1 Introduction

1.1 Background

Fairfax County contains all or part of 30 **watersheds**, of which Difficult Run is the largest. Development and population growth over the past century have transformed Fairfax County, and the Difficult Run watershed, into a bustling suburban community. Today the watershed is comprised of a mix of **open space**, residential areas, and commercial centers. The plan presents the issues affecting the quality of the watershed's streams and receiving waters, builds on previous management efforts, and presents a comprehensive strategy for mitigating and reducing the impacts of development.

In the mid to late 1970s, an environmental baseline and subsequent master plan for flood control and **drainage** were completed for Difficult Run. The plans combined the study of **aquatic** and terrestrial natural resources with modeled water quality results, to recommend immediate and future projects that would address sanitary sewer issues, stream stability, **detention** ponds, and **flooding** through the year 2000. In addition, the *Difficult Run Headwaters Land Use Study* was prepared by the Fairfax County Office of Comprehensive Planning in 1978 to study the area's ability to accept various residential densities and simultaneously maintain high-quality environmental standards. In the late 1980s, Fairfax County proposed the installation of regional ponds to control erosion and flooding in the western portion of the watershed, including Difficult Run.

Stream channel in Difficult Run Watershed

The County initiated the Stream Protection Strategy in 1998 to survey the health of the County's streams using measures of biological integrity, aquatic habitat and physical stream stability.

The 2001 *Stream Protection Strategy Baseline Study* recommended watersheds for protection, restoration and further study. Spurred by the Stream Protection Strategy results, the **Chesapeake Bay 2000 Agreement**, and advances in stormwater management technologies, the Stormwater Planning Division of the Fairfax County Department of Public Works and Environmental Services (DPWES) initiated the creation of watershed management plans for the County's 30 watersheds.

The management plans will provide an assessment of the watersheds' current conditions through evaluation of management needs and a prioritization of solutions within each watershed. The goal is to provide a consistent basis for the evaluation and implementation of solutions for protecting, enhancing and restoring the receiving water systems and to restore the habitat and water quality throughout the County. The Difficult Run watershed is the fifth in a series of 15 watershed management projects that are slated for completion over a seven-year period.

1.2 Watershed Planning Process and Public Involvement

The development of the plan for the Difficult Run watershed began in July 2004. The plan is intended to complement and supplement the County's policies and comprehensive plans over the next 25 years and support its commitment to the Clean Water Act and Virginia's commitment to the Chesapeake Bay Act. The County, which encompasses all County government entities, and other stakeholders of the Difficult Run Watershed, are committed to protecting Difficult Run from future degradation and promoting watershed-wide management actions that work to restore the stream and other areas in the watershed to an environmentally healthy ecosystem. This commitment emphasizes the importance of protecting the County's valuable natural resources, including surface waters, and supports the sustainability and improvement of the environment which has a direct impact on the quality of life of the County's residents.

Current stream conditions throughout the watershed are generally Fair or Poor based on the Stream Physical Assessment, and this plan proposes a comprehensive strategy for improving these conditions. The plan was written to manage future changes in the watershed to protect Difficult Run and its tributaries so they can be enjoyed by future generations. The objectives of the plan will also help the County meet or exceed federal, state, and local regulatory water quality requirements.

The planning process initiated by Fairfax County for development of this watershed management plan included the participation and recommendations of a watershed steering committee consisting of approximately 15-20 residents of the Difficult Run watershed. The Difficult Run Steering Committee and a broader group identified as the "advisory committee" were convened to assist the *Difficult Run Watershed Management Plan* project team in the development of the plan. The committee members served as liaisons between their respective communities or organizations and the project team.

The Steering Committee participated in monthly meetings to examine the issues facing the watershed and its residents. The committee is made up of residents from the community who represent a variety of **stakeholder** groups and interests such as environmental and conservation groups, homeowners associations, business groups, and state and local government.

The goal of the planning effort is expressed in the Steering Committee's process statement:

> *To develop an environmentally effective watershed management plan, created by community stakeholders, which protects and improves water quality and habitat in Difficult Run and reduces the adverse impacts of flooding and stormwater.*

Ultimately, the Steering Committee, with input from other residents, have assisted in the development of a comprehensive watershed plan that identifies the major issues in the watershed and recommends solutions.

In addition to the work being performed by the committee, members of the community have been involved through a series of public workshops and forums to ensure that the plan can be successfully implemented by Fairfax County and the residents living and working in the watershed.

1.3 Watershed Goals and Issues

With the assistance of the Steering Committee and Fairfax County staff, four broad goals were developed which governed the development of the plan:

1. To restore and protect the County's streams, 70 percent of which are in fair to very poor condition.
2. To position the County to meet state and federal **water quality standards**, including listed impairments for Difficult Run.
3. To support Virginia's commitment to the Chesapeake 2000 Agreement to clean the Chesapeake Bay.
4. To develop alternatives, where feasible, to the unbuilt regional ponds.

In addition, several more detailed watershed issues were identified, both through the Steering Committee and at the first public meeting, the Issues Scoping Forum, which was held on November 6, 2004. These were:

- Issue 1 -- Stormwater runoff pollution Most runoff in Difficult Run is not treated to remove pollutants. Runoff quantity controls were first implemented in 1974 and use of quality controls began in 1993. Proposed actions should reduce the amount of pollutants reaching Difficult Run and its tributaries.
- Issue 2 -- Increased stormwater runoff Increased stormwater flows increase the frequency of flooding, and contribute to stream erosion. Proposed actions should reduce both the volume and speed of stormwater.
- Issue 3 --Uncontrolled stormwater In older areas that were developed before stormwater management was required, the effects of increased runoff and non-point source pollution are not treated. Proposed actions have been recommended to retrofit either water quality or channel protection treatment in these areas.
- Issue 4 -- Erosion and streambank instability Stream bank erosion impacts properties, results in sediment deposits in lakes, and impairs aquatic habitat. Proposed actions should reduce further erosion or restore actively eroding streams to a stable state.
- Issue 5 -- Stream water quality Poor water quality can be harmful to organisms such as fish, benthic macroinvertebrates, and amphibians. Proposed actions should reduce runoff pollution and help restore stream health.
- Issue 6 -- Stream habitat loss Streams face many stressors that can degrade stream habitat, including channelization, increased stormwater flow, and stream erosion. Because stream habitat is dependent on so many factors, there are many ways to protect and enhance it. Stormwater management can reduce erosion and trap pollutants. Stabilizing streams can reduce erosion and sedimentation. Protecting and replanting riparian vegetation provides shade and bank protection.
- Issue 7 -- Natural resource protection measures Watershed issues are not always problems of declining water quality or environmental degradation. In most watersheds, there are also areas of good stream habitat or high quality environment. Proposed actions are intended to preserve these areas from disturbance.
- Issue 8 -- Stormwater regulatory compliance Maintenance of privately-owned stormwater facilities, and waivers of Stormwater Management and Resource Protection Area regulations during development can limit the effectiveness of a stormwater program. Proposed actions are intended to improve compliance with the existing programs.

1.4 Plan Layout

The *Difficult Run Watershed Management Final Plan* provides a detailed approach for attaining the goals outlined above. The plan includes analysis of the historic and current watershed condition and presents management alternatives designed and selected to

address watershed issues. Due to the size of the watershed, 58 square miles, this is a large management plan; however, the plan should be utilized as 18 individual subwatershed action plans as put forward in Chapter 3.

The management plan chapters include the following topics:

Chapter 1 Introduction: Background, goals, plan layout.

Chapter 2 Watershed Condition: Watershed history and condition, current and future land use, **impervious surfaces**, aquatic and terrestrial environments, and modeling results.

Chapter 3 Subwatershed Condition and Plan Action: Subwatershed current and future land use, stormwater management, stream condition including **geomorphology**, habitat, water quality, problem areas and modeling results.

Chapter 4 Watershed-wide Policy Recommendations: Recommended policy and ordinance changes. Watershed improvement recommendations, including structural and non-structural projects and programs. Concept plans for each project are shown in Volume 2 of this plan.

Chapter 5 Summary of Watershed Plan Action and Benefits: This section recaps the watershed goals and issues, and lists the actions which address each goal. A summary of pollutant reduction benefits, derived from the watershed modeling, is provided as well.

Chapter 6 Implementation Plan: Project prioritization and long-term monitoring.

Appendices Extensive data on soils, land use and stormwater facilities and more detailed procedures for the modeling and candidate site selection.

Glossary A Glossary is presented that defines many of the terms and concepts used in the plan. Terms shown in the document in **bold typeface** are found in the Glossary.

1.5 How to Use the Plan

Because the *Difficult Run Watershed Management Plan* is organized by subwatershed, the key to finding information of interest is to locate the appropriate subwatershed, then find the problem areas and proposed projects at a particular location. Map 2.2 in Chapter 2 shows the major road network and subwatershed boundaries. More detailed maps in each subwatershed section show the street network and street names.

Each subwatershed has sections describing the following:

- Subwatershed characteristics
- Existing and future land use
- Existing stormwater management
- Soils
- Geomorphology
- Stream habitat and water quality
- Hydrology and water quality modeling
- Hydraulic modeling
- Candidate sites for improvements

- Subwatershed plan action
    - Regional pond alternative projects
    - Catchment improvement projects
    - Stream restoration projects

Along with the text, each subwatershed section of Chapter 3 includes five maps that depict the subwatershed and stream conditions, the selected candidate sites and the resulting projects.

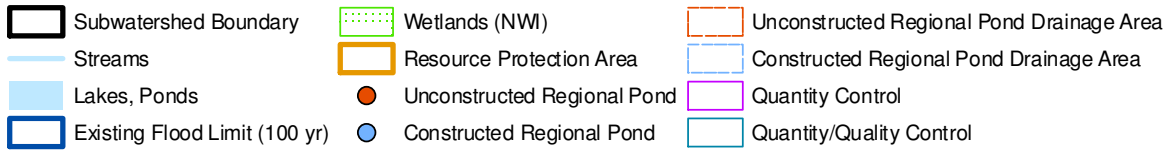
- Subwatershed Characteristics
- Future Land Use
- Stream Condition
- Candidate Sites for Improvements
- Proposed Improvements

The following sections describe the information that is presented on the maps:

Subwatershed Characteristics

The first of the four maps depicts the overall subwatershed characteristics including the land use, wetlands and resource protection areas and the stormwater management that is currently in place. The layers are described and shown below.

Map Layer	Description
Subwatershed Boundary	The delineated drainage areas for the subwatersheds is shown
Streams, Lakes	Stream layer from the Stream Physical Assessment
Existing Flood Limit (100 yr)	The modeled 100-year flood limit is provided.
Wetlands (NWI)	The National Wetlands Inventory
Resource Protection Area	Component of the Chesapeake Bay Preservation Area comprised of lands adjacent to waterways that have an intrinsic ecological and biological value
Regional Ponds	Sites of constructed and unconstructed regional ponds; drainage areas to these sites are also provided
Quantity/Quality control	Areas with existing stormwater management are shown. Parcels with quality
Current Land Use	Fairfax County's land use parcel data coded according to the Stormwater Planning Division's designations for watershed management planning studies.



Land Use Categories

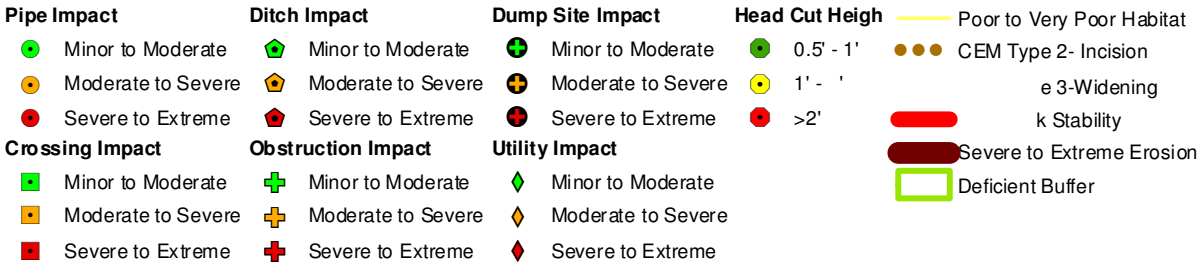
Future Land Use

The Future Land Use map shows two things: the forecast land use for each subwatershed using the same color coding as the previous map, and the parcels where land use changes are projected to occur. These are shown with the outline of the parcel highlighted in black.

Stream Condition

The Stream Condition map provides a graphical representation of much of the data generated by the Stream Physical Assessment. The purpose of the map is to highlight problem areas related to stream condition. The layers are described briefly and shown below. The layers are descibed in more detail in section 3.2.5 above.

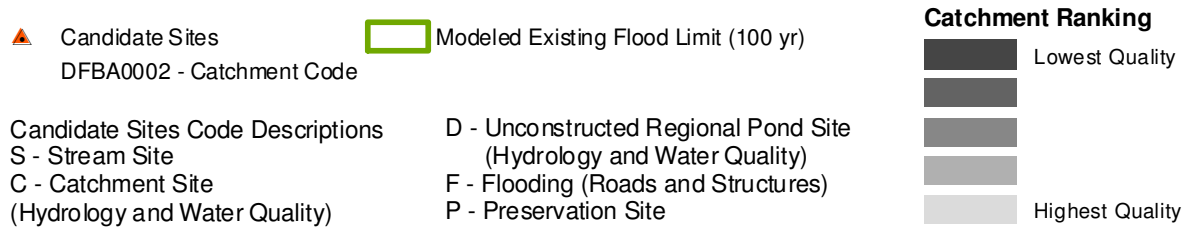
Map Layer	Description
Pipe Impact	Pipes with minor, moderate, severe and extreme impact.
Crossing Impact	Road crossings with minor, moderate, severe and extreme impact.
Ditch Impact	Ditches with minor, moderate, severe and extreme impact.
Obstruction Impact	Obstructions with minor, moderate, severe and extreme impact.
Dump Site Impact	Dump sites with minor, moderate, severe and extreme impact.
Utility Impact	Utilities with minor, moderate, severe and extreme impact.
Headcut Impact	Headcuts categorized by height, greater height is more severe.
Poor to Very Poor Habitat	Streams with a habitat assessment rating of Poor or Very Poor.
Channel Evolution Model (CEM)	Streams that are undergoing incision (Type II) and widening (Type III)
Low Bank Stability	The bank stability indicator of the habitat assessment, indicates >60 percent of bank area with active erosion across the reach.
Severe to Extreme Erosion	Specific sites of severe and extreme erosion and moderate to high restoration potential.
Deficient Buffer	Specific sites of severe to extreme riparian buffer deficiency and moderate to high restoration potential.



Candidate Sites for Improvements

The Candidate Sites map shows the locations of the candidate sites and results of the catchment ranking procedure. The procedure for site selection and the catchment ranking is described in section 3.3 and Appendix G.

Map Layer	Description
Candidate Sites	Sites, stream reaches, or catchments that were identified to have a degraded condition and are potential areas for restoration. Additionally, areas that are currently in good condition but are vulnerable in the future due to changes in land use were selected as candidate sites for preservationSites selected from for further field investigation that
S-Stream Sites	Sites identified as candidate locations for stream restoration, channel stabiliazation or riparian buffer restoration.
C-Catchment Sites	Catchments identified as candidates for improvements to reduce stormwater impacts such as high levels of runoff.
D – Unconstructed Regional Pond Sites	Sites where regional ponds were planned but are yet unbuilt. These sites are candidates for alternative projects to reduce the impacts of stormwater.
F – Flooding	Sites where the potential of flooding currently exists at culverts and bridges are condidate sites for projects that would reduce the frequency of flooding.
P - Preservation	Areas of high quality habitat or land cover that should be preserved as the area is developed in the future
Catchments	The delineated drainage areas for the catchment is shown. The catchments are labeled with their codes such as DFAB0002
Modeled Existing Flood Limit (100 yr)	The modeled 100-year flood limit is provided.
Catchment Ranking	Ranking of the catchments from lowest quality to highest quality

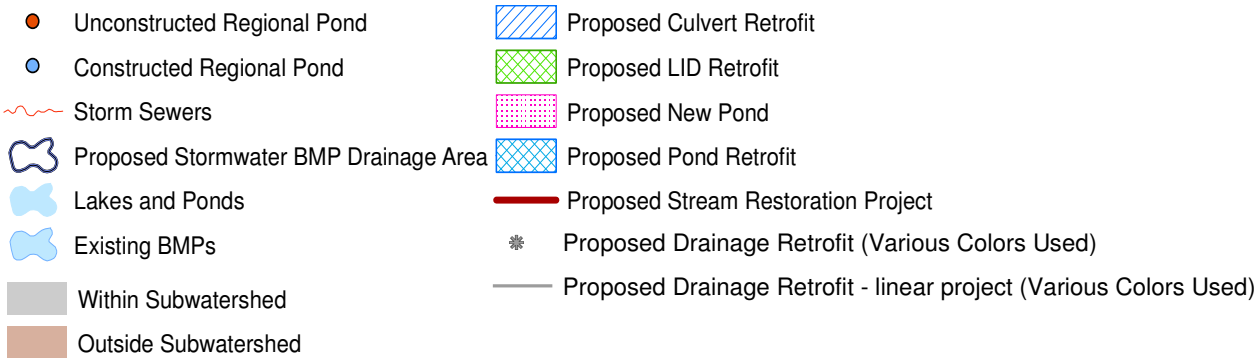


Proposed Improvements

The Proposed Improvements map shows the Projects and Actions that resulted from the field investigation of the candidate sites. There may be more than one project proposed for each candidate site.

The map layers and symbology used in the Proposed Improvements map are also used on the smaller maps for each project on the concept plans. They provide an overview of the project, its type, size, location and the potential benefits. Also described are the potential constraints for permitting, designing and constructing the project. The description and legend below is provided to describe the features in both maps.

Map Layer	Description
Regional Ponds	Sites of constructed and unconstructed regional ponds; drainage areas to these sites are also provided. Note: The concept plan maps do not differentiate between constructed and unconstructed.
Storm Sewers	The locations of storm sewers.
Paved Drainage Ditch	The locations of paved drainage ditches.
Streams	Stream layer from the Stream Physical Assessment
Proposed Stream Restoration Project.	Includes restoration, stabilization and riparian buffer enhancements.
Outside/Within Subwatershed	Indicates area that is either inside or outside the subwatershed in which the proposed project lies.
Proposed Stormwater BMP Drainage Area	The delineated drainage area
Existing BMPs	Locations of current best management practices (BMPs)
Lakes and Ponds	Locations of Lakes and Ponds from the County GIS
Proposed Improvements	The types of projects and actions are listed below in the legend and are described in section 3.4 above.



Notes:

- Proposed Drainage Retrofits (shown on the proposed improvement maps as an asterisk for outfalls or a line for ditches) are displayed in different colors on each

map. The colors used for each particular project match those used on Chapter 3 mapping.

- The footprint for New Pond, Pond Retrofit, and Culvert Retrofit projects shows the maximum extent of bankfull conditions during storm events, and not a permanent pool.

Project Numbering

Projects are identified using a numbering convention (XX9YZZ) where:

XX =	Watershed Code (DF for Difficult Run)	
9 =	County Watershed Project (all projects have this designation)	
Y =	0	Regional Pond Alternative Projects
	1	Non-Regional Ponds Or Pond Retrofits
	2	Stream Restoration
	3	Not Used
	4	Road Crossing Improvements
	5	Culvert Retrofits
	6	Flood Control Projects
	7	Drainage Improvements
	8	LID Retrofits
	9	Other
Z =	ID number for unbuilt regional pond, catchment, or stream restoration site	

For example, DF9051C in Angelico Branch is in Difficult Run (DF), a watershed project (9), a regional pond replacement project (0) for regional pond D-51 (51) and is one of a series of projects (C).

Project DF9236 in Little Difficult Run is in Difficult Run (DF), a watershed project (9), a stream restoration project (2) at stream site S36 (36).

Project DF9550B in Colvin Run is in Difficult Run (DF), a watershed project (9), a culvert retrofit project (5) at catchment site C50 (50) and is one of a series of projects (B).

Projects are listed in numerical order in the Executive Summary to make it easier to find a project by the project number. Projects in each subwatershed are listed in numerical order in the Subwatershed Plan Action section.