SECTION 1 INTRODUCTION

1.1 BACKGROUND

The Howard County Department of Public Works (DPW), as part of its mission and responsibilities for protecting and restoring the County's streams and water resources, has undertaken this study to develop watershed restoration implementation plans for the subwatersheds draining to Centennial and Wilde Lakes, located within the Little Patuxent River watershed. This effort supports the County's responsibility to target watershed restoration activities within subwatersheds representing 10% of the County's impervious area, as outlined in its current National Pollutant Discharge Elimination System (NPDES) permit. The NPDES permit requires the County to develop a restoration plan for both subwatersheds and to begin implementation efforts in one of them by June 2005. This study will also support County and State efforts to implement a total maximum daily load (TMDL) strategy for Centennial Lake and address nutrient management and water quality impairment concerns in both lakes.

Centennial Lake is listed on the State of Maryland 303d list of impaired waterbodies and has a TMDL for sediments and phosphorus (Maryland Department of the Environment, 2001). The water quality goal of the TMDLs is to reduce long-term phosphorus and sediment loads to acceptable levels in order to control water quality problems such as excessive algal blooms, and low dissolved oxygen levels. Management for these conditions will also improve the Lake's aesthetic condition and preserve its value as a significant recreational resource for County residents. Though it does not have a TMDL, Wilde Lake has been affected by sediment loads and associated nutrients, and is also a significant recreational resource for the County and Columbia Association (CA). In both lakes, nonpoint sources of pollution stemming from stormwater runoff and associated stream channel erosion are the primary management concern. Nutrient loads from residential areas in the Wilde Lake subwatershed and from agricultural areas in the Centennial Lake subwatershed are also of concern.

1.2 STUDY PURPOSE AND SCOPE

This report outlines a series of recommendations for watershed restoration and protection in the two lake watersheds, describes management strategies, and identifies priority projects for implementation. Planning level cost estimates are provided where feasible, and a preliminary schedule for implementation over a 5-year horizon is outlined. Financial and technical partners for plan implementation are suggested for various recommendations and projects.

This study builds on past County and State efforts to assess conditions in the Little Patuxent River watershed, and takes these efforts to the next level by looking at subwatershed-scale conditions and opportunities within the two lake drainages and developing practical implementation plans. Previous studies have examined the Little Patuxent drainage as a whole, with an emphasis on structural runoff controls and addressing the worst problem areas throughout the watershed. This study takes a closer, more detailed look at the two drainage areas to the lakes, with the objective of developing a comprehensive implementation plan for a variety of smaller-scale projects, such as habitat improvements and some potential stormwater retrofits. The management strategies developed for each of the watersheds address conditions both in the upland areas of the watershed to identify potential nonpoint pollutant sources and opportunities

for improving runoff controls, and in the stream channels themselves, to identify erosion and habitat problem areas that can be addressed to improve aquatic resources and reduce sediment loads from channel erosion.

The draft implementation plan presented here is intended to assist the Howard County government, Columbia Association, and watershed stakeholders in moving forward with "on-the-ground" implementation of stormwater treatment practices, residential and municipal stewardship, and restoration recommendations. Specific locations and recommendations are made for projects and actions to be taken to improve the health of the lakes and the local neighborhood streams that drain to them.

1.3 CENTENNIAL AND WILDE LAKES SUBWATERSHED DESCRIPTIONS

Centennial and Wilde Lakes are two suburban subwatersheds located in Howard County. Wilde Lake is a highly developed subwatershed located in one of the original sections of the planned town of Columbia, Maryland. Centennial Lake is a less densely developed subwatershed containing mostly low-density residential development and low-intensity agriculture. More details on each subwatershed are provided below, and maps are provided in Figures 1.1 and 1.2.

Centennial Lake Subwatershed

Centennial Lake is a man-made impoundment located near Columbia, north of Route 108 and west of Route 29 (Figure 1-1). The lake, located just north of the Town of Columbia boundary, was constructed in 1985 for the purposes of flood control and recreation. It has a drainage area of 3.47 sqare miles that is composed primarily of low- to medium-density residential development (35%) and agricultural land uses (39%), with the remainder in herbaceous cover, forest, or water bodies (Maryland Office of Planning, 1997).

The Centennial subwatershed consists of two main tributaries and associated headwater streams—Clarks Creek (Reach A) and an unnamed tributary (Reach D). Existing subwatershed imperviousness is 9% and future imperviousness is projected to be slightly over 10%. Although minor, this increase is potentially enough to change the current "sensitive" management category to "impacted," as described further in Section 2 of this document. This change in impervious cover makes this subwatershed a high priority for targeting stormwater treatment practices and habitat protection and restoration approaches.

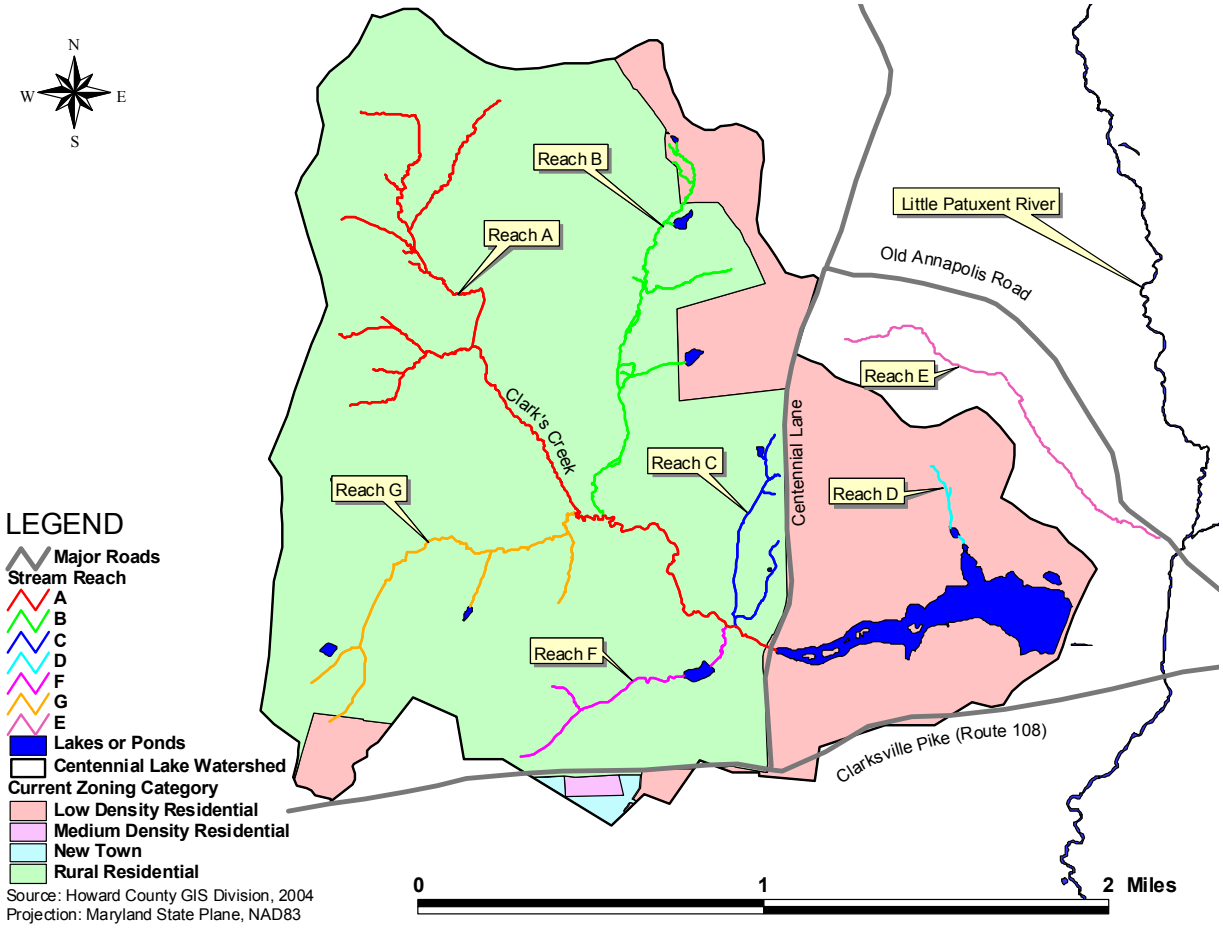

Figure 1.1 Centennial Lake Subwatershed

Wilde Lake Watershed

Wilde Lake is a man-made impoundment located in the Village of Wilde Lake, the first of Columbia's nine villages and Town Center. The lake was constructed as a regional stormwater facility, and consistent with policies at the time, most development above the lake was constructed with no on-site stormwater management controls. The streams in this subwatershed exhibit moderate to severe erosion due to this lack of stormwater control, and efforts have been made to control this erosion in several of the main tributaries. Several stormwater control facilities have also been constructed as retrofits and through redevelopment. The drainage area to the lake is 1.9 square miles, consisting of medium- to high-density residential development and commercial and institutional uses. Existing subwatershed imperviousness is 32%. The subwatershed is fully developed and no change is projected in impervious cover. The high level of imperviousness and existing levels of stream degradation place this watershed in the "nonsupporting" management category, as explained further in Section 2. Despite the overall high level of imperviousness in this subwatershed, many streams in the local neighborhoods still maintain fair habitat conditions, and this subwatershed is a priority for restoration because of the high potential for community involvement in restoring neighborhood streams and the need to reduce sediment and nutrient impacts to Wilde Lake.

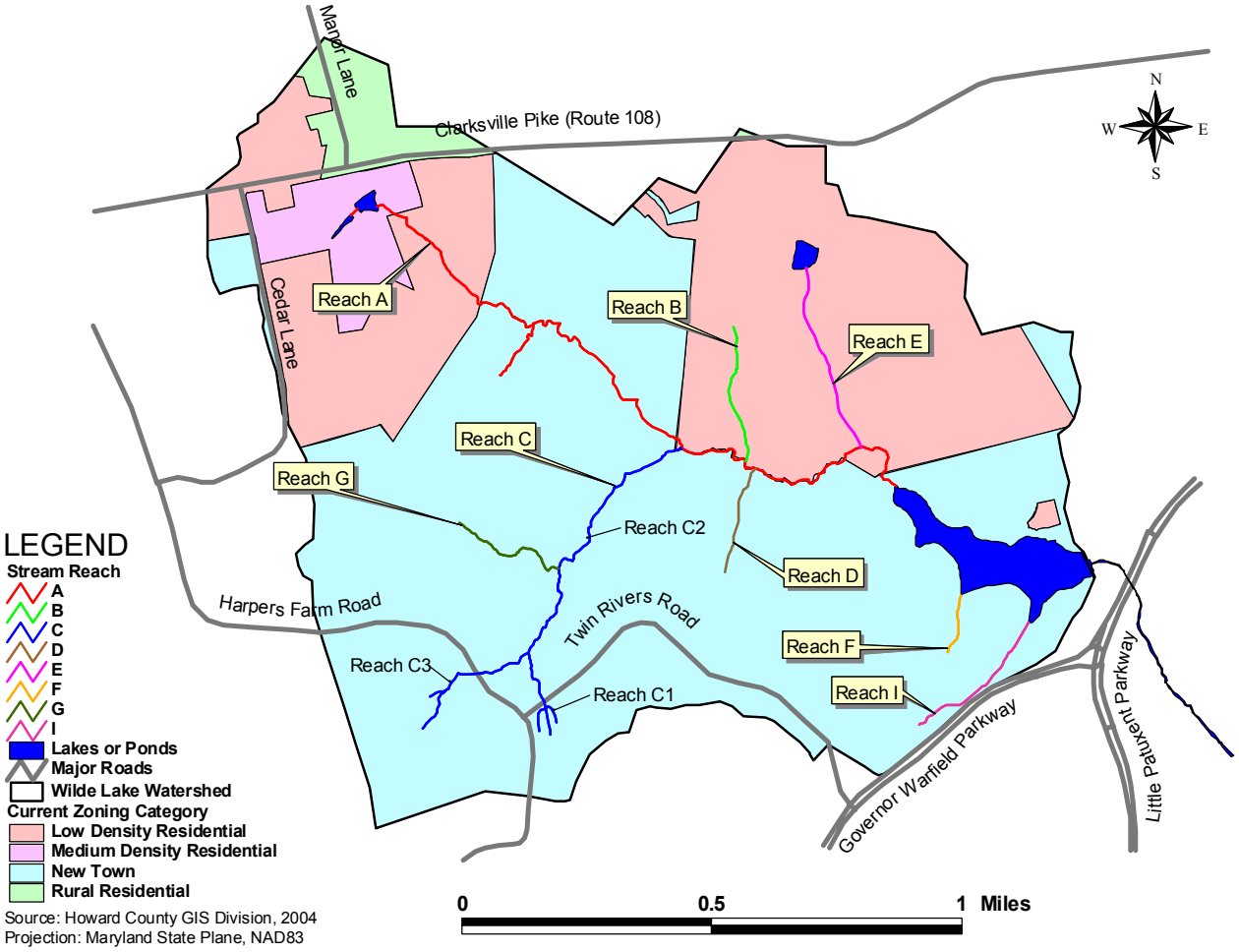

Figure 1.2 Wilde Lake Subwatershed

1.4 EXISTING STUDIES AND TECHNICAL INFORMATION

A number of existing reports and studies have been performed for the Centennial and Wilde Lake subwatersheds. These studies are listed below, with a brief description of the more relevant findings pertinent to the current study.

Centennial Lake 1996 Monitoring Program. Coastal Environmental Services, Inc. January 1997.

This study conducted limited sampling of Centennial Lake as a follow-up to the 1995 study and confirmed that phosphorus is the nutrient of concern for eutrophication and algal blooms in the lake.

Howard County Watershed Prioritization. Final Report. Tetra Tech, Inc. and Center for Watershed Protection. November 2004.

This study conducted an impervious cover analysis on 62 subwatersheds covering Howard County, to develop a priority ranking system and select subwatersheds for

further restoration efforts. The study was in direct response to requirements in the County's current NPDES permit. The ranking study resulted in the selection of Centennial and Wilde Lakes to fulfill the permit requirement of conducting measurable restoration activities in subwatersheds representing 10% of the County's impervious cover.

Little Patuxent River Watershed Restoration Action Strategy (WRAS). Howard County Department of Public Works in cooperation with Maryland Department of Natural Resources. January 2002.

The WRAS, conducted cooperatively with the State Department of Natural Resources, includes a watershed restoration plan and implementation strategy for the 51-square-mile Little Patuxent River. The watershed characterization compiled and analyzed existing information on water quality, land use, and living resources for the large watershed and fourteen subwatersheds. Biological information was compiled for three broad subwatersheds delineated for the upper, middle, and lower Little Patuxent. Information on the location of specific environmental problems was limited. The plan resulted in many overarching recommendations that have been the basis of the County's efforts to organize subsequent watershed implementation programs.

Phase I Diagnostic/Feasibility Study of Centennial Lake. Coastal Environmental Services, Inc. December 1995.

The purpose of this study was to identify and document the sources and nature of water quality degradation to the lake and outline alternatives that could be implemented to restore the system. The study found that land development activities occurring primarily when the lake was built had delivered large amounts of sediment to the system, along with ongoing impacts from continuing development and agricultural activities.

S*tormwater Management Pond Retrofit Assessment—Little Patuxent River Watershed*. KCI Technologies, Inc. March 1997.

This study examined a number of existing stormwater facilities throughout the Little Patuxent watershed, including three within the Wilde Lake and Centennial Lake drainages. This study did not recommend any priorities in these two subwatersheds, because the focus of the study was on somewhat larger pond retrofits.

Wilde Lake Stream Evaluation and Sediment Study. Heil, Thomas M., and Peggy Johnson. University of Maryland Department of Civil Engineering. August 1995.

This study provides a detailed sediment transport study of the stream channels flowing to Wilde Lake. The naming convention used in this study for stream reaches is also were used in the current study. Several reaches where stream stability was an issue are identified – reaches B, C, and D. The study focused primarily on the stream reaches and rather than on upland areas or comprehensive management approaches. The study concluded that sediment loads to the lake should not impair its current uses for at least the next 20 years; however, the study did not delve into water quality analysis.

1.5 REPORT ORGANIZATION

The rest of the report is organized as follows:

Section 2 presents the stakeholder goals for the subwatersheds and outlines the management categories and types of watershed protection and restoration practices recommended for the Centennial and Wilde Lake subwatersheds. Protection practices include land conservation, impervious area reduction techniques, and reforestation and forested buffer enhancement and agricultural Best Management Practices (BMPs). Restoration practices include stormwater retrofits, stream corridor restoration, discharge prevention, pervious area restoration, pollution source control, and municipal practices and programs. More detail on stormwater retrofitting and concepts for priority projects can be found in **Section 4** and **Appendix A**. **Appendix B** provides more detail on stream corridor restoration, including costs and practice fact sheets. **Appendix C** contains supplemental information on pollution source control practices for residential, municipal, and business stewardship programs.

Section 3 presents the study methods and assessment results from the fieldwork conducted for this project. The methods covered include the unified stream assessment (USA), unified subwatershed and site reconnaissance (USSR), retrofitting evaluations, and lake assessments. A table outlining all potential project sites is included, with those selected for further study identified.

Section 4 provides subwatershed implementation plans for the two subwatersheds, including the identification of target areas and conditions, recommended project descriptions, and priority project concept designs. The implementation recommendations are based on watershed impacts observed during field assessments, physical watershed characteristics, and a brief review of existing programs and municipal capacity. Subwatershed maps and project tables are provided.

Section 5 provides guidance for implementation, cost estimates, and general recommendations on maintenance needs for the various treatment practices recommended.