



Executive Summary

Initiatives for the Protection of the Swift Creek Reservoir Watershed

Introduction

Chesterfield County conducted an assessment of the conditions of the Swift Creek Reservoir Watershed in 1989. Three years later, the Board of Supervisors adopted goals to protect the Swift Creek Reservoir and established a Watershed Management Committee that included citizen and staff representatives. This committee was charged with identifying strategies and alternatives to protect the reservoir. Based on recommendations from the committee in 1997, the Board established through ordinance, a phosphorus loading limit of 0.22 pounds per acre per year (lbs/ac/yr) for new residential development and 0.45 lbs/ac/yr for nonresidential development. These loading limits were established by setting a 0.05 milligrams per liter (mg/L) in-lake phosphorus limit and calculating an allowable annual phosphorus input load. The Board also directed staff to prepare a regional master plan that included a *funding strategy* requiring the development community to fund the construction of regional facilities. Additionally, development within the watershed was to fund the *maintenance* of the regional facilities.

In 2000, the Board unanimously approved the regional master plan called the *Watershed Management Master Plan and Maintenance Program*. The *Watershed Master Plan* was developed to meet the goals and strategies set forth in Watershed Management Plan of 1996 through the construction of a system of regional stormwater treatment facilities. One of these facilities, the regional in-stream pond component was to provide the greatest reduction of pollutants.

In January 2006, the use of regional in-stream ponds met with resistance from federal regulatory agencies. During a meeting with the regulatory agencies, staff was advised that the in-stream regional pond component would not receive permitting and any future regional facilities would require off-line construction.

Description of the Swift Creek Reservoir and its Watershed

The watershed, with portions of three magisterial districts overlaying its boundaries, encompasses 64 square miles or approximately 42,000 acres. The largest area, 85% (35,000 acres) is contained within Chesterfield County with the remaining 15% in Powhatan County. The delineation of the watershed drainage boundaries, which incorporates three comprehensive

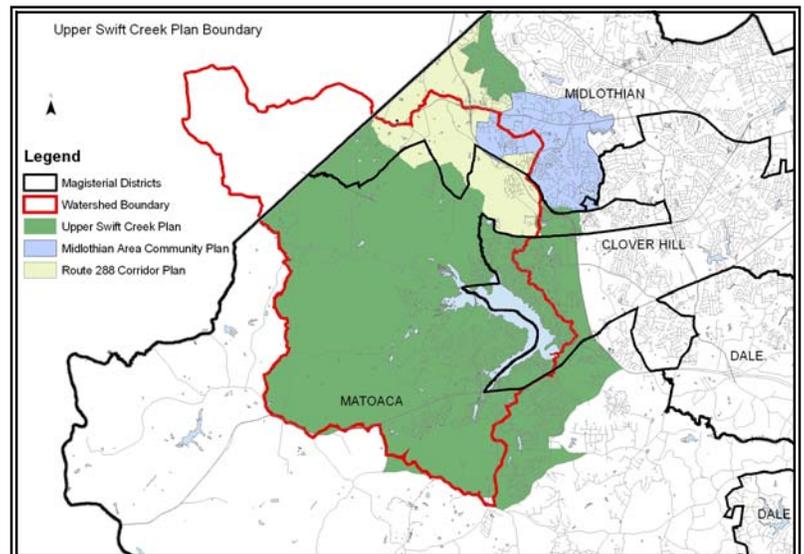


Figure 1. Area and Boundary Map

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land-use area plans (see **figure 1**), is important because that boundary defines the portion of the county to be considered when establishing protection measures for drinking water.

Modifications to the Watershed Master Plan

The *Watershed Master Plan* is in its 6th year of implementation. The regional in-stream pond component would have provided the greatest portion of storm water quantity and quality control for the protection of the reservoir. The inability to use this type of treatment, due to regulatory actions from federal agencies, greatly impacts the plan's performance. Staff has identified a framework of tasks and steps needed to modify the plan to meet the regulatory challenges and to provide opportunities to further protect the reservoir. A brief discussion of the progress as well as the needed modifications follows.

The modifications can be grouped into three main tasks: 1) the requirement of new construction to address stormwater management on-site, 2) acquire additional detail information on current and future land-use phosphorus contributions and 3) modifications to the *Watershed Master Plan*.

I. On-site Stormwater Management

On February 14, 2007 the Board amended county ordinances requiring developers to treat stormwater runoff on-site and allow the use of alternative treatment measures to control pollutants if necessary. This effectively removed the requirement of developers to participate in the payment of the regional ponds while still allowing regional facilities to be built off-line when appropriate.

II. Determine Phosphorus Load Contributions to Reservoir

Understanding current and future potential pollutant loads to the reservoir is essential for the development of a successful watershed management program. Staff working in conjunction with consultants revised the existing watershed models to determine phosphorus load contributions to the reservoir as well as predicting in-lake phosphorus concentrations under current and future levels of land-use development.

Based upon the most recent land-use information, staff determined the current or "base" load of phosphorus entering the reservoir. This base load information was then used to predict the anticipated phosphorus associated with future development. The total annual load contribution for existing and future development draining to the reservoir is 43,000 lbs/yr.

The regional in-stream pond facilities were intended to reduce this load to a level that met the county's in-lake phosphorus limit of 0.05 mg/L. In the absence of regional in-stream pond facilities the Board, on February 14, 2007 reinstated on-site stormwater controls. The required on-site stormwater load reduction was applied to each of the land use categories. This reduction resulted in annual load contribution exceeding the target load limit by approximately 4000 lbs/yr at ultimate build out under the current and proposed land use plans. The reduction of this load will be required to ensure that the

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future loads are further reduced to meet the required level of protection to maintain the county's in-lake phosphorus concentration on 0.05 mg/L.

III. Modifications to the Watershed Master Plan

The stormwater site design practices and techniques outlined below identify methods to further limit and reduce pollutant loads from both future and current development. Many of these strategies may be easily incorporated into the *Watershed Master Plan* while others will require additional studies, training and an implementation program.

Stormwater pollution is directly related to the amount of impervious surface within a development. The reason for this is conventional storm water controls use these areas to collect, concentrate and convey stormwater prior to discharge to a waterbody. Reducing impervious surface reduces the amount of runoff and limits the pollutant concentration resulting in the protection of county waters and the reservoir. The following will aid in reducing impervious surface starting with a review of existing county ordinances.

- **County Ordinances (Site Plan and Subdivision):** A preliminary review of county ordinances has identified several ordinances which could assist in the reduction of pollutant loads from new development. A more comprehensive review of the county's ordinances will be conducted to determine those areas where modifications may help to improve stormwater runoff.
- **Preservation and Restoration of Natural Cover and Areas:** Retaining the existing natural conditions such as vegetation, soils and wetlands provide a natural and cost effective way to manage stormwater quantity and quality.
- **Low Impact Site Design Techniques:** LID is a site design strategy with the goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques to create a functionally equivalent hydrologic landscape.
- **Utilization of Natural Features for Stormwater Management:** Traditional stormwater systems are designed to collect, concentrate and convey storm flows efficiently away from the development. Natural drainage patterns tend to be ignored and replaced with structural controls. A nontraditional approach would seek to incorporate the sites existing natural features. These could include natural drainage patterns, depressions, permeable soils, wetlands and vegetative areas. This would reduce the number of structural controls and provide for more natural stormwater control of infiltration, pollutant filtration and maximize on-site stormwater storage.

The above measures will help to minimize the pollutant loads from future development by controlling the pollutants at the source. That portion of the future loads which can not be reduced as part of the on-site treatment and is in excess of the target

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load limit is referred to as the 'orphan load'. The reduction of load will need to be addressed through county run projects. The program will be executed through funds collected as part of the pro-rata fees. Many of these projects will be regional in nature and aimed at reducing identified pollutants loads.

- Regional facilities other than in-stream ponds
- Provide treatment for existing phosphorus loads
- Retrofit culverts and drainage systems, including vegetated open channels
- Compensatory mitigation projects
- Education and incentive programs for existing homeowners to improve stormwater quality on individual lots and open spaces
- Pollutant trading or credit program

Watershed Master Plan - Financial Summary

Capital Program: Pro-rata Share Program for the construction of the regional BMPs as of 12/31/06

Revenues

Pro-rata Fees	\$1,831,800
General Fund	<u>\$506,400</u>
Total Revenue	\$2,338,200

Expenses

Planning & Design	\$191,401
Permitting	<u>\$811,429</u>
Total Expenses	\$1,002,830

Balance **\$1,335,370**