# New York State

# Stormwater Management Design Manual

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For:
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George E. Pataki, Governor  Erin M. Crotty, Commissioner

# Table of Contents

**Chapter 8. Stormwater Design Example**



**Appendices**

**List of Tables**



**List of Figures**

## Acknowledgments

The New York State Stormwater Management Design Manual was prepared under a joint effort between the New York State Department of Environmental Conservation (DEC), the Soil and Water Conservation Committee, and the Central New York Regional Planning and Development Board. Several individuals at these organizations were instrumental in the process of completing this Manual. Don Lake provided the vision to initiate the process, and has been an integral part of its development. Shohreh Karimipour was also indispensable, providing detailed guidance throughout the process and acting as a liaison between the Center for Watershed Protection, the DEC, and several other agencies that commented on the manual. Thanks also to Mike Rafferty, Ken Stevens and Phil DeGaetano who shaped the final outcome of the manual, and provided valuable insight on its potential role in shaping the way stormwater management is conducted in the State of New York.

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## Forward

On November 16, 1990, the initial federal NPDES stormwater regulations were established. These required certain industrial activities to obtain permit authorization in order to discharge site runoff. DEC, as the NPDES permit issuing authority in this State, promulgated two SPDES general permits for stormwater runoff in 1993, GP-93-05 for the more traditional industrial sites and GP-93-06 for construction sites.

GP-93-06 requires that an operator who is covered under the permit implement a stormwater pollution prevention plan (SWPPP) that has been developed for the particular site. The minimum components of the SWPPP include a variety of requirements, including both structural and non-structural practices, inspections, contractor certifications, compliance with narrative water quality standards and other conditions. The attention, concern and efforts being directed at stormwater management practices at construction sites are constantly growing as new technologies emerge and experiences with older ones is gained. Additionally, construction site runoff is gaining wider attention as the federal NPDES stormwater program progresses. There is an ever-growing need to disseminate information concerning practices that are acceptable in New York.

The scope of attention is broadening on a national scale to smaller construction sites as evidenced by the "Phase 2" stormwater regulations. Phase 2 lowers the threshold to one or more acres of disturbance, the runoff from which requires NPDES authorization for discharges to surface waters. Permitting will be required beginning on March 10, 2003. It's becoming more evident as time passes that there is a greater need for stormwater management practices that are technically effective and viable in New York State. "Spreading the word" to engineers, municipal officials, and the general public is crucial to the success of DEC's efforts in implementing the federal NPDES stormwater regulations and reducing incidences of water quality impairments.

Accordingly, permits that are issued in the future for construction site runoff will rely heavily on this new manual and the practices that are described therein. When properly designed and maintained, the implementation of these practices will become an important component of New York's overall stormwater management program. Adherence to the criteria and practices described will better ensure a successful implementation of stormwater controls and compliance with the SPDES general permit(s) issued for construction site runoff and maintaining water quality.

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# Preface

The New York State Stormwater Design Manual is prepared to provide standards for the design of the Stormwater Management Practices (SMPs) to protect the waters of the State of New York from the adverse impacts of urban stormwater runoff. This manual is intended to establish specifications and uniform criteria for the practices that are part of a Stormwater Pollution Prevention Plan (SWPPP).

This manual is intended primarily for engineers and other professionals who are engaged in the design of stormwater treatment facilities for new developments. Users are assumed to have a background in hydrology, hydraulics, and runoff and pollutant load computation. It is not intended to be a primer on any of these subjects. The manual may also be used by reviewing authorities to assess the adequacy of SWPPPs.

The manual is limited to the design of structures. It does not address the temporary control of sedimentation and erosion from construction activities, nor the development of Stormwater Pollution Prevention Plans. The reader is referred to the documents *"Reducing the Impacts of Runoff from New Development"* and *"New York State Guidelines for Urban Erosion and Sediment Control"* for guidance with these subjects.

Recommended Standards, consisting of proven technology, are intended to serve as a guide in the design and preparation of plans and specifications for Stormwater Management Practices, to suggest limiting values for items upon which an evaluation of such plans and specifications may be made by the reviewing authority, and to establish, as far as practicable, uniformity of practice. As statutory requirements and legal authority pertaining to stormwater management are not uniform across the State, and since conditions and administrative procedures and policies also differ, the use of these Standards must be adjusted to these variations.

The terms "shall" and "must" are used where the practice is sufficiently standardized to permit specific delineation of requirements or where safeguarding of the public health justifies such definite action. Other terms, such as "should," "recommend," and "preferred," indicate desirable procedures or methods, with deviations subject to individual consideration.

## Section 4.2 Water Quality Volume ($WQ_v$)

The Water Quality Volume (denoted as the $WQ_v$) is designed to improve water quality sizing to capture and treat 90% of the average annual stormwater runoff volume. The $WQ_v$ is directly related to the amount of impervious cover created at a site. Contour lines of the 90% rainfall event are presented in Figure 4.1.

The following equation can be used to determine the water quality storage volume $WQ_v$ (in acre-feet of storage):

$$WQ_v = \frac{(P)\,(R_v)(A)}{12}$$

where:

$WQ_v$ = water quality volume (in acre-feet)
P = 90% Rainfall Event Number (see Figure 4.1)
$R_v$ = 0.05 + 0.009(I), where I is percent impervious cover
A = site area in acres

A minimum $WQ_v$ of 0.2 inches per acre shall be met at residential sites that have less than 17% impervious cover.

**Figure 4.1 90% Rainfall in New York State**

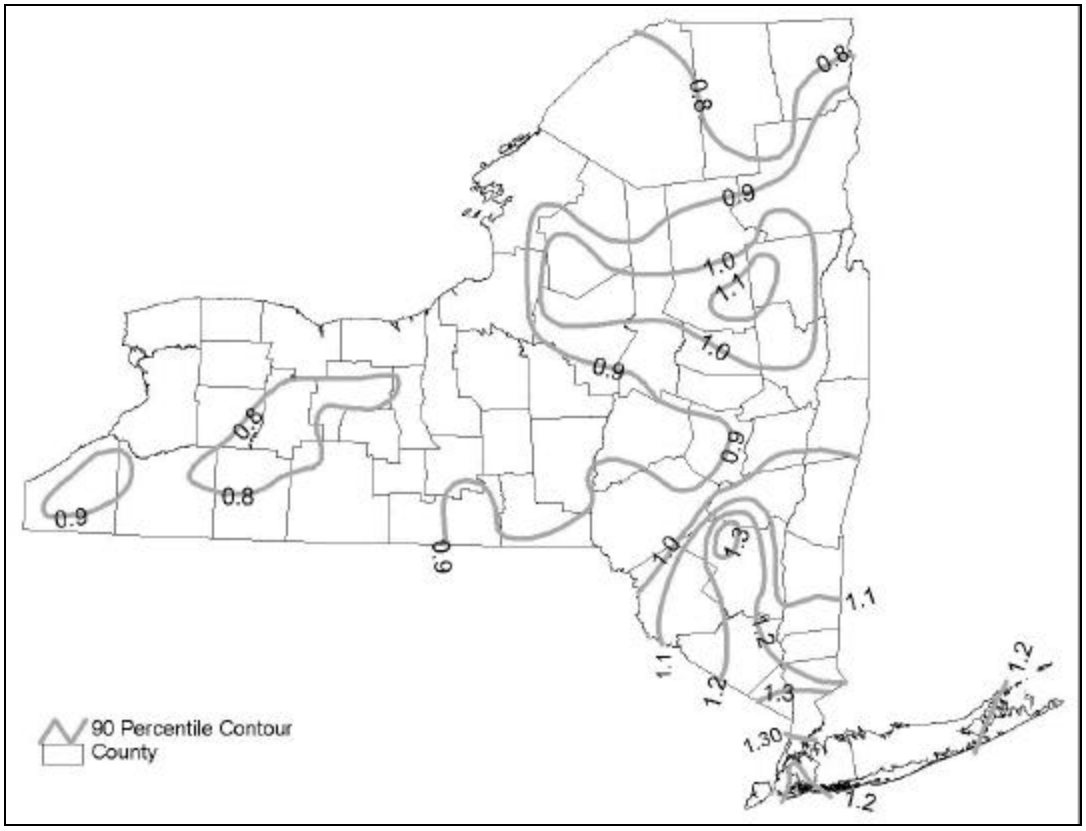

**Figure 4.4 One-Year Design Storm**