 0 9

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition	Village of Ossining
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SPDES ID NYR 2 0 0 0 5 А

3. What strategies did your MS4/Coalition use to achieve education and outreach goals during this reporting period? Check all that apply:

O Construction Site Operators Trained

- Direct Mailings
- Kiosks or Other Displays
- List-Serves
- Mailing List
- O Newspaper Ads or Articles
- Public Events/Presentations
- School Program
- TV Spot/Program
- Printed Materials:

Locations (e.g. libraries, town offices, kiosks)

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# Attendees					
# Days Run			3	9	8
Total # Distributed			8	4	3

This report is being submitted for the reporting period ending March 9, 2 0 0 9

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

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This report is being submitted for the reporting period ending March 9, 2 0 0 9

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		SPD	ES	ID							
Name of MS4/Coalition	Village of Ossining	Ν	Y	R	2	0	A	0	0	5	

4. Evaluating/Measuring Progress MCM 1

What indicators do you use to evaluate the overall effectiveness of your Education and Outreach Program, how long have you been tracking them and at what frequency?

Exe	ample*:				
Ind	licator:	Public phone	survey		
Beg	gan Track	ing:	2005	Frequency:	Annual
#	1000			(ex · samples/part	icipants/events)
Res	sults:	Increased a	wareness of	fissues related to	use of fertilizers

* This indicator is provided as an example only.

Ind	licator:	Num	ber of hits on the Village s	torm water webpage	
Be	gan Trac	king:	2009-2010 (year)	Frequency:	Annual Summary (ex.: annual, monthly, biweekly)
#	n/a				· · ·
				(ex.: samples/part	icipants/events)
Re.	sults:	The V an in Outre	Village plans to ev dicator for measur each program.	valuate the numbe ring the overall ef	r of hits on the Village storm water webpage as fectiveness of the Public Education and

Submit additional pages as needed.

This report is be	ing submitted	for the rep	orting period	ending Marc	h 9,	2	0	0	9	l
I mis report is at	and submitteed	ior the rep	or this period	containg total c	AL 29		$1 \sim 1$	~ ~ I		

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition	Village of Ossining
Name of MS4/Coalition	v mage of Ossning

SPDES ID Ν Y R 2 0 0 0 5 Α

Minimum Control Measure 2. Public Involvement/Participation

The information in this section is being reported (check one):

- On behalf of an individual MS4
- \bigcirc On behalf of a coalition
 - How many MS4s contributed to this report?
- 1. What opportunities were provided for public participation in implementation, development, evaluation and improvement of the Stormwater Management Program (SWMP) Plan during this reporting period? Check all that apply:

• Cleanup Events	# Events 2
O Comments on SWMP Received	# Comments
Community Hotlines	Phone # (914) $(762 - 6232$
Phone # ()	Phone # ()
Phone # ()	Phone # ()
Phone # ()	Phone # ()
Phone # ()	Phone # ()
Phone # ()	Phone # ()
O Community Meetings	# Attendees
○ Plantings	Sq. Ft.
○ Storm Drain Markings	#Drains
○ Stakeholder Meetings	# Attendees
O Volunteer Monitoring	# Events
$lacebreak$ Other: $E \mid n \mid v \mid i \mid r \mid o \mid n \mid m \mid e \mid n \mid t \mid a \mid 1$	A d v i s o r y C o u n c i 1

2. Was public notice of availability of annual report and Stormwater Management Program (SWMP) Plan provided? • Yes O No

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If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

		S	PDES	S ID						
Name of MS4/Coalition	Village of Ossining	ſ	1 Y	R	2	0	Α	0	0	5

2. URL(s) con't.:

Please provide specific address(es) where notice(s) can be accessed - not home page.

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This report is being submitted for the reporting period ending March 9, 2 0 0 9

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition	Village of Ossining		

SPDES ID 0 0 5 NYR2 0 A

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Please provide specific address(es) where notices can be accessed - not home page.

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MM 2 Page 4 of 6

This report is being submitted for the reporting period ending March 9, 2 0 0 9

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

SPDES ID Village of Ossining Ν Y R 2 0 A 0 0 5 Name of MS4/Coalition 4. Were comments received during this reporting period? O Yes No If Yes, attach comments, responses and changes made to SWMP in response to comments to this report. If submitting a report for single MS4, answer 5.a.. If submitting a joint report, answer 5.b.. 5.a. Was an Annual Report public meeting held in this reporting period? • Yes O No If Yes, what was the date of the meeting? 5 0 2 2 8 7 0 0 If No, is one planned? O Yes O No 5.b. Was an Annual Report public meeting held for all MS4s contributing to this report during this reporting period? O Yes O No

O Yes

O No

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If No, is one planned for each?

MM 2 Page 5 of 6

This report is being submitted for the reporting period ending March 9, 2 0 0 9

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

			SPI	DES	ID						
Name of MS4/Coalition	Village of Ossining	-	N	Y	R	2	0	Α	0	0	5

6. Evaluating/Measuring Progress MCM 2

What indicators do you use to evaluate the overall effectiveness of your Public Involvement/Participation Program, how long have you been tracking them and at what frequency?

Example*:	
Indicator:	Number of attendees at public events
Began Trackin	g: 2005 (year) Frequency: Annual (ex.: annual, monthly, biweekly)
# 1000	
	(ex.: samples/participants/events)
Results:	Attendance at public events has increased 200% since 2005.

* This indicator is provided as an example only.

Ind	licator:	Num	aber of cleanup events		· · · · · · · · · · · · · · · · · · ·
Beį	gan Track	king:	2008-2009 (year)	Frequency:	Annual Summary (ex.: annual, monthly, biweekly)
#	2 cleanup e	vents			· · ·
	· .			(ex.: samples/part	icipants/events)
Re	sults:	The indic Parti year.	Village plans to ev ator for measuring cipation program.	valuate the numbe g the overall effec There were two c	r of cleanup events held in the Village as an tiveness of the Public Involvement/ cleanup events in the Village in this reporting

Submit additional pages as needed.

This report is being submitted for the reporting period ending March 9, $2 \mid 0 \mid 0 \mid 9$

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition Village of Ossining

SPL	DES	ID				-		
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Minimum Control Measure 3. Illicit Discharge Detection and Elimination

The information in this section is being reported (check one):

- On behalf of an individual MS4
- \bigcirc On behalf of a coalition

How many MS4s contributed to this report?

- 1. Enter the number and approx. percent of outfalls mapped:
 - : 150# 100%

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- 2. How many of these outfalls have been screened for dry weather discharges during this reporting period (outfall reconnaissance inventory)?
- **3.a.**What types of generating sites/sewersheds were targeted for inspection during this reporting period?

○ Auto Recyclers	\bigcirc Landscaping (Irrigation)	
O Building Maintenance	○ Marinas	
○ Churches	O Metal Plateing Operations	
○ Commercial Carwashes	○ Outdoor Fluid Storage	
○ Commercial Laundry/Dry Cleaners	O Parking Lot Maintenance	
○ Construction Vehicle Washouts	○ Printing	
○ Cross-Connections	○ Residential Carwashing	
O Distribution Centers	○ Restaurants	
○ Food Processing Facilities	○ Schools and Universities	
\bigcirc Garbage Truck Washouts	○ Septic Maintenance	
\bigcirc Hospitals	○ Swimming Pools	
\bigcirc Improper RV Waste Disposal	○ Vehicle Fueling	
○ Industrial Process Water	○ Vehicle Maint./Repair Shops	
O Other:	None	
O Sewersheds:		

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MM 3 Page 1 of 4

This report is being submitted for the reporting period ending March 9, 2 0 0 9

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

	SPDES ID
Name of MS4/Coalition Village of Ossining	N Y R 2 0 A 0 0 5
3.b.What types of illicit discharges have	been found during this reporting period?
O Broken Lines From Sanitary Sewer	○ Industrial Connections
○ Cross Connections	○ Inflow/Infiltration
○ Failing Septic Systems	○ Pump Station Failure
\bigcirc Floor Drains Connected To Storm Sewers	○ Sanitary Sewer Overflows
O Illegal Dumping	○ Straight Pipe Sewer Discharges
• Other: O i l T a n k L e a k	○ None
4. How many illicit discharges/potential reporting period?	l illegal connections have been detected during this
5. How many illicit discharges have bee	n confirmed during this reporting period?
 6. How many illicit discharges/illegal coperiod? 7. Has the storm sewershed manning be 	onnections have been eliminated during this reporting
If No, approximately what percent has l	been completed?
8. Is the above information available in Is this information available on the w If Yes, provide URL(s):	GIS?YesNoyeb?YesNoYesYesNo
Please provide specific address of page	where map(s) can be accessed - not home page.

This report is being submitted for the reporting period ending March 9, 2 0 0 9

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

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Name of MS4/Coalition	Village of Ossining	ľ	I Y	R	2	0	А	0	0	5

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Please provide specific address of page where map(s) can be accessed - not home page

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- 9. Has an IDDE law been adopted for each traditional MS4 and/or have IDDE procedures been approved for all non-traditional MS4s contributing to this report?
- 10. Has an attorney certified law(s) adopted by traditional MS4s to be equivalent to the NYS Model IDDE law?

11. What percent of staff in relevant positions and departments has received IDDE training?

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This report is being submitted for the reporting period ending March 9, 2 0 0 9

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

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Name of MS4/Coalition	Village of Ossining		N	Y	R	2	0	A	0	0

12. Evaluating/Measuring Progress MCM 3

What indicators do you use to evaluate the overall effectiveness of your Illicit Discharge Elimination Program, how long have you been tracking them and at what frequency?

Exe	ample*:		-		
Ind	licator:	Number of illicit	discharges ide	ntified/eliminated	
Beg	gan Trackii	ng: 20	005 ear)	Frequency:	Monthly inspections (ex.: annual, monthly, biweekly)
#	25 illicit disch	arges identified/24	eliminated	· · · · · · · · · · · · · · · · · · ·	~
	· · ·			(ex.: samples/part	icipants/events)
Res	ults:	Since 2005, t tracking syst average, with	he numbe em and ill iin a week	r of annual inspeci icit discharges that of discovery.	ctions has doubled. We have developed a at have been identified are being eliminated, on

* This indicator is provided as an example only.

				· .	
Ind	licator:	Numl	ber of illicit discharges det	ected	
Beg	an Track	ing:	2005-2006	Frequency:	Annual Summary
C			(year)		(ex.: annual, monthly, biweekly)
#	1 illicit discl	narge dete	cted		
	L ·			(ex.: samples/part	icipants/events)
Res	ults:	The V measu discha elimin period	/illage plans to ev uring the overall e arges detected dur nated. There were ds.	valuate the numbe effectiveness of the ring this reporting this no illicit dischar	r of illicit discharge detected as an indicator for e IDDE program. There was one illicit period from an oil tank leak, which was ges detected in the previous three reporting

Submit additional pages as needed.

This report is being submitted for the reporting period ending March 9, 2 0 .9

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Village of Ossining Name of MS4/Coalition

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Minimum Control Measures 4 and 5.

Construction Site and Post-Construction Control The information in this section is being reported (check one): On behalf of an individual MS4 \bigcirc On behalf of a coalition How many MS4s contributed to this report? 1. Has each Town, City and/or Village contributing to this report adopted a law, ordinance or other regulatory mechanism that provides equal protection to the NYS SPDES General Permit for Stormwater Discharges from Construction Activities? • Yes O No If Yes, provide date of equivalent NYS Sample Local Law. 0 09/2004 • 03/2006 2. Does your MS4/Coalition have a SWPPP review procedure in place? Yes O No 3. How many Construction Stormwater Pollution Prevention Plans (SWPPPs) have been reviewed in this reporting period? 1 4. Does your MS4/Coalition have a mechanism for receipt and consideration of public comments related to construction SWPPPs? O No • Yes 0 If Yes, how many public comments were received during this reporting period? 5. Does your MS4/Coalition provide education and training for contractors about the local SWPPP process? O No • Yes 6. Identify which of the following types of enforcement actions you used during the reporting period for construction activities, indicate the number of actions, or note those for which you do not have authority:



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MM 4/5 Page 1 of 1

This report is being submitted for the reporting period ending March 9, 2 0 0 9

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition Village of Ossining

 SPDES ID

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Minimum Control Measure 4. Construction Site Stormwater Runoff Control

The information in this section is being reported (check one):

- On behalf of an individual MS4
- \bigcirc On behalf of a coalition

How many MS4s contributed to this report?

- 1. How many construction projects have been authorized for disturbances of one acre or more during this reporting period?
- 2. How many construction projects disturbing at least one acre were active in your jurisdiction during this reporting period?
- 3. What percent of active construction sites were inspected during this reporting period?

4. What percent of active construction sites were inspected more than once?

- 5. Do all inspectors working on behalf of the MS4s contributing to this report use the NYS Construction Stormwater Inspection Manual?
- 6. Does your MS4/Coalition provide public access to Stormwater Pollution Prevention Plans (SWPPPs) of construction projects that are subject to MS4 review and approval?

• Yes O No

%

%

If Yes, use the following page to identify location(s) where SWPPPs can be accessed.

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This report is being submitted for the reporting period ending March 9, 2 0 0 9

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Name of MS4/Coalition	Village of Ossining	Ν	Y	R	2	0	Α	0	0	5

7. Evaluating/Measuring Progress MCM 4

What indicators do you use to evaluate the overall effectiveness of your Construction Site Stormwater Management Program, how long have you been tracking them and at what frequency?

Exa	imple*:	
Ind	icator:	Percent SWPPPs reviewed
Beg	an Tracki	ing: 2005 (year) Frequency: Upon submission (ex.: annual, monthly, biweekly)
#	50 SWPPPs	· · ·
		(ex.: samples/participants/events)
Res	ults:	100% of SWPPPs were reviewed. 50% of the SWPPPs reviewed were returned with comments. All of these were returned with modifications reflecting NYS Standards.

* This indicator is provided as an example only.

-		Perce	nt SWPPPs reviewed		· · · · · · · · · · · · · · · · · · ·
Ind	licator:				·
Be	gan Track	ing:	2008-2009	Frequency:	Annual Summary
			(year)	~	(ex.: annual, monthly, biweekly)
#	100% SWPF	Ps review	ved		
	L			(ex.: samples/part	icipants/events)
Re.	sults:	The V measu Progr which	Village plans to ev uring the overall e am. There was or h was reviewed an	aluate the percent ffectiveness of th he SWPPP submit d returned with c	t of SWPPPs reviewed as an indicator for e Construction Site Storm Water Management tted to the Village since September 2008, omments.

Submit additional pages as needed.

This report is being submitted for the reporting period ending March 9, 2 0 0

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition Village of Ossining

SPL	DES	ID						
Ν	Y	R	2	0	A	0	0	5

Minimum Control Measure 5. Post-Construction Stormwater Management

The information in this section is being reported (check one):

• On behalf of an individual MS4

 \bigcirc On behalf of a coalition

How many MS4s contributed to this report?

1. How many and what type of post-construction stormwater management practices has your MS4/Coalition inventoried, inspected and maintained in this reporting period?

	# Inventoried	# Inspections	# Times Maintained
• Alternative Practices	0		
• Filter Systems	0		
• Infiltration Basins	0		
• Open Channels	0		
• Ponds	- O		
• Wetlands	0		
• Other	0		

- 2. Do you use an electronic tool (e.g. GIS, database, spreadsheet) to track post-construction BMPs, inspections and maintanance?
- 3. What types of non-structural practices have been used to implement Low Impact Development/Better Site Design/Green Infrastructure principles?
- Building Codes
- Comprehensive Planning
- Overlay Districts
- Zoning

○ None					
O Other:					
039\LL05279.FRM_SWMPAR	MM 5	Page	1 of 2		

This report is being submitted for the reporting period ending March 9, 2 0 0 9

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			SPL	DES	ID						
Name of MS4/Coalition	Village of Ossining]	N	Y	R	2	0	A	0	0	5

4. Evaluating/Measuring Progress MCM 5

What indicators do you use to evaluate the overall effectiveness of your Post-Construction Stormwater Management Program, how long have you been tracking them and at what frequency?

Exi	ample*:				-
Indicator:		Number of repo	orts of flooding d	luring storm events from b	usiness district
Reg	an Tracki	2005 2005		Frequency:	Annual Summary
Degun Huenn		(year)			(ex.: annual, monthly, biweekly)
#	18				
	L	•		(ex.: samples/part	icipants/events)
Res	ults:	During this that the nun attributable	reporting p ber of inci- to increase	eriod, we experie dences of floodin d inspection and 1	nced average rainfall, but DPW records show g in the business district fell 25%. This is naintenance of post construction BMPs.

* This indicator is provided as an example only.

Indicator: Began Trackin		Num	iber of SWPPP Guidance Do	ocuments distributed	
		ing: 2009-2010 (year)		Frequency:	Annual Summary (ex.: annual, monthly, biweekly)
#	n/a				
				(ex.: samples/part	icipants/events)
Res	ults:	The Tas an Wate Docu Villa	Village plans to ev indicator for meas or Management Pro- ument, which will h ge's Construction !	aluate the numbe suring the overall ogram. The Villa be distributed to b Site SWMP.	r of SWPPP Guidance Documents distributed effectiveness of the Post-Construction Storm ge is finalizing the SWPPP Guidance puilding permit applicants to inform them of the

Submit additional pages as needed.

This report is being submitted for the reporting period ending March 9, $2 \mid 0 \mid 0 \mid 9$

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Name of MS4/Coalition Village of Ossining

Salf Assessment

Minimum Control Measure 6. Stormwater Management for Municipal Operations

The information in this section is being reported (check one):

- On behalf of an individual MS4
- \bigcirc On behalf of a coalition

How many MS4s contributed to this report?

1. Choose/list each municipal operation/facility that contributes or may potentially contribute Pollutants of Concern to the MS4 system. For each operation/facility indicate whether the operation/facility has been addressed in the MS4's/Coalition's Stormwater Management Program(SWMP) Plan and whether a self-assessment has been performed during the reporting period. A self-assessment is performed to: 1) determine the sources of pollutants potentially generated by the permittee's operations and facilities; 2) evaluate the effectiveness of existing programs and 3) identify the municipal operations and facilities that will be addressed by the pollution prevention and good housekeeping program, if it's not done already.

			Sell-Assessi	nem
			Operation/Activit	ty/Facility
			performed within	the past 3
Operation/Activity/Facility	Addressed in	<u>n SWMP?</u>	years?	
Street Maintenance	• Yes	0 No	O Yes	No
Bridge Maintenance	····· O Yes	• No	○ Yes	• No
Winter Road Maintenance	• Yes	O No	O Yes	• No
Salt Storage	• Yes	O No	O Yes	🖲 No
Solid Waste Management	• Yes	0 No	O Yes	• No
New Municipal Construction and Land Disturban	nce O Yes	• No	○ Yes	No
Winter Road Maintenance	• Yes	0 No	○ Yes	No
Right of Way Maintenance	• Yes	○ No	○ Yes	No
Marine Operations	O Yes	• No	○ Yes	● No
Hydrologic Habitat Modification	○ Yes	• No	○ Yes	🖲 No
Parks and Open Space	• Yes	0 No	○ Yes	• No
Municipal Building	• Yes	0 No	○ Yes	• No
Stormwater System Maintenance	• Yes	0 No	○ Yes	🛡 No
Vehicle and Fleet Maintenance	• Yes	○ No	○ Yes	● No
Other	• Yes	○ No	○ Yes	• No

This report is being submitted for the reporting period ending March 9, 2 0 0 9

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition	Village of Ossining
I vanic of Mot/ Coantion	

SPL	DES	IÐ						
Ν	Y	R	2	0	А	0	0	5

2. Provide the following information about municipal operations good housekeeping programs:

Parking Lots Swept	# Acres	0
• Streets Swept	# Miles	4 5
• Catch Basins Inspected and Cleaned Where Necessary	* #	222
 Post Construction Control Stormwater Management Practices Inspected and Cleaned Where Necessary 	#	0
Phosphorus Applied In Chemical Fertilizer	# Lbs.	0
• Nitrogen Applied In Chemical Fertilizer	# Lbs.	0
Pesticide/Herbicide Applied As Pure Product	# Lbs.	0

- 3. How many stormwater management trainings have been provided to municipal employees during this reporting period?
- 4. What was the date of the last training?

	_				
03/	I	2	0	0	9

1 0

- 5. How many municipal employees have been trained in this reporting period?
- 6. What percent of municipal employees in relevant positions and departments receive stormwater management training?

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· · ·		SPL	JES	ID.							
Name of MS4/Coalition	Village of Ossining	N	Y	R	2	0	A	0	0	5].

7. Evaluating/Measuring Progress MCM 6

What indicators do you use to evaluate the overall effectiveness of your Municipal Stormwater Management and Good Housekeeping Program, how long have you been tracking them and at what frequency?

idicator:	Catch b	asins inspected and cle	aned	·			
egan Trac	king:	2005	Frequency:	monthly			
	0	(year)		(ex.: annual, monthly, biweekly)			
40 catch b	asins cleaned						
h			(ex.: samples/part	ticipants/events)			
Results: In this reporting period scheduled inspections were increased by 50%. Maintenand was performed 50% more often than last year. This resulted in a 40% decrease in deployment of personnel during storm events to perform emergency maintenance.							

* This indicator is provided as an example only.

Ind	licator:	Num	ber of catch basins cleaned	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·				
Began Tracki		king: 2007-2008 (year)		Frequency:	Annual Summary (ex.: annual, monthly, biweekly)				
#	9 catch basi	9 catch basins cleaned							
				(ex.: samples/part	icipants/events)				
Res	sults:	The V indic Mana this r	Village plans to evator for measuring agement and Good eporting period.	aluate the numbe the overall effec Housekeeping P Of those, it was de	r of catch basins cleaned annually as an tiveness of the Municipal Storm Water rogram. 222 catch basins were inspected during etermined that 9 required cleaning.				

Submit additional pages as needed.

This report is being submitted for the reporting period ending March 9, 2 0 0 9

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Name of MS4/Coalition Village of Ossining

 SPDES ID

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 0
 0
 5

Additional Watershed Improvement Strategy Best Management Practices

The information in this section is being reported (check one):

On behalf of an individual MS4

 \bigcirc On behalf of a coalition

How many MS4s contributed to this report?

MS4s must answer the questions or check NA as indicated in the table below.

MS4 Description	Answer	Check NA	(POC)	
NYC EOH Watershed	-	-	-	
Traditional Land Use	1,2,3,4,5,6,7,8a,8b,9	10,11,12	Phosphorus	
Traditional Non-Land Use	1,2,3,4,7,8a,8b,9	5,10,11,12	Phosphorus	
Non-Traditional	1,2,7,8a,8b,9	3,4,5,10,11,12	Phosphorus	
Onondaga Lake Watershed	-	-	-	
Traditional Land Use	1,6,7,8a,9	2,3,4,5,8b,10,11,12	Phosphorus	
Traditional Non-Land Use	1,6,7,8a,9	2,3,4,5,8b,10,11,12	Phosphorus	
Non-Traditional	1,6,7,8a,9	2,3,4,5,8b,10,11,12	Phosphorus	
Greenwood Lake Watershed	-	-	-	
Traditional Land Use	1,4,6,7,8a,9	2,3,5,8b,10,11,12	Phosphorus	
Traditional Non-Land Use	1,4,6,7,8a,9	2,3,5,8b,10,11,12	Phosphorus	
Non-Traditional	1,4,6,7,8a,9	2,3,5,8b,10,11,12	Phosphorus	
Oyster Bay	-	- :	-	
Traditional Land Use	1,4,7,8a,9,10,11,12	2,3,5,6,8b	Pathogens	
Traditional Non-Land Use	1,4,7,8a,9,10,11,12	2,3,5,6,8b	Pathogens	
Non-Traditional	1,4,7,8a,9	2,3,4,5,8b,10,11,12	Pathogens	
Peconic Estuary	-	-	-	
Traditional Land Use	1,4,7,8a,9,10,11,12	2,3,5,6,8b	Pathogens and Nitrogen	
Traditional Non-Land Use	1,4,7,8a,9,10,11,12	2,3,5,6,8b	Pathogens and Nitrogen	
Non-Traditional	1,4,7,8a,9	2,3,4,5,8b,10,11,12	Pathogens and Nitrogen	

1.	Does your MS4/Coalition have an education program addressing impacts of					
	phosphorus/nitrogen/pathogens on waterbodies?	○ Yes	\bigcirc No	• N/A		

2. Has 100% of the MS4/Coalition conveyance system been mapped in GIS?

○Yes ○No ●N/A

%

%

If N/A, go to question 3.

If No, estimate what percentage of the conveyance system has been mapped so far.

Estimate what percentage was mapped in this reporting period.

3. Does your MS4/Coalition have a Stormwater Conveyance System(infrastructure) Inspection and Maintenance Plan Program? ○ Yes ○ No ● N/A

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Additional BMPs Page 1 of 2

This report is being submitted for the reporting period ending March 9, 2 0 0 9

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

SPDES ID NYR2 5 0 A 0 0 Village of Ossining Name of MS4/Coalition 4. Estimate the percentage of on-site wastewater treatment systems that have been inspected and maintained or rehabilitated as necessary in this reporting period? % 5. Has your MS4/Coalition developed a program that provides protection equivalent to the NYS DEC SPDES General Permit for Stormwater Discharges from Construction Activities (GP0-08-001) to reduce pollutants in stormwater runoff from construction activities that disturb five thousand square feet or more? \bigcirc Yes O No • N/A 6. Has your MS4/Coalition developed a program to address post-construction stormwater runoff from new development and redevelopment projects that disturb greater than or equal to one acre that provides equivalent protection to the NYS DEC SPDES General Permit for Stormwater Discharges from Construction Activities (GP-0-08-001), including the New York State Stormwater Design Manual Enhanced Phosphorus Removal O Yes Standards? O No • N/A 7. Does your MS4/Coalition have a retrofitting program to reduce erosion or phosphorus/nitrogen/pathogen loading? ○ Yes O No • N/A 8a. Has your MS4/Coalition developed and implemented a turf management practices and procedures policy that addresses proper fertilizer application on municipally owned lands? O Yes O No • N/A 8b.Has your MS4/Coalition developed and implemented a turf management practices and procedures policy that addresses proper disposal of grass clippings and leaves from municipally owned lands? O Yes O No N/A 9. Has your MS4/Coalition developed and implemented a program of native planting? \bigcirc Yes O No • N/A **10.Has your MS4/Coalition enacted a local law prohibiting pet waste on municipal properties and** prohibiting goose feeding? \bigcirc Yes O No • N/A **11.Does your MS4/Coalition have a pet waste bag program?** \bigcirc Yes O No • N/A **12.Does your MS4/Coalition have a program to manage goose populations?** Yes O No • **N/A**

Additional BMPs Page 2 of 2

APPENDIX C

GENERIC MUNICIPAL ORGANIZATION CHART


APPENDIX D

NYSDEC STORM WATER ASSESSMENT AND DESIGN MODELING TOOLS

Stormwater Assessment and Design Modeling Tools For Implementation of Stormwater Management Plans

Abstract:

Computer models are commonly used for simulation of stormwater runoff, pollutant loading and design of stormwater management structures and pollutant removal practices. This study examined appropriate applications of available modeling tools for implementation of New York State stormwater design standards requirements and assessment of Municipal Separate Storm Sewer System (MS4) Stormwater Management Plans (SWMP). The study provides a summary of required elements, data, procedures, and software used for stormwater modeling. Various details of the designs for state standard practices can be configured by the use of simple methods and techniques and used along with, or exported to more advanced stormwater modeling tools. The study provides examples of design applications for satisfying state standards and application of the simple methods for stormwater management analysis and tracking.

Introduction

Stormwater quality and quantity computer models are used for pollution load assessment, watershed planning and design of stormwater control and treatment facilities. This study examines appropriate applications of available modeling tools for implementation of New York State stormwater design standards requirements and assessment of Municipal Separate Storm Sewer System (MS4) Stormwater Management Plans (SWMP).

Water quantity models are generally used for hydrologic and or hydraulic simulation, design of stormwater management practices, flow routing and flood control. Water quality models range from simple tools for screening watershed pollutant load to advanced simulation of in-stream pollutant transport and transform in a dynamic system. In urban stormwater management, hydrology and hydraulic models are heavily used by the design professionals for an efficient design of the configuration of stormwater controls, while water quality models are commonly used for pollutant load estimates and source identification in management decision-making process.

EPA's Compendium of Tools for Watershed Assessment and TMDL Development

provides an excellent source of information for selection of an appropriate model. Although computation methods and water quality components of the available model engines have not significantly changed lately, recent development of stormwater regulations has led the industry in a direction for more effective and innovative application of the design tools. This report focuses on methods and models with most immediate use for implementation of urban stormwater management and design. This study examines some of the urban modeling tools available commercially or in public domain. However, the list of models discussed in this paper is not exhaustive. Selections are made solely based on providing simulation examples for required design components and program needs.

Applications:

Stormwater modeling tools may be grouped to three types of applications: hydrologic models, hydraulic models and water quality models. Some of the modeling tools provide a combination of functions and best apply to the specific applications for which they are designed. Selection of an appropriate tool is made based on the capability, strength and appropriateness of the tool in answering the question and objectives of the study. The purpose of this paper is evaluation of modeling tools that useful for implementation of Phase II Stormwater rules and since the rules calls for technology based controls, this study focuses on modeling tools for the design of stormwater management practices. Watershed models are discussed for comparative analysis of stormwater management practice implementation. Water quality models are discussed for applications where instream water quality is of significance such as TMDL watersheds.

A typical modeling process involves identification of modeling objectives, resources identification (hardware, software, expertise), data collection, model selection, watershed/field characterization, model execution (calibration, validation, verification), model post processing, output analysis and report.

Objectives Identification:

Objectives are identified by the questions that need to be answered. That is the key factor that sets the goal and extent of all related activities. The process identified in this report is limited to the needs of stormwater program that may involve the use of modeling tools:

Stormwater Pollution Prevention Plan (SWPPP) preparation Stormwater Management Plan (SMP) implementation assessment

For the purpose of this review several modeling tools, commonly used for hydrology, hydraulics and watershed assessment are selected. A brief evaluation of each model is discussed. A few selected tools are applied and their key features are identified. This evaluation includes the methodologies incorporated in the modeling tools, a brief description of model capabilities, and examples of actual applications of the models. This report may provide a useful toll to the communities whom may decide to use the hydrology/hydraulic/water quality models for assessment of their stormwater management program, construction plan review, evaluating flood impacts, or analysis for discharges to sensitive waters. Regulated municipalities may find use of such analysis tools helpful in their day-to-day decision-making process or long-term stormwater management and land use control.

This document provides a brief overview of the basic steps involved in the use of stormwater models and examines the assessment and design capabilities of the models for applications that are often used by practitioners for compliance with stormwater regulations. This study does not provide step-by-step instructions for any of the evaluated models. All readers must refer to the original documentation provided by the developer of each model. The mention of trade names or commercial products does not constitute endorsement or recommendation of the authors for use.

Data Management

Modeling stormwater runoff is driven by two sources of data: meteorological data and land based data. Locating the most appropriate, accurate and recent data that reflect the characteristics of the watershed, site area, or waterbody can be challenging. Although most data analysis tools and software are commercially available, most spatial and historical data sets remain in public domain. Water quality and flow measures are as significant as physical features in water quality modeling. The calibration and verification process in watershed modeling involve use of pollutant measures in the surface water of concern. This section briefly lists some of the resources commonly used in stormwater modeling in the following order:

Meteorological Data

Distribution List

Spatial Data

Data Distribution Federal Agencies State Agencies Local Agencies Academic Sources Other Sources of Interest Data Category Waters Land use/cover Watershed boundary Slope length/percentage CAD compatibility Commercial GIS Software

Guidance for resources of tabular or spatial data is provided on DEC website.

Hydrologic Models

Hydrologic models are used to quantify rainfall-runoff and flow hydrograph. They provide a basis for most hydraulics and water quality computations. Hydrologic models are typically characterized by following properties:

Input parameters:

Rainfall- historic or event based precipitation measures Soil- properties that impact the hydrologic behavior of the watershed Slope- percentage and sheet, shallow concentrated, channelized flow length Land cover/ land use characteristics Antecedent moisture condition or storage potential Drainage system configuration (pipes, inlet, outlet)

Output parameters:

Runoff – depth of rainfall runoff, which does not infiltrate to ground Runoff volume- runoff depth X area

Peak flow - maximum rate of discharge

Spatial distribution:

Lumped – variables in a land area are represented as an aerial weighted averages. Distributed– variables of each homogenous land areas are represented individually.

Temporal distribution:

Continuous – precipitation of multiple events are accounted for over a period of time for long-term hydrologic simulation Event based –rainfall of single storm event in certain frequencies for design

purposes.

Hydrology Computation Methods:

Hydrology models are essential to implementation of the stormwater permit. They are the primary tools for the design of stormwater drainage and structural controls. A few hydrology methods are used within various stormwater modeling tools. Among many others, rational method, NRCS TR-55, USGS regression, and Green-Ampt are commonly incorporated in stormwater models. Simple Method however, required by New York design standards for sizing stormwater treatment facilities, is not included in any of the commercial or public domain models. The following is a brief description of the available methods often used in the stormwater control design.

Simple Method

Simple method is used for sizing the Water Quality Volume. This method targets the capture and treatment of 90% of the average annual stormwater runoff volume and direct relation with respect to the amount of impervious cover of the drainage area.

Formulation:

$$WQ_v = (\underline{P}) (\underline{R}_v)(\underline{A})$$
12

where: WQ_v = water quality volume (in acre-feet) P = 90% Rainfall Event Number R_v = 0.05 + 0.009(I), where I is percent impervious cover

A = site area in acres

This method requires a minimum of 0.2 to be met where the impervious cover is less than 17 percent. The rainfall values are determined based on the 90th percentile of daily rainfall event. The Simple Method provides a good estimate for sizing runoff from small storm (0.8" to 1.35" in NY), presented as the basis of small storm hydrology. While NY Design Manual requires the use of Simple Method for calculation of water quality volume, the same standards requires the use of TR-55 method for sizing water quantity volumes. The SCS TR-55 and TR-20, designed for estimating runoff from larger rain events, tend to underestimate small rain events. This underestimation is particularly exaggerated in relatively small sites, which are typical in urban application. A number of scenarios examined in this study showed that TR-55 generates zero runoff for the 90-percentile storm and does not provide a viable tool in water quality design process.

None of the marketed hydrology design models have simple method incorporated in their algorithms. Only a couple of screening level watershed models use this method as their runoff computation method. Simple Method calculations take no more than a simple manual calculation and integrating the estimated WQ_v values in the design of control structures takes a few additional steps.

NRCS (SCS) Methods

The NRCS (SCS) TR-55 (Technical Release 55), the Urban Hydrology for Small Watersheds and TR-20 are the basis of runoff calculation in many hydrology/watershed models. TR-55 is an event based hydrology method for calculation of runoff volume, discharge rate and storage volume. The model uses a series of soil/land use based curve numbers for runoff computation and generates the watershed hydrograph for a 24-hour rainfall duration. It is limited to a maximum of 2000 acres, 10 sub-watershed with a minimum or 0.1 hour and maximum 10-hour time of concentration. This method has been widely used for urban hydrology and integrated in various model interfaces. TR-20 has fewer limitations and applies hydrologic soil-cover complexes to determine runoff volumes and peak rates of discharge by using time of concentration, travel time, and drainage area for large drainage basins and routing flow in multiple watersheds, storage facilities and outlet structures.

Formulation (TR-55): $Q = (P-I_a)_2 / (P-I_a) + S$

Where, Q = runoff (in), P = rainfall (in), S = potential maximum retention after runoff begins (in), Ia = initial abstraction (in). Ia = 0.2S Q = (P-0.2S)₂/(P+0.8S) S = (1000 / CN) - 10

Watershed size:	Maximum 2000 acres				
Input parameters:	runoff coefficient (curve numbers, values based on land use/cover)				
	rainfall depth (for various storm frequencies)				
	drainage area (contributing area, acres)				
Output variables:	peak discharge (Q, cfs)				
	Runoff depth (inch)				
	Runoff hydrograph				

Rational Method:

The Rational Method is a simple method recommended for small catchments, which are highly paved. This method provides a tool suitable for calculating the discharge from relatively homogenous areas into a conveyance system such as pipes or ditches. This method is not suitable for storage sizing.

Formulation: Qp = KcCIA

Qp= peak flow (cfs, m^3/s))

C = runoff coefficient representing the ratio of runoff to rainfall

 $I = average rainfall intensity for a duration equal to the t_c (in/hr or mm/h)$

A = drainage area contributing to the design location (acres or ha)

Kc= conversion factor =1.008 to convert ac.in/hr to cfs (routinely ignored)

Watershed size:	smaller than 20 acres					
Input parameters:	runoff coefficient (constants, values based on ratio of runoff to					
	rainfall)					
	rainfall intensity (IDF curves from locally derived data)					
	drainage area (contributing area, acres)					
Output variables:	peak discharge (Q, cfs)					
Limitations:	no volume calculation, not suitable for storage sizing					
	in the absence of IDF curves for the area of concern, custom made					
	values need to be used with caution					

The rational method does not produce a hydrograph, it does not account for time dependent conditions such as soil moisture or rainfall intensity, and because of assuming homogenous rain and equilibrium at the time of peak, it does not provide accurate results for large watersheds. Due to assuming homogenous rain, rational method over estimates the peak for larger areas. Because the only product of the rational method is peak flow, this method is not useful for the design of stormwater control practices.

Modification are made to the rational method to make up for these shortcomings and presented as Modified Rational Method. In this method runoff hydrograph is assumed to be trapezoidal in shape with a peak runoff rate calculated using the rational formula. Given the watershed time of concentration and the allowable runoff rate, the method estimates a runoff volume to be used for sizing stormwater structure. MODRAT (Modified Rational) model is developed by the Los Angeles County Department of Public Works (LACDPW) to compute runoff rates under the conditions common to the area of the county.

http://www.ems-

i.com/wms70help/Hydrologic_Models/MODRAT/Overview_of_MODRAT.htm

USGS Regression method

The USGS regression method is a hydrologic computation method derived by statistical analysis of hydrologic response of the physiographic regions using historical data associated with rainfall, stream flow, and a few physical characteristics of each region. The USGS regression equations are suitable for large un-gagged drainage areas whose characteristics fall within the ranges identified for the equations of each physiographic region (USGS Report 90-4197).

The Report 94-4002 lists the following variables for application in NY's eight physiographic regions: "drainage area (A), in square miles; basin storage (ST), the percentage of the drainage area shown as lakes, ponds, or swamps on topographic maps; mean annual precipitation (P), in inches; main-channel slope (SL), in feet per mile; basin forest cover (F), as a percentage of the total drainage area; average main-channel elevation (EL), in feet, computed as the average of the elevations at points located 10 and 85 percent of the channel length upstream from the gage; and basin shape index (SH), computed as the ratio of the square of the main-channel stream length, in miles, to drainage area, in square miles."

- This method is most useful for flood studies at basin or watershed scale. A number of elements limit the use of USGS equations for site-specific urban applications.
- This method is not suitable for areas with significant size of pond and lakes, which effect the storage capacity of the drainage area.
- This method is not suitable where other drainage characteristics alter the hydrology so that the general regression equations may not hold true.

The urban application of this method in NY is documented by Stedfast (1986). Stedfast concluded that the urban equations described in Sauer and others (1983) yielded the smallest standard errors and bias in relation to flood peaks based on a rainfall-runoff model at the 11 urban watersheds. The method of Sauer and others (1983) is available in the NFF Program.

Documentation on this model is available at:

http://water.usgs.gov/software/nff.html

http://water.usgs.gov/software/nff_manual/ny/index.html

USGS is in the process of updating the regression variables and integrating the model in a GIS environment. A beta version of the model is scheduled for December 2004.

Hydraulic Models

Hydraulics generally describes the physics and dynamics of the water within the system. Hydraulic models use the output of the hydrologic model to compute the flow characteristics such as discharge rate, depth, velocity, and pressure in a dynamic or static system. Hydraulic models are typically characterized by following properties:

Input parameters:

Watershed hydrology: flow rate, velocity, runoff volume

Water course geometry: bank slope, bottom width, length

Slope- percentage of the water course slope

Drainage system configuration (pipes, channels, inlet/outlet, storage, obstructions)

Output parameters:

Flow discharge rate - stage-discharge relation, flow velocity

Outlet design: configuration and sizing

Flow characterization: normal, critical, super critical, hydraulic jump

Flow regime:

Uniform – assuming depths and velocities are constant throughout the flow Non-uniform – assuming varying energy and momentum of flow (e.g. variable channel geometry)

Flow dynamics:

Steady - assuming constant flow with respect to time

Unsteady – assuming variable flow in time (e.g. lateral flow)

Flow directions:

One-dimensional – modeling flow in one direction

Multi-dimensional - modeling flow in multiple directions (e.g. estuaries)

Hydrology and Hydraulic Computation Tools:

As many technical documents and literature are made available in electronic format on the Internet, most agencies are providing their standard computation methods electronically. The following list some of the tools commonly used for hydrologic and hydraulic computation that can be easily accessed on the web.

Hydraulic Charts for the Selection of Highway Culverts http://www.fhwa.dot.gov/bridge/hec05.pdf

Design of Riprap Revetment http://www.fhwa.dot.gov/bridge/hec11SI.pdf

Design Charts for Open-Channel Flow http://www.fhwa.dot.gov/bridge/hds3.pdf

FHWA Hydraulics Engineering <u>http://www.fhwa.dot.gov/bridge/hyd.htm</u>

Army Corp of Engineers Engineer Manuals <u>http://www.usace.army.mil/inet/usace-docs/eng-manuals/em.htm</u> <u>http://www.usace.army.mil/inet/usace-docs/</u>

Guidelines for Design of Dams: http://www.dec.state.ny.us/website/dow/toolbox/swmanual/appendixa.pdf

Water Quality Models

Water quality models are used for simulation of watershed or receiving water pollutant load and transport processes for various pollutants of concern. The basis most watershed/stormwater models is hydrologic and or hydraulic calculation. Stormwater models are typically characterized by following properties:

Methodology:

Empirical: relationships developed based on observations or measurements. Mechanistic: based on some fundamental relationship - balance laws or other physical Laws.

Variability:

Deterministic: does not account for variability in model parameters. Stochastic: accounts for variability in model parameter

System simulation:

Watershed model - load estimate from non-point sources for specific pollutants Receiving water model – pollutant load, transport, transformation, accumulation and degradation in waterbody

Rain simulation type

Event based: for design of stormwater control practices Continuous: for modeling long-term impacts of loading

Loading function:

Steady – assuming constant pollutant load concentration at a given point in the system

Unsteady - assuming variable flow concentration temporally and spatially

Application type:

Screening - simple calculation methods for a gross load estimate

Planning – mid range computations with algorithms for basic planning analysis Design - Complex loading processes simulation with greater input variable demand and detailed output results suitable for advanced applications.

Several models are evaluated for their applications in stormwater management. Evaluation of any modeling tool relies on the methodologies incorporated in the tool. Methodologies primarily relate to the hydrology and hydraulic computations and the loading processes simulation.

 Table 1. Stormwater Management and Design Models

Model Developer	Modeling Tools	Hydrology /	Calculation Method	Simulation Method	Range /	Parameters	BMP	Platform	*Public Domain	
_		Hydraulics			Application					
Water Quantity Models										
<u>NRCS</u> <u>Hydraulics</u> &Hydrology	<u>TR-55</u> / <u>Win-TR55</u>	X / -	Runoff CN	Event	Simple / Urban	Flow rate, runoff volume	Q	DOS / Windows	AU / Y	
Models	<u>TR-20</u> <u>Win-TR20</u>	- / X	Runoff CN	Event	Mid / Mixed	Flow rate, runoff storage & channel routing	Q	DOS Windows	AU / Y	
	<u>NRCS Geo-</u> <u>Hydro</u>	-		TR-20 GIS Interface	Mid	Input variables		GIS	Y	
<u>US Army</u> <u>Corps of</u> Engineers	HEC-HMS HEC-GeoHMS	X / -	Runoff CN Rational Hyd. Sim.	Event Continuous	Mid / Mixed	Flow rate, runoff storage & channel routing	Q	Windows GIS	Y	
	HEC-RAS HEC-GeoRAS	- / X	Hyd. Sim.	Event Continuous	Detailed / Mixed	Storage, routing, water surf. Elev., back water	Q	Windows GIS	Y	
<u>Stormwater</u> <u>System</u>	<u>HydroCAD</u>	X / X	Runoff CN Rational	Event	Mid / Urban	Flow rate, runoff storage & channel routing	Q	Windows	Ν	
	<u>PondPack</u>	X / X	Runoff CN Rational	Event	Mid / Urban	Flow rate, runoff storage & channel routing	Q	Windows	Ν	
	StormCAD	X / -		Event	-	-	Q	Win-CAD	Ν	
	<u>CulvertMaster</u>	- / X	Channel flow	Event	Simple / Urban	Flow analysis, Conveyance	Q	Windows	Ν	
	<u>FlowMaster</u>	- / X	Channel flow	Event	Simple / Urban	Flow analysis, Conveyance	Q	Windows	Ν	
	<u>WMS</u>	X / X	Runoff CN Rational Hyd. Sim.	Event Continuous	Mid / Mixed	Flow rate, runoff storage & channel routing	Q	Windows GIS	В	
USGS	NFF	X / -	Regression	Statistical	Medium /	Peak flow,	Ν	Windows	Y	

Model	Modeling Tools	Hydrology	Calculation Method	Simulation Method	Range	Parameters	BMP	Platform	*Public		
Developei		/ Hydraulics	Wiethou	Methou	Application				Domani		
	<u>WSPRO</u>	- /X			Mixed	open channel, back water	Q	DOS			
NYSDEC	FloodWare	X / X	Hyd. Sim.	Event / continuous	Detailed / Mixed	Storage, routing, water surf. Elev., back water		GIS	А		
	Watershed and Water Quality Models										
NRCS	<u>RUSLE</u> II	-	Empirical	-	Simple / Ag.	Sediment	ES. Ctrl	DOS	Y		
	WEPP	X / -	Process based	Continuous	Mid / Rural	Sediment	ES. Ctrl	Win-GIS	Y		
CWP	Simple Method	Х	Coefficient	Event	Low / Mixed	Nutrient, Sed., Other	Y (%)	NA	Y		
	WTM	X / -	Coefficient	Event	Simple / Mixed	Nutrient, Sed., Other	Y (%)	Windows	Y		
Academic Sources	Win-SLAMM	X / -	Empirical	Continuous	Mid / Urban	P, N, Sediment, metals, COD	Y	Windows	Ν		
	<u>P8</u>	X / -	Empirical	Event	Mid / Urban	P, N, TSS, metals	Y	DOS	Y		
	AVGWLF	X / -	Loading Functions	Continuous	Mid / Mixed	P, N, Sediment	Y ^	Win-GIS	Y		
	NY P Index	-	Empirical	-	Simple / Ag.	Р	-	Win.	?		
NYC DEP	WatershedTools GWLF	X / -						Win-GIS	А		
EPA Surface Water	STEP L	X / -	Coefficient	Runoff Coefficient	Simple / Mixed	P, N, Sediment, other	Y (%)	Windows	Y		
Models	<u>SWMM</u>	X / X	Processes	Continuous	Detailed / Urban	P, N, Sediment, metals, hydrocarbons	Y	DOS-Win	В		
	BASINS**	X / X	Host models	Continuous	Interface	Wide range	Y	GIS	А		
	HSPF	X / X	Processes+#	Continuous	Detailed / Mixed- rec. water	Wide range	Y	DOS/Win	A		

Model Developer	Modeling Tools	Hydrology /	Calculation Method	Simulation Method	Range /	Parameters	BMP	Platform	*Public Domain
_		Hydraulics			Application				
	WASP5	- / X	Processes+#	Continuous Estuary	Detailed/ rec. water,	Wide range	Y	DOS	Y
USACE	BATHTUB		Empirical+	Statistical	Mid / rec. water, Lake	N, P, DO, chlorophyll		DOS	Y
<u>USGS</u>	SPARROW	X / -	Regression	Statistical	Simple / Mixed	Nutrients		Win-GIS	Y

Key: *

- Α = Available upon agreement
- = Available but un-supported AU
- B = Both commercially and in public domain
- Y = Available in public Domain
- Ν = Commercially available

Hyd. Sim. = Hydrologic and / or Hydraulic Simulation Processes

= Percentage of removal by the use of BMPs estimated by an additional tool, PREDICT. Λ

BASINS Modules	Hydrology / Hydraulics	Simulation Method	Range	Application	Public Domain
QUAL2E/QUAL2K		Event	Mid	Receiving Water	Yes
WinHSPF	X / X	Continuous	Detailed	Watershed Rec. Water	Yes
SWAT	X	Continuous / Event	Mid - Detailed	Watershed Rec. Water	Yes
PLOAD		Event	Simple		Yes

+ Dilution

Advection, Dispersion, Re-aeration

< Heat Balance, Particle fate, cohesive / non-cohesive sediment transport

<u>TR-55</u>

The NRCS (SCS) TR-55 (Technical Release 55) is a computation method for the Urban Hydrology for Small Watersheds. This method has been widely used for urban hydrology and integrated in various model interfaces. However, since the development of the Windows version of the method, NRCS, no longer provides support for the DOS version of the model. Multiple input files and scenarios were examined in this study.
Example: Spreadsheet model for 1, 10 and 100 year and storage calculations Conveyance of offsite stormwater discharge via pipe (design example)

Win-TR55

Win-TR55 is an updated version of the TR-55 method, essentially consists of the same methodology as the DOS version with a few modifications. A major modification is the Win-TR55 method for calculation of storage volume. Several examples were tested by Win-TR55 and following minor issues were observed:

- The calculated values do not directly provide a storage volume. Runoff volume can be calculated by looking up the runoff depth from "TR-20 Printed Page File" and multiplied by the area of the catchment.
- Rainfall data depth and distribution types are different from published rain data.
- Model does not allow design of multiple orifices or other outlet structures.
- Due to method of discharge rate calculation, omitting the flows less than 0.5 cfs, the discharge rates are reduced comparing to TR-55 model. This problem makes the Win-TR55 method less viable for small sites applications.
- Does not allow storage for a specific period of time or release rate.

<u>TR-20</u>

Technical Release No. 20 is a watershed scale model capable of hydrology and hydraulic calculations. This model calculates runoff, plots the watershed hydrograph by accounting for base flow, lateral inflow and diversion, routing the flow through reaches and constructed structures for a simple watershed as well as complex system that may include

detention structures and hydraulic structures with multiple discharge rate and targeted flow characteristics.

This model, developed and maintained by NRCS in cooperation with the Hydrology Laboratory (ARS) in 1964, was originally utilized in mainframe platform and later on DOS environment. Many other hydrology/hydraulic software system employ the TR-20 model algorithms in their computational processes.

Win-TR20

Win-TR20 is windows version of TR-20 computer model which is reconstructed by using new algorithms. This model is planned to follow the same computation methods as TR20 and deliver the same outputs. The Beta Test version (including programs, sample data, and documentation) was made available on the web for download and testing in 2000. The latest updates of the model available for download, dated April 2004, are still in Beta format.

NRCS-Geo Hydro

NRCS Hydro is a GIS interface to the WinTR-20 hydrologic model. This interface, developed in ESRI ArcView 3.3 and the Spatial Analyst extension, enables the user to extract the required for setting up a WinTR-20 hydrologic analysis model. The GIS scripts provide an automated process to define drainage boundaries and channel geometry. The WinTR-20 is executed provides the model engine for hydraulics calculation.

HEC-HMS

The Hydrologic Modeling System is a hydrologic simulation system applicable in a wide range of applications. The model provides an integrated set of tools and computation methods that could be used for large river basins, flood hydrology, and small urban or natural watershed runoff. Hydrographs produced, flow forecasting, future urbanization impact, reservoir spillway design, flood damage reduction, floodplain regulation, and systems operation. The integrated work environment of the software allows a seamless

transition between the different components of the model. Program is in public domain while technical support is only provided to the US Army Corp of Engineers applications.

HEC-GeoHMS

Is the GIS interface of HEC-HMS for data extraction and import into HEC model engine and preparation of the input files.

HEC-RAS

HEC-RAS is a one-dimensional hydraulic model for a full network of natural and constructed channels. The hydraulic analysis capabilities of the model currently include steady and unsteady flow components and the sediment transport component is being developed at this time. The system can handle a full network of channels, with capability of modeling subcritical, supercritical, and mixed flow regimes water surface profiles, as well as one-dimensional unsteady flow component primarily for subcritical flow regime calculations. Technical support is provided only to USACE applications.

HEC-GeoRAS

Is the GIS interface of HEC-RAS for data extraction and import into HEC model engine and preparation of the input files.

HydroCAD

HydroCAD is a stormwater runoff modeling tool, which provides computation methods such as SCS, NRCS, SBUH runoff hydrographs, Rational Method with automatic IDF curves, Hydrograph routing through ponds & reaches, tailwater and culvert hydraulic calculation and infiltration systems.

Heastad Methods

Heastad Methods include a model series for vaious hydrology and hydraulic calculations in multiple individual platforms

PondPack: is used for storage design and flow routing.

<u>CulvertMaster</u>: is used for hydraulic design and analysis of barrels, different shapes and sizes, special tailwater considerations, and roadway overtopping,

<u>FlowMaster</u>: is used for design and analysis of pipes, ditches, open channels, weirs, orifices, and inlets.

<u>StormCAD</u>: offers gradually varied flow computations, inlet and gutter flow computations and profile manager, and headloss detailed reports by integration in CAD environment.

FloodWare:

Floodware is a detailed GIS tool for floodplain mapping, is developed under a contract with NYS Environmental Conservation for use by FEMA. This GIS tools extracts the spatial data from GIS, performs the basic hydrology calculations, and exports the flow discharge values to an input file usable for HEC-RAS model interface. Floodware uses two hydrology methods: USGS regression and NRCS CN. The model is very data intensive and uses high resolution digital elevation models (LIDAR) and survey data for generating the stream and floodplain geometry. This model is not available for public use.

Simple Method

The Simple Method (Schueler, 1987) is a method of pollutant load estimate from a site or drainage area. This method is used for stormwater runoff pollutant loads urban areas with minimal amount of information, including the subwatershed drainage area and impervious cover, stormwater runoff pollutant concentrations, and annual precipitation. With the Simple Method, land use can be broken up into specific land use areas and annual pollutant loads for each type of land can be calculated by utilizing their corresponding pollutant concentration.

This model provides a simple and easy to use tool for gross estimate of loading. The model provides a list of pollutant removal efficiency for various stormwater management practice groups, which allows a relative comparison of before and after treatment scenarios for the MS4 program implementation. It is noted however, that the calculations method provided in this document for multiple practices in series is not validated and for some variation of practices my result in unrealistic load reduction.

<u>WTM</u>

The Watershed Treatment Model (WTM) is a simple spreadsheet that tracks pollutant sources from various sources in urban and urbanizing watersheds. The model allows incorporating multiple treatment options and estimates their effectiveness in pollutant removal. The WTM can be used to estimate nutrients or sediment, help direct bacteria detective work, determine the effectiveness of watershed education programs; and target the future program in a Phase II community. The WTM spreadsheet does not contain a compiled source code and may be enhanced or customized based on the users need.

EPA Spreadsheet Models (STEPL)

Spreadsheet Tool for Estimating Pollutant Load (STEPL) and Region 5 model are two spreadsheet-based models developed for non-point source load evaluation. These models use simple algorithms to calculate nutrient and sediment loads from different land uses and the load reductions and factor in a load reduction based on BMP implementation. Scenarios can be set up for a watershed scale and calculations can provide result for surface runoff; nutrient loads, including nitrogen, phosphorus, and 5-day biological oxygen demand (BOD5); and sediment delivery based on various land uses and management practices. Both models are available for public use, support is not provided for these models, although the user-friendly interface and simplicity of the algorithms seem to be easy for any novice user.

Win-SLAMM

WinSLAMM (Source Loading and Management Model for Windows) is a mid-range empirical model for evaluation of stormwater runoff loading in urban watersheds. This modeling tool uses small storm hydrology method and calculates the runoff from rain events for any given period of time. The model pollutant loading from various land uses and allows the user to simulate the stormwater load reduction by incorporating control devices. The stormwater management practices provided in WinSLAMM include: infiltration, bio-filtration, street sweeping, wet detention ponds, grass swales, porous pavement, and catchbasins.

Win-SLAMM provides a useful tool for the MS4s to evaluate the implementation of their SWMPs in an easy and efficient manner. This user-friendly tool is built based on a comprehensive field data collected in urban areas. The latest version of this model include includes instruction on stormwater BMP modeling, including Better Site Design and Low Impact Development techniques. EPA report *BMP Modeling Concept and Simulation* discusses the details of these model features.

<u>P8</u>

The Urban Catchment Model, P8, is a mid-range model for estimating pollutant load and transport from urban runoff. This model provides a useful tool for watershed evaluation by single event or continuous simulation of rain event. The model can incorporate up to 24 sub-catchments and calculate the load using up to five particle sizes and ten water quality components. The model allows simulation of 24 stormwater management practices including swales, buffer strips, detention ponds (dry, wet, extended), flow splitters, and infiltration basins (offline and online).

GWLF

The Generalized Watershed Loading Function model (Haith &Shoemaker, 1987) is a lumped, mid-range, continuous simulation model that estimates runoff, sediment, and nutrient loading from a watershed for mixed land uses, The model also allows the user to incorporate point source and septic system loading.the given variable-size source areas. In runoff calculation the model uses SCS curve numbers for pervious areas, where in urban areas a runoff coefficient is employed. The model uses the USLE algorithm for each land cover area and calculates the sediment delivery ratio based on watershed size.

AVGWLF

GWLF has been linked to a GIS in several platforms. The most recent version of a GIS coupled version is the Penn. State AVGWLF. This model additionally includes an algorithm for streambank erosion routine based on estimation of watershed-specific lateral erosion rate. Several other improvements are made to improve the functions of the

original model engine. This model is calibrated for use in NY. Read about it <u>here</u>. The latest version of this model is being revised to incorporate an urban hydrology module.

<u>SWMM</u>

SWMM is an urban runoff hydrology, hydraulics, and runoff quality model, for singleevent or long-term simulation of watershed flow and loading processes. SWMM, by far is the most advanced and detailed design tool capable of flow routing and storage for surface, sub-surface, stormwater and combined sewer overflow conveyance and groundwater system, as well as treatment and application of stormwater management practices. The recent version of this model has an improved algorithm for Transport and Extran blocks, resulting in computations equivalent to HEC software as well as additional algorithms such as disconnecting flow from pipes and directing through BMPs.

This software is in public domain and Fortran source codes are available to end users. Numerous graphical user interfaces of this software are developed and distributed by various entities. Because all versions of the models are not necessarily approved by the regulatory agencies, users need to verify the status of the versions before application of the model where such compliance is required. The latest version of this model include includes instruction on stormwater BMP modeling, including Better Site Design and Low Impact Development techniques. EPA report *BMP Modeling Concept and Simulation* discusses the details of these model features.

BASINS

BASINS is a comprehensive watershed and water quality modeling tool for a multifaceted analysis of environmental problems at regional, state, and local level. This system was originally developed in 1996 as a host tool or interface for an integrated analysis of point and nonpoint source pollution and for targeting problem areas and evaluation of management option by utilizing simple to advanced model engines. The most recent version of BASINS includes AGWA, SWAT, PLOAD, AquaTox, and, HSPF models. The models can be used for simple watershed assessment to advanced load estimates, as well as well as in-stream water quality simulation of pollutant load and transport

processes. Although an efficient use of the more advanced features of the model requires sufficient expertise and can be labor intensive, it still is one of the most comprehensive, well supported, data incorporated, and widely used tools in public domain. BASINS is often used to support development of cost-effective approaches to watershed management and environmental protection, including TMDLs.

RUSLE

Revised Universal Soil Loss Equation, an empirical model for prediction of soil erosion by water, has evolved since its initial development in the 40s. This multiplicative model, A=R.C.SL.K.P, uses a series of unit-less factors such as rainfall erosivity factor (R), crop factor (C), soil slope and length (SL), soil erodibility factor (K) and management practice factor (P) to estimate the soil mass that is mobilized due to the energy of the raid drops. The latest version of this model, RUSLE2, is available in electronic format. This simple tool, originally developed for field scale agricultural land applications, is also used for urban or construction phase erosion control planning. Numerous non-point source and stormwater modeling tools use this method as their soil loss algorithm.

Many resources are available in the form of desktop software to commercial of public funded interactive calculation tools. The interactive tools provide easy access instantaneous calculation useful for variety of applications. The following are a few examples of such tools:

LandfillDesign.com

NYS Standards and Specifications for Erosion and Sediment Control

WEPP

The Water Erosion Prediction Project (WEPP) is a mechanistic model that simulates the soil erosion and transport processes based on the fundamentals of hydrologic and erosion mechanics. WEPP relies on an extensive use of rainfall simulators, incorporates hydrology, sedimentology, and the impact of channel erosion as well as management practices. This method include rill and inter-rill ersion as well as freeze/thaw process. The model contains three primary components: hillslope, channel, and impoundment.

The hillslope component calculates rainfall excess by a Green-Ampt, Mein-Larson infiltration equation; peak runoff rate by kinematic wave overland flow routing or simplified regression equations for predicting interrill erosion as a process of soil detachment by raindrop impact. The hillslope hydrologic and erosion outputs such as storm duration, time of concentration, runoff depth, volume and peak, total sediment detachment and sediment deposition at the end of the hillslope, as well as sediment concentration by particle size class are computed and then read in and used in simulation of sediment transport or deposition in the channels and impoundments. Considering the strengths of the WEPP method, it is predicted that it will replace the earlier methods of soil loss equations. This model is primarily suitable for agricultural and forestry application, although it has been applied to special urban scenarios such as construction sites, road-sides and land fills. An interactive version of <u>WEPP</u> is available online.

HSPF

Hydrologic Simulation Program, Fortran, is a mechanistic model with comprehensive calculation methods for watershed loading processes and in-stream interaction for a wide range of pollutants as well as contaminants. This model simulates both upland and instream erosion and sediment transport. The erosion algorithms use a detachment and wash-off equation for calculating soil loss and delivery. The model is capable of continuous and event based hydrology computations. The in-stream pollutant transport and sediment-chemical reaction are simulated using a one-dimensional hydraulic model. The model demands calibration and verification. This advanced planning tool is appropriate for watersheds with mixed land uses. HSPF model engine is available in DOS, Windows and also GIS environment as the NPS component of BASINS model.

Response to Comments on Draft SPDES General Permit for Stormwater Discharges from Municipal Separate Storm Sewer Systems (MS4s) GP-0-08-002 April, 2008

Instructions for a preliminary delineation of storm sewershed map:

A storm sewershed is a drainage area where the drainage boundaries are defined based on not only the surface topography, but also the topography of the sewer system. It can be looked at as a watershed which may have additional catchment area created by drainage system modifications. The point(s) of discharge and service areas are subject to the configuration of man-made structures and direction of conveyance systems, which do not necessarily follow surface topography. Evaluating their storm sewersheds can help the operators of the regulated municipal separate storm sewer systems (MS4's) identify and control the areas contributing to their outfalls and point out locations where adjacent MS4's discharge, pass-through or receive stormwater from the MS4. The following identifies the steps involved in a preliminary delineation of storm sewersheds.

Storm sewersheds are generally identified as either unsewered, combined, or separate, depending on the contributing storm sewer system. The regulated MS4 boundaries which are defined based on the census tracks meeting a minimum population density may be corrected to show the actual drainage area that contributes to the regulated separate systems and their outfalls. These boundaries may be extended or reduced to reflect the boundaries operated by each permitted municipality. A preliminary map of the storm sewersheds may be delineated using desktop tools (such as GIS) along with minimal field inspection. More detailed delineation involving field verification and further investigation is an ongoing activity of MS4s stormwater management programs.

- 1- Obtain Spatial Data
 - a. Hydrography dataset 1:24,000 or greater
 - b. Watershed and sub-watershed boundaries
 - c. Municipal boundaries
 - d. Regulated MS4 boundaries and surrounding/adjacent MS4s identified
 - e. Outfalls

The following datasets and images are helpful in data processing and as background information for interpretation and analysis:

- Roads
- Record Maps of existing storm systems (mapping databases if available)
- Historical drawing for approved storm sewer systems
- Wetlands
- Topo maps
- Planimetric map
- Ortho-photo or aerial photos
- Tax maps

- 2- Overlay the following data sets. The polygon features of the data layers may be intersected or united to form an output that contains the attributes of the full extent of all the datasets.
 - a. Regulated MS4 boundaries
 - b. Municipal boundaries
 - c. Watershed boundaries and Sub-watershed boundaries
 - d. Topographic maps
- 3- Examine the sewersheds by defining the distinct drainage areas within the regulated MS4. Example: Regulated stormwater discharges in the Town of Bethlehem fall under three watersheds (Figure 1):
 - a. Normanskill (HUC 02020006030)
 - b. Vlomankill Creek (HUC 02020006050)
 - c. Onesquathaw Creek (HUC 02020006060)
- 4- Evaluate individual drainage areas in relation with the receiving surface water and regulated outfalls. Starting from either the boundaries of regulated MS4 or outfalls, verify based on the natural topography and road configuration whether the system boundaries are correct or if additional drainage areas need to be added to the existing boundaries.
 - a. If the regulated MS4 areas are located on the upper part of the watershed and / or clearly do not convey stormwater from areas outside of the regulated area, the boundaries remain the same as the MS4 regulated areas. Example: Areas A discharging to the stream in the lowest part of the regulated MS4 in the Town of Bethlehem.

(Area A up to the watershed line in Selkirk in Figure 2)



Figure 1. Watershed delineation



b. If there is a municipal collection or conveyance system or a distinct topographic divide line indicating that greater areas contribute stormwater

discharges to the regulated outfall, then the boundary of the sewershed may be extended to the boundaries of the service areas. (Area B in Selkirk up to the divide line or road system in Figure 3)

- c. If multiple areas outside of the regulated areas contribute to the outfalls, owned and operated by the same MS4, discharging to different tributaries, collectively create a new sewershed line.
 Adding areas A and B (up to area B divide line in Figure 3) to the storm sewershed is recommended.
- d. If an area with stormwater connection is outside of the regulated MS4 boundaries, but is municipally owned and is a potential source of polluted runoff, it should be considered for adding to the sewershed line (Town garage area shown on figure 4).



Figure 3. Condition c



5- Evaluate individual drainage areas in relation with the receiving surface water and regulated outfalls and neighboring municipalities. Starting from the boundaries of the regulated MS4, based on the natural topography, road drainage, and interconnections with neighboring MS4s, verify whether the system boundaries are correct or greater drainage areas need to be added to or eliminated from the existing boundaries. Such determination is established via inter-municipal agreements.

- a. When a portion of the system drains to a combined sewer system, the actual drainage of the area may be identified accordingly in the storm sewershed map.
- b. Areas that discharge to a storm sewer system owned and operated by another MS4 entity (Transportation agency) may be identified accordingly in the storm sewershed map. Area A in Figure 5 discharges to the road operated by NYS Thruway Authority.
- 6- If any new lines are defined based on assumptions or topographic mapping, a field inspection would be necessary to verify the delineation to the extent practicable.



Figure 5. Multiple MS4 connection

7- Finalize the map by defining the storm sewershed line consisting of a single boundary line. This modified delineation of regulated MS4 boundaries represents a more accurate sewershed division line operated by the regulated municipality.

For available resources refer to Data Management instructions on DEC's website.