

PROPOSAL

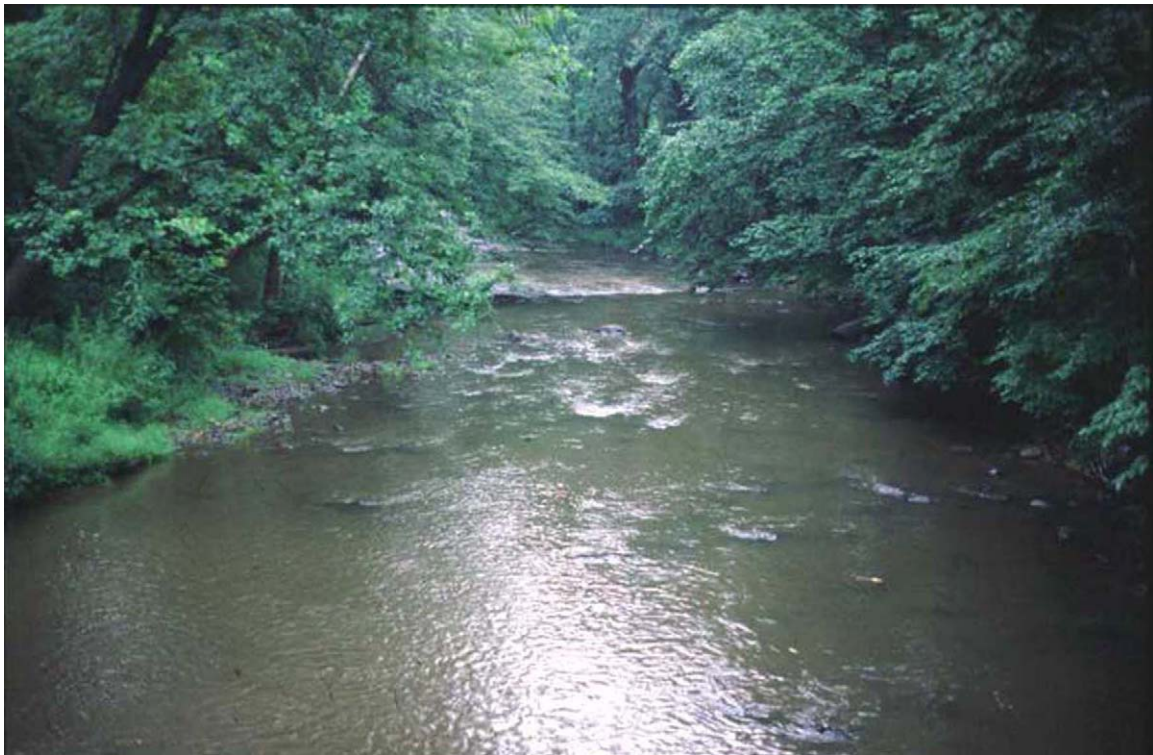
*The Development of a Stormwater Best Management Practices Manual
to Support the Implementation of EPA Phase II Stormwater Management Requirements and Statewide
Stormwater Management Program*

Submitted to

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Section II-1

**Statement of the
Problem**

STATEMENT OF THE PROBLEM

In Pennsylvania and across the nation, a new understanding of stormwater and its many issues has emerged. The stormwater problem with all of its water quality and water quantity aspects is being viewed in ways which contrast dramatically with the past. And with this new appreciation of the stormwater problem, there comes the need for equally out-of-the-box solutions. Stormwater management is changing. Pennsylvania's Stormwater Management Program, including its new Comprehensive Stormwater Management Policy and the proposed Manual, embody these changes. The issues of quality, groundwater recharge, better design practices, and small storm management must be addressed in addition to the large storm and flooding issues.

The challenge is enormous and the need for education is a critical part of this program. Municipal and county officials and policy makers need to understand the issues and have the tools to make the new Stormwater Management Policy work for their local watersheds. Designers and municipal engineers need to understand the specific "how-to" methods for both design and construction. And developers, homebuilders, and land owners need to understand how better design and stormwater management can work for them, both economically and in terms of a better finished product. We believe effective training and workshop efforts are absolutely critical for the success of this Manual.

We also believe that this Manual needs to take the "next step" beyond the many other BMP Manuals available, and truly serve as a design manual. Many manuals provide a wealth of information on both non-structural and structural BMPs. While these manuals offer a "cookbook" of good ideas, they do not tell the user how to put these ideas together into a program: how to select the best techniques for a particular project, how to develop the mathematical "stormwater calculations", or how to build and maintain BMPs. We believe that this Manual needs to provide a design process for the user, and provide a methodology that takes the user from the first step of evaluating the site and incorporating planning concepts, through the selection of the appropriate structural BMPs and detailed stormwater calculations, and all the way to the detailed design, construction and maintenance of the stormwater program. And this Manual needs to speak to an audience that includes both technical designers and reviewers, as well as the larger non-technical audience. It needs to address both new development and re-development, in urban, suburban, and rural areas. This is no small challenge, but we believe that nothing less is required for the successful implementation of the Stormwater Management Policy, compliance with the federal Phase II requirements, and the protection and restoration of Pennsylvania's waterways.

Historical Stormwater Practice and the Challenges for this Manual

A variety of Best Management Practices (BMPs) Manuals have been produced by various Federal, State and local agencies over the past twenty-five years, all intended to guide designers in the selection of appropriate measures that reduce the impacts of uncontrolled stormwater runoff from new development. However, many local ordinances focus primarily on peak rate attenuation for large storms, and so most projects develop stormwater management designs that are quite specific in designing a structure that accomplishes the objective of peak rate control. Additionally, both the designers and the technical reviewers are usually engineers who are

familiar and comfortable with this concept and with the techniques of design and calculation for peak rate attenuation.

As the understanding of stormwater impacts has evolved to include issues of water quality, BMP Manuals have added measures that attempt to reduce pollutant loadings through the addition of basic physical processes and functions. Often it has not been clear when a desired level of water quality has been achieved in stormwater runoff, and even less often is it clear if the measures selected are most appropriate for a given location and given application. In many cases, the set of measures recommended for a project are primarily limited to rate control, with limited guidance for water quality. Guidance is often not indicated to suggest how to combine the various measures to achieve the desired design criteria, or even exactly what these criteria may be, other than not exceeding the pre-development runoff rate for a major event. The end result has been a “Chinese menu” approach to stormwater management, with little specific guidance provided beyond the sizing of the detention basin.

The current state of water quality in many rivers, streams and lakes, as well as the negative impacts to streambanks and the worsened flooding conditions has confirmed that peak rate attenuation alone is not enough. The Pennsylvania Comprehensive Stormwater Policy recognizes this, and recognizes the need for “stormwater to be an integral part of progressive water resource management”. The effects of lost groundwater recharge, increased flow volumes, stream channel degradation, water quality impairment and worsened flooding have been recognized in Pennsylvania. The new policy seeks to improve water quality, sustain quantity (including recharge and stream baseflow) and integrate federal stormwater management obligations.

With this new understanding of the many different aspects of the stormwater problem, there is a recognition that stormwater management is infinitely more complex as well. There are compelling ways to minimize and even prevent stormwater generation from the outset through the nonstructural approaches. Through creative clustering provisions and protection of important natural features such as riparian buffers, stormwater quantity can be reduced and quality improved. A variety of techniques may be used to reduce imperviousness. Better regulations can promote the application of minimum disturbance/minimum maintenance site development which not only reduces stormwater generation but even offers opportunity for direct management itself. Pennsylvania’s new stormwater management manual must embrace all of these nonstructural approaches and present them in a way that they are recognized by both the designer and reviewer as “stormwater management”.

Even with nonstructural approaches and every effort to reduce stormwater generation, clearly stormwater will continue to be generated and mitigation will continue to be necessary through structural BMPs. Making sense of this array of nonstructural approaches and more specific structural practices is a challenge. In a world of tremendous complexity, confronted by a wide variety of sites and a wide variety of different building proposals, how do we optimize stormwater management? How do we pick from this longer and longer list of different approaches and practices?

And most importantly, because Pennsylvania land development decisions are largely made on a municipal basis, how do we provide municipal officials, designers, and municipal engineers with the tools and techniques to achieve this at a local level?

The Cahill Team recommends that a new Site Planning and Design Procedure be developed, as illustrated in Figure 1-1. This Procedure sets out a process that we believe should be followed for integrating stormwater management into the site design process from the initial steps of site design and building program development. All aspects of nonstructural and structural management systems are taken into account. The process begins with an understanding of the natural systems of the site itself, including both the challenges as well as the opportunities posed by the site. All possible mechanisms for preventing generation of stormwater then are evaluated. Once prevention is maximized, the most effective, simplest, least costly practices for satisfying water quantity (volume and peak) and quality objectives for the specific site are determined. A “Worksheet” approach using a desktop computer model is provided for both the designer and reviewer to determine compliance with all elements of rate attenuation, ground water recharge, and water quality. And finally, specific guidance for design, construction, and maintenance is provided.

Accomplishing change in the nearly 2,600 municipalities comprising the Commonwealth is a significant challenge. But we believe that this Stormwater Management Manual can be the vehicle for that change.

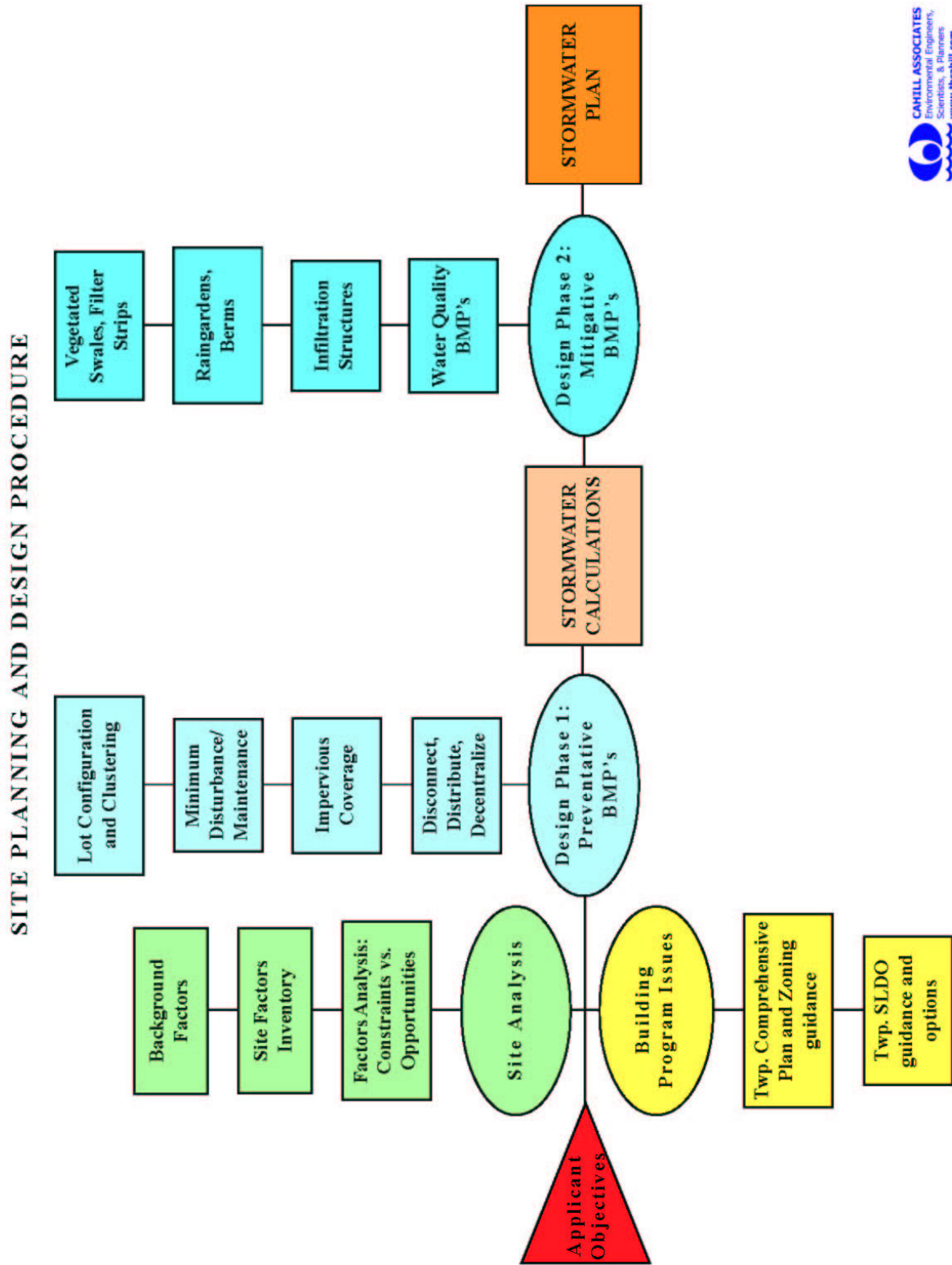


Figure 1-1 Site Planning and Design Procedure