

SECTION I: FORWARD

A. Introduction

This report was developed for Tredyffrin Township as part of a hydrologic and hydraulic analysis of the Trout Creek watershed, to develop a hydrologic model of the watershed, to prioritize and evaluate conceptual stormwater BMP retrofits, to develop preliminary design plans for two stormwater Best Management Practices (BMP) retrofit projects within Tredyffrin Township, and to assist the Township in developing a Trout Creek educational document. The Trout Creek watershed is located in the northeastern section of Chester County, Pennsylvania, with a small portion of the tributary located in southwestern Montgomery County where the creek discharges into the Schuylkill River. Although the watershed extends into Montgomery County only the Tredyffrin Township portion of the watershed is the subject of this study.

B. Stormwater Management

Until recently, stormwater management controls were concerned mostly with site-specific or localized controls. However, advances in modern stormwater management strategies now encourage a more comprehensive approach to managing stormwater runoff. This comprehensive approach to stormwater management encourages the evaluation of the effects of stormwater runoff from upper portions of the watershed on downstream receiving watercourses (i.e., analyzing the impacts of local development in a watershed's headwaters on flooding downstream) and the interaction of stormwater runoff from one portion of the watershed with stormwater runoff from another portion of the watershed. Effective stormwater management reduces flooding, minimizes streambank erosion and sedimentation, recharges groundwater supplies, and improves the overall quality of the receiving streams. To accomplish effective stormwater management requires implementation of both non-structural and structural BMPs to control surface runoff and preserve the water resources within the Township. Non-structural controls are those controls that require little or no construction to implement, such as disconnection of downspouts from gutters or storm sewer, street sweeping, reduction of impervious surfaces, and protection of sensitive environmental features. Conversely, structural stormwater BMPs are physical features constructed within the watershed such as stormwater wetlands, bioretention islands (rain gardens), infiltration areas, green roofs, and stormwater basins intended to control the rate, volume or quality of the stormwater runoff. A secondary objective of this study is to identify locations and the types of stormwater BMPs that may be constructed within the watershed.

Typically, BMPs are placed into newer land development to manage stormwater runoff. However, installation of BMPs is also encouraged for existing developments to address stormwater quality, streambank erosion and groundwater recharge. Historically these areas were typically overlooked in many stormwater management designs before implementation of the current BMP stormwater control philosophy. As stormwater BMPs can take on many different shapes and forms such as placed either above ground or below ground, consist of structural or nonstructural methods, control an individual or multiple properties or buildings, BMPs are ideally suited to fit into existing developments to enhance existing stormwater management controls and possibly augment existing aesthetics.

Proper planning, engineering, construction, operation and maintenance are all necessary elements of any effective watershed wide stormwater management program. This report and the corresponding analysis is presented as a planning tool intended to identify a means of improving the stormwater management within the Trout Creek Watershed to preserve existing resources and mitigate the impacts of stormwater runoff within the Tredyffrin Township portion of the watershed.

C. Scope of Work

The scope of work for this project was broken down into four major phases:

Task I. Existing Conditions Hydrologic Analysis of the Trout Creek Watershed

Task I focuses on understanding the existing condition of the watershed with the ultimate goal the creation of a watershed hydrologic model. To complete this phase of the project following subtasks were conducted:

1. Review the Trout Creek Watershed Restoration and Protection Plan and other documents such as Chester County's water resource planning document "Watersheds" and FEMA's Flood Insurance Study (FIS) for Chester County for data useful to this study.
2. Perform a field visit to verify existing stormwater conditions, observe problem areas, understand spatial orientation within the watershed and obtain field measurements of key features within the watershed related to problem areas and stormwater management.
3. Meet with the Township Staff to discuss existing conditions, stormwater problem areas, flooding, streambank erosion, water quality problem areas and the development of the hydrologic model.
4. Collect watershed related data from the Township other relevant agencies (USGS, DEP, PASDA, etc.) and develop a hydrologic model of the watershed to evaluate the hydrologic response of the watershed to a series of design storms.

Task II. Analysis and Prioritization of Potential Stormwater BMP Retrofits

Task II concentrates on identifying conceptual stormwater management features that can be placed within the watershed to better manage stormwater runoff. It further seeks to recognize important factors necessary to identify two projects with the greatest potential for immediate application within the watershed. Subtasks associated with this phase of the project include:

1. Work with the Township staff to develop a process to evaluate potential retrofit projects and locations and Stormwater Best Management Practices to address flooding, streambank erosion, and water quality impairment in the watershed.
2. Identify a preliminary list of potential stormwater BMP retrofit sites and narrow the preliminary list of sites to a minimum of 10 sites for conceptual evaluation and evaluate conceptual BMPs for the 10 sites using the aforementioned evaluation process. The hydrologic model developed in Phase I, was used to complete a portion of the evaluation

3. Coordinate with the Township to develop a list of criteria and weighting used to evaluate the effectiveness of conceptual retrofit projects.
4. Assist the Township in narrowing the 10 conceptual retrofits down to five sites with the greatest potential for achieving the Township's stormwater management objectives for the project as identified using the evaluation criteria developed in this phase.
5. Assist the Township in narrowing the top 5 sites to 2 sites best suited for the development preliminary plans.

Task III. Preliminary Design Plans

Task III advances two of the conceptual designs, with the greatest potential for success, into preliminary design and the development of plans and supporting calculations. This phase will move two of the conceptual designs closer to implementation within the watershed. Task III consists of the following subtasks:

1. Development of the plans will include preparation of supporting calculations and completion of hydrologic analyses of the proposed facilities using the watershed's hydrologic model prepared in Phase I.
2. Design of innovative stormwater best management practices that are consistent with the Pennsylvania Stormwater BMP Manual and Tredyffrin Township's standards and requirements.
3. Preparation of a Preliminary Design Package which includes:
 - Existing Conditions Plan
 - Erosion and Sediment Control Plan, compliant with CCCD and PADEP Chapter 102 Regulations and Chapter 181 of the Code of Tredyffrin Township
 - Stormwater Management Plan, compliant with PADEP NPDES permit requirements and the requirements of Chapter 181, Appendix I – Stormwater Management of the Code of Tredyffrin Township
 - Construction Details Plan
 - Stormwater BMP Retrofit Report for the Final two sites
4. Development of an engineer's estimate of probable construction costs.

Task IV. Educational Document

This phase of the project focuses on assisting the Tredyffrin Township with the development of educational opportunities geared specifically to the Trout Creek Watershed and improving stormwater management within the watershed. The assistance will focus not only on the content but also the best format to convey the importance of better managing stormwater runoff within the watershed.