Acknowledgments

The Cameron Run Watershed Plan was developed with the assistance of the Cameron Run Citizen's Advisory Committee. We wish to thank the following individuals and organizations for contributing their time and knowledge in developing this draft plan:

Dave Eckert, Falls Church Stream Stewards

Diane Davidson, Lake Barcroft Association

George Madil, Bren Mar Park Civic Association

Kent Baake, Bren Mar Park Lincolnia Park Trails Association

Kathy Joseph, Earth Sangha

Glenda Booth, Fairfax County Wetlands Board

Patrick Lucas, Fairfax Trails and Streams/Potomac River Greenways Coalition

Richard Hartman, Huntington Association

Davis Grant, Lake Barcroft Watershed Improvement District

Jonathan Daw, Poplar Heights Civic Association

Robert Taylor, Poplar Heights Recreation Association

Russ Rosenberger, President of Madison Homes

Joan Maguire, Providence District Board of Supervisors

Bruce Williams, Sleepy Hollow Citizen Association

Nick Byrne, Sleepy Hollow Homeowners Association

Liz McKeeby, Supervisor Gross/Mason District

Noel Kaplan, Fairfax County Department of Planning and Zoning

Than Bawcombe, Fairfax County Stormwater Planning

Stacey Sloan Blersch, USACE Baltimore District, Planning Division

Chris Bright, Earth Sangha

Florence Cavazos, Tripps Run resident

Vince Cusumano, Pinecrest Homeowners Association

Don Demetrius, Fairfax County Department of Public Works

Charles deSeve, Lake Barcroft Water Improvement District

James Dillon

Eric Eckl

Susan Ellicott, Huntington Community Association

Phyllis Evans, Huntington Community Association

Sally Henley, Tripps Run Resident

Bill Hicks, Northern Virginia Regional Commission

Allan Hudson, Baileys Crossroads Revitalization

Bob Jordan, Fairfax Trails and Streams/ Potomac River Greenways Coalition

Ken Kopka, Lake Barcroft Watershed Improvement District

Sharon Kulez

Steven Lester, Poplar Heights Civic Association/ Center for Health, Environment and Justice

Janice Martin, President, Poplar Heights Recreation Association

Jim McGlone, Virginia Department Of Forestry

Heather Melchior, Fairfax County Park Authority

James Mottley

Mia Musolino

Francoise B. Renard

Fernando Charro

Mack Rhoades, President, Huntington Community Association

Aaron Rodehorst

Larry Sexton, President, Falls Hill Civic Association

Harry Shepler, Huntington Community Association

F. Wyatt Shields, Assistant City Manager, City of Falls Church

Peter Silvia, Lake Barcroft Watershed Improvement District

Mike Wing, Supervisor Linda Smyth/ Providence District

Moe Wadda, Falls Church engineer

Tom Wasaff, City of Alexandria

The *Cameron Run Watershed Plan* was initiated by the Fairfax County Stormwater Planning Division and completed by the following:

Fairfax County Staff

Fred Rose, P.E., Chief, Watershed Planning and Assessment Branch
Dipmani Kumar, P.E., Project Manager, Watershed Planning and Assessment Branch
Gayle England, Ecologist, Watershed Planning and Assessment Branch

Versar, Inc.

Mark Southerland, Ph.D., Project Manager
Steve Schreiner, Ph.D.
Morris Perot
Mike Klevenz, P.E.
Jennifer Shore
Kristine Sillett
Brenda Morgan
Deborah Slawson, Ph.D.
Nancy Roth
Julie Tasillo
Beth Franks

Horne Engineering Services, LLC

Helene Merkel
Amanda Peyton

THIS PAGE INTENTIONALLY LEFT BLANK

Executive Summary

The *Cameron Run Watershed Plan* is a strategic plan that will protect and improve the condition of water resources in the watershed over the next 25 years. The watershed planning process, initiated by Fairfax County, included characterizing existing stream conditions, modeling conditions in the base year (2001) and for future years, and soliciting the participation of a watershed advisory committee and the public. The Cameron Run Watershed Advisory Committee created the following vision to guide development of the watershed plan:

> *A fishable, swimmable, and biologically diverse Cameron Run watershed that supports a safe and enjoyable environment for people and property.*

The Cameron Run Watershed Plan includes recommended policies and specific projects for mitigating adverse effects on the watershed and its streams, particularly those resulting from impervious surfaces and stormwater runoff.

BACKGROUND

The Cameron Run Watershed Plan is part of a series of planning projects initiated by Fairfax County beginning in 2002. The Cameron Run watershed encompasses 44 square miles, 33 of which are located in Fairfax County, and has a long history of urbanization. Most land within the watershed was developed by the early 1970s, and only an estimated 5 percent remains vacant today. The watershed's large proportion of impervious surface causes substantial physical consequences for streams, such as erosion, flooding, and channel alteration due to the increased volume and rate of flow of stormwater runoff. Several reaches within the watershed fail to meet water quality standards specified in Section 303d of the Clean Water Act (CWA) and, therefore, are included in the Virginia Department of Environmental Quality's list of impaired streams. Two reaches are listed because of the presence of fecal coliform bacteria and require determinations of total maximum daily loads. Two other reaches are listed because they have impaired benthic communities, and a fifth reach is listed because of the presence of both fecal coliform in the water and PCBs in fish tissue. The county's 2001 Stream Protection Strategy (SPS) Baseline Study classified Cameron Run as Watershed Restoration Level II. Primary goals in Watershed Restoration Level II areas are to prevent further degradation and to take active measures for improving water quality to support Chesapeake Bay initiatives and comply with existing water quality standards. In order to support the Chesapeake 2000 Agreement, Fairfax County is committed to developing watershed management plans for all of its watersheds.

PURPOSE

The objectives for developing the Cameron Run Watershed Plan were:

1. To apply a comprehensive approach in addressing multiple regulations, commitments, and community needs.

2. To replace the previous, out-dated watershed management plan.

3. To support Virginia's commitment to the Chesapeake 2000 Agreement.

4. To meet state and federal water quality standards.

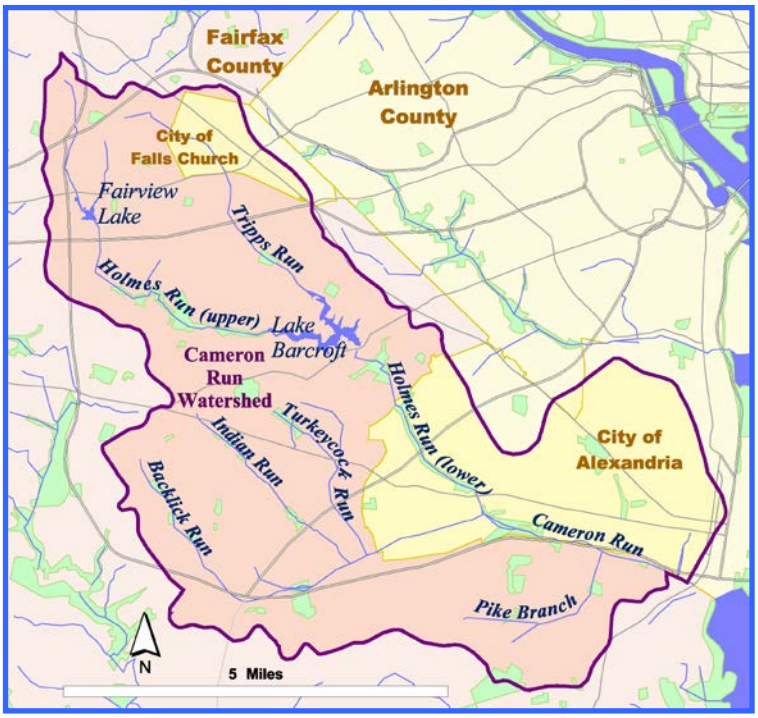
This watershed plan addresses these objectives with a strategy for restoring and protecting the watershed.

The plan was developed with input from the Cameron Run Watershed Advisory Committee and other members of the community. The Advisory Committee comprised members of the local community who represented the views and concerns of various interest groups, including environmental organizations, businesses, and homeowners. The Committee met with the Project Team regularly over 18 months to provide valuable local input and feedback. This public involvement process helped to ensure that the watershed plan will meet the specific needs and desires of residents of Cameron Run watershed.

The developers of this plan recognized that many parcels in older neighborhoods across the county are undergoing "mansionization," as smaller dwellings are replaced with substantially larger structures. Although mansionization is likely to affect stormwater runoff and water quality, this plan does not address that issue directly because the county intends to examine the issue comprehensively in the future.

WATERSHED CONDITION

Today, the mainstem Cameron Run is a flood-control channel whose surrounding area is characterized by medium- to high-density urban development. The Cameron Run watershed encompasses some of the oldest and most highly developed areas in Fairfax County. Nearly 95% of the watershed is developed with homes, strip malls, commercial enterprises, and extensive roadway systems that were built before the advent of modern stormwater management facilities for controlling the quantity and quality of runoff. The effects of this development are evident throughout the watershed. The historic floodplain of lower Cameron Run is primarily a



Map of Cameron Run watershed

transportation corridor throughout which the Capitol Beltway parallels the stream channel. Industrial, commercial, and residential areas have replaced the wetlands and forests that once attenuated floodwaters. Only small remnants of wetlands remain in the watershed. Sections of the Cameron Run mainstem and Holmes Run were channelized to remove floodwaters quickly from developed areas. The poor quality of water within the channels illustrates the effects of these alterations.

Non-point source pollution and urban stormwater runoff greatly affect the health of this watershed. According to the 2001 SPS Baseline Study, the Cameron Run mainstem and its tributaries "have substantially degraded biological and habitat integrity." The SPS study listed Cameron Run as a Watershed Restoration Level II watershed, characterized by dense development, significantly degraded in-stream habitat conditions, and substantially degraded biological communities. Based on the Stream Physical Assessment (SPA) study, the Cameron Run watershed has few adequate riparian buffers. In addition, the watershed has more than five discharge pipes and ditches per mile and a large number of points at which public utility lines and roadways cross over streams. Erosion and instability of stream banks is widespread throughout the watershed, and illegal trash dump sites are common.

PLAN GOALS AND OBJECTIVES

Drawing on knowledge of the ultimate causes and proximate stresses affecting the watershed, the Project Team and Advisory Committee developed the following goals and objectives that are consistent with the vision defined for Cameron Run:

Goal A: Reduce the effects of stormwater runoff from impervious areas to help restore and protect streams within the Cameron Run watershed

Objective A1: Increase the effectiveness of existing Best Management Practices (BMPs) by improving maintenance or "retrofitting" them to further reduce the effects of impervious areas (altered flows and poor water quality).

Objective A2: Install new BMP and Low Impact Development (LID) facilities in areas that do not have existing stormwater management controls.

Objective A3: Require (1) reduction of the rate and volume of runoff following the development of new commercial and residential sites to the minimum possible levels and (2) reduction of post-development runoff at redevelopment sites by targeted percentages from the pre-development rate and volume.

Objective A4: Increase the participation of residents in decreasing the amount of stormwater runoff from impervious surfaces in residential areas.

Objective A5: Reduce the effects of stormwater runoff from existing and proposed roadways by instituting new countywide watershed management requirements.

Goal B: Preserve, maintain, and improve watershed habitats to support appropriate native flora and fauna

Objective B1: Preserve, restore, and manage riparian buffers to benefit appropriate native flora and fauna (and reduce the effects of stormwater runoff).

Objective B2: Preserve, restore, and manage habitat in streams and on stream banks to benefit appropriate native flora and fauna (and water quality).

Objective B3: Preserve, restore, and manage wetlands to benefit appropriate native flora and fauna.

Goal C: Preserve, maintain, and improve water quality within streams to benefit humans and aquatic life

Objective C1: Reduce and mitigate the effects of bank erosion and sedimentation.

Objective C2: Reduce the amount of pollutants such as fecal coliform, phosphorous, and nitrogen in stormwater runoff.

Objective C3: Reduce the amount of trash and number of dumping sites in the watershed to help protect and improve the streams.

Goal D: Improve stream-based quality of life and environmentally friendly recreational opportunities for residents of and visitors to Cameron Run watershed

Objective D1: Create additional access and trails for stream-based recreational opportunities in the watershed.

Objective D2: Increase public awareness and appreciation of streams in the watershed.

POLICY RECOMMENDATIONS

Policy recommendations address the goals and objectives stated above and include proposals that typically would involve amending the County Code and other supporting documents, such as the Public Facilities Manual. These recommendations are part of a series being developed during the first round of watershed planning, and several are in various stages of implementation. The county will undertake a separate effort to combine and refine policy recommendations stemming from the plans. Recommendations developed as part of the Cameron Run Watershed Plan are as follows:

Goal A

- Change the inspection and assessment protocols for stormwater controls.
- Amend inspection and maintenance ordinances for privately owned controls.
- Update the county's list of recommended BMPs.
- Retrofit existing facilities.
- Enact new policy to require on-site water retention for all land-disturbance projects.
- Avoid granting water quality waivers for non-bonded lots that exceed 18% imperviousness.
- Install new BMP and LID facilities for properties without stormwater controls.
- Increase fines for noncompliance with BMP or LID requirements.
- Coordinate stormwater management activities with neighboring jurisdictions, including annual reviews.
- Require 10% net decrease in runoff on commercial and residential redevelopment.
- Amend zoning regulations to promote smarter development and better design.
- Provide incentives for developers to use conservation design and LID to reduce runoff.
- Limit removal of mature trees and native vegetation in any development or renovation.
- Conduct frequent inspections to ensure compliance with permit conditions regarding landscaping and stormwater runoff requirements.
- Allocate sufficient funding for inspection and enforcement
- Facilitate technical assistance and financial incentives for residential LID practices in headwater areas.
- Involve the public in watershed planning from initial conception through implementation.
- Require road-widening projects to control runoff from all paved areas and reduce existing peak runoff by 5%.
- Replace grasses on medians and sides of roadway with native trees and vegetation where possible.

Goal B

- Plant buffers using native vegetation and trees, and monitor those buffers for 5 years.
- Provide additional personnel and resources for protecting buffers in Resource Protection Areas (RPAs), and ensure adequate training.
- Require restoration of buffers at developments within RPAs and mandate the use of native vegetation mixes for restoration.

- Provide educational assistance regarding buffers to owners of properties with tidal shorelines or streams.
- Amend ordinance to expand woodlands and survey existing trees, and amend requirements for builders to protect existing trees.
- Determine current level of mature tree canopy, and establish a reforestation goal.
- Monitor and report on stream condition by performing stream physical assessments.
- Facilitate acquisition/donation of easements to community groups for buffer/stream protection.
- Install natural and water-conserving landscaping at county facilities.
- Educate property owners about steps for improving water quality in their streams.
- Perform wetlands functions-and-values survey to identify characteristics of existing wetlands.
- Construct and restore wetlands at suitable locations as identified in wetlands survey.
- Purchase, designate, and acquire land for conservation of critical wetland habitat areas.
- Provide outreach materials describing the value and benefit of wetlands and identifying which permits are required for wetland activities.
- Discourage further development within native wetlands, and require mitigation when adverse effects are unavoidable.

Goal C

- Increase personnel and resources to inspect development projects regarding erosion and sediment controls.
- Encourage the development community to use bioengineering to stabilize streambanks and improve habitat.
- Reduce the amount of de-icing chemicals and sand entering surface waters of the watershed.
- Identify sources of fecal coliform in the watershed and prepare an action plan to reduce it.
- Perform additional water quality monitoring including surveys of macroinvertebrates and aquatic plants.
- Identify, investigate, and prosecute illicit discharges from commercial and residential activities.
- Educate the public about ways to reduce pollutants in stormwater runoff.
- Create a "green label" program for lawn-care and landscaping companies that use environmentally sound techniques.

- Strengthen enforcement of "pooper scooper" regulation and institute $100 fine for violators.
- Partner to clean up trash, woody debris, and dumpsites throughout watershed.
- Conduct a vigorous public information campaign to deter littering and dumping.
- Place containers at public facilities for recycling along with signs requesting sorting of recyclables and stating the fines for littering.
- Enforce solid waste and erosion and sediment control ordinances against illegal dumping; impose fines, and require restoration of dumping sites.

Goal D

- Identify stream corridors that could be purchased to increase public access to streams and environmentally friendly recreation.
- Develop a master plan for environmentally friendly recreation opportunities in Cameron Run.
- Post signage publicizing the existence and importance of RPAs for stream protection and recreation.
- Install signage explaining benefits of LID and identify sources for further information.
- Conduct a study to determine the most effective program of public education for watershed stewardship.

RECOMMENDED PROJECTS

The proposed projects for the Cameron Run Watershed Plan are based on analyses performed by the Project Team with contributions from the Advisory Committee and the public. The projects were selected to help meet the goals and objectives stated above. The projects recommended in the plan fall into the following four categories:

- **Low Impact Development (LID)** – LID approaches are innovative practices designed to mimic natural flows by reducing the volume of stormwater runoff at the source, not merely by managing flows as they leave a site. Distributed LID involves a series of small landscape features that function as detention areas within a developed area. These features are designed and constructed to detain and treat stormwater through natural processes such as infiltration, soil storage, and uptake by vegetation. In addition to being incorporated into planning for new development, these solutions are being used increasingly to reduce the effects of stormwater runoff and other adverse influences on the environment in previously developed areas.
- **New Storm Water Management (SWM) ponds** – Placing new stormwater management ponds, including small, extended-detention dry ponds, in locations that currently have no mechanisms for controlling the quantity and quality of stormwater runoff.

- **SWM pond retrofits** – Modifying existing SWM ponds to provide additional quantity or quality controls.
- **Stream restoration** – Modifying stream channels, banks, and instream habitat to improve degraded and unstable conditions.

Projects were separated into the following three groups to help define priorities among the approximately 650 opportunities for watershed improvements identified during this study:

- **Tier 1** – Projects that represent the best opportunities for the county's efforts because they are located on public lands and were selected using SWMD's prioritization framework in rough proportion to the amount of uncontrolled impervious surface within the subwatershed.
- **Tier 2** – Sites representing lower-priority projects on public land, or sites on private lands that present good opportunities and have received various levels of support from Advisory Committee members or the general public.
- **Tier 3** – The rest of the sites identified during the initial map review and public involvement process.

The plan focuses on the Tier 1 projects because they represent the best opportunities for the county to implement watershed improvements. The Tier 2 and Tier 3 sites also present good opportunities, particularly if they can be implemented through the development-review process or other means. Information on individual projects is included in Appendix A, including site-specific factsheets for each Tier 1 project, and tables containing descriptive information for Tier 2 and Tier 3 projects.

In a supplemental effort, drainage complaints filed with the Fairfax County's Maintenance and Stormwater Management Division were used to help identify areas with problems related to stormwater drainage, flooding, and streambank erosion. These records provided an initial list of 70 candidate drainage projects. The best opportunities to address drainage problems were selected from the candidates using a ranking process. The 25 drainage projects selected by the ranking process include 21 projects that address localized flooding issues and four projects that address localized streambank erosion in residential backyards. Recommended actions to help alleviate problems at the 25 selected drainage projects are described in project fact sheets found in Appendix A-4.

The breakdown of all projects by project type and tier is shown below.

Project Type	Tier 1	Tier 2	Tier 3	Total
New SWM Pond	1	1	-	2
SWM Pond Retrofit	15	5	78	98
LID	77	54	306	437
Stream Restoration	4	32	2	38
Non-structural Projects & Special Studies	3	-	21	24
Drainage Complaint Projects	25	-	-	-
Total	125	92	407	624

BENEFITS OF THE PLAN

The Cameron Run Watershed Plan provides a set of tools for communities to go beyond minimum regulatory requirements. These tools can be used to help communities ensure the protection of water resources, the reduction of streambank erosion, and the restoration of fish and wildlife habitat. They will also help to meet commitments under the Chesapeake 2000 Agreement, which include the following:

- State signatories will work with local governments, community groups, and watershed organizations to develop and implement locally supported watershed management plans in two-thirds of the bay's watershed.
- Local watershed management plans will address the protection, conservation, and restoration of stream corridors, riparian buffers, and wetlands for the purpose of improving habitat and water quality.

Implementing the recommended policy amendments and projects will provide a range of benefits for the Cameron Run watershed. Policies that are implemented countywide in conjunction with other watershed management plans will be more efficient and should result in improved environmental conditions throughout Fairfax County and the surrounding region. Because these policy recommendations are non-structural, it will be difficult to measure their benefits quantitatively. Generally, the policy recommendations will help to improve the enforcement of existing regulations and laws and to provide additional protection for areas that are environmentally valuable but not necessarily located within an RPA. Instituting programmatic solutions is one of the best ways to deal with the cumulative adverse effects of distributed influences, such as stormwater.

Cameron Run is the most heavily urbanized watershed in the county: impervious surface in every subwatershed exceeds the 10% to 15% threshold considered the minimum for good stream conditions. Most of the development in the watershed occurred before stormwater controls were required; therefore, reducing the effects of stormwater runoff created by uncontrolled impervious surface is the most important benefit that can be achieved through this plan. Each project included in the plan will provide a degree of control for the effects of stormwater runoff. Both the quantity (i.e., reduction in average peak flows) and the quality (i.e., reduction in pollutant loading) of the runoff will be improved .

Model-based estimates of the benefits of the projects indicate that the proposed actions in the Cameron Run Watershed Management Plan will reduce pollutant loadings throughout the Fairfax County portion of the watershed. The model of future conditions with proposed projects shows a 4.9% decrease in total suspended solids, a 3.8% decrease in total phosphorus, and a 3.6% decrease in total nitrogen loads for the entire Cameron Run watershed. The modeled decreases in pollutant loading seem small because the watershed is highly developed, and opportunities for BMPs are limited in many areas. These model-based estimates can be used to evaluate the Plan's contributions to meeting water quality standards (e.g., TMDL implementation) and Chesapeake Bay Tributary goals.

The selected restoration projects will improve habitat and water quality within streams. To quantify the benefits of the proposed stream restoration projects, the U.S. Army Corps of Engineers stream condition index (SCI) rating was applied to determine the increase in stream habitat quality and reduction in erosion and sediment loss. Restoration is anticipated to improve SCI ratings for each project site, resulting in an 11% to 17 % increase in SCI rating among the sites. The stream restoration projects in the plan will improve a number of stream miles from one condition class to another (e.g., very poor habitat to fair habitat); therefore, increases can be expected in the abundance and diversity of stream life in those areas.

PLAN TOTAL COST

The 25-year estimated funding requirements for all the structural and non-structural recommended actions is $47.4 million. The breakdown of funding requirements for each 5-year period of the plan is shown below. Estimated costs included in this plan represent actual costs that, in some cases, may be off-set through the use of existing staff resources, in-kind services, cost-share programs, donated materials, volunteer labor, and other means.

The policy recommendations of this plan will require further evaluation in light of greater countywide implications. The current approach for processing policy recommendations is to consolidate them with similar recommendations included in management plans for other watersheds in the county.

Funding Requirements	
Implementation Period	**Estimated Funding Requirements**
Group A: Fiscal Year 2007 – 2011	$11,468,000
Group B: Fiscal Year 2012 – 2016	$9,174,000
Group C: Fiscal Year 2017 – 2021	$8,840,000
Group D: Fiscal Year 2022 – 2026	$10,028,000
Group E: Fiscal Year 2027 – 2031	$6,833,000
Drainage Complaint Projects: Fiscal Year 2007 – 2011	$1,059,000
Total	$47,402,000

Although this plan proposes a schedule for implementing recommended actions, additional factors may affect the individual projects and the implementation schedule:

1. Members of the county's staff and the Fairfax County Board of Supervisors (Board) will review the projects, programs (both structural and non-structural), and policy recommendations in this plan prior to implementation. The Board's adoption of the Watershed Management Plan will not ensure automatic implementation of projects, programs, initiatives, or policy recommendations that have not first been subjected to sufficient scrutiny to determine if they will provide the greatest environmental benefit for the cost.

2. The Watershed Management Plan provides a conceptual master-list of structural capital projects and a list of potential non-structural projects for the watershed. Each fiscal year, the county's staff will prepare and submit to the Board a detailed spending plan that includes a description of proposed projects and an explanation of their ranking, based on specific criteria that have yet to be established. Criteria used to assemble this list will include, but are not limited to, cost-effectiveness as compared to alternative projects, a clear public benefit, a need to protect public or private lands from erosion or flooding, a need to meet a specific goal for the watershed or for water quality, and the project's ability to be implemented within the same fiscal year that funding is provided. The staff also intends to track the progress of implementation and report back to the Board periodically.
3. Each project on the annual list of structural projects will be evaluated before implementation using basic value-engineering, cost-effectiveness principles and considering alternative structural and non-structural means for accomplishing the purposes of the project.
4. Obstruction removal projects on private lands will be evaluated on a case-by-case basis for referral to the Zoning Administrator and/or County Attorney for action as public nuisances. These projects will also be evaluated to determine appropriate cost-sharing by any parties responsible for the obstructions.
5. Any stream-crossing improvements not related to protecting streambeds or banks or to preventing structure flooding will not be implemented using the county's stormwater improvement funds.
6. Stream restoration projects on private lands will be evaluated to determine means for cost-sharing by landowners who are directly responsible for degradation resulting from their land uses.

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

LIST OF TABLES

Table No. **Page**

LIST OF FIGURES

Figure No. **Page**