Four Mile Run Restoration Master Plan

March 2006
Mount Vernon Avenue Plaza
And View North to Arlington’s Water Play Area: A Vision
# Preface

**James P. Moran**

## 1. Introduction

- **A. Overview**
- **B. History of the Project**
- **C. Restoring our Waterways: National Trends**
- **D. Four Mile Run and the Chesapeake Region**
- **E. Master Plan Vision for Four Mile Run**

## 2. Four Mile Run Today

- **A. Community Profile**
- **B. In-Stream Conditions**
- **C. Natural Environment**
- **D. Near-Stream Conditions**

## 3. A Plan Evolves

- **A. Two Communities Working Together**
- **B. Envisioning the Corridor**

## 4. The Plan

- **A. The Vision: Celebrating a Restored Four Mile Run**
- **B. The In-Stream Plan**
- **C. The Near-Stream Plan**

## 5. Design Language

- **A. Green Principles**
- **B. Public Spaces**
- **C. Built Features**

## 6. Framework Implementation

- **A. Next Steps**
- **B. Coordination and Management**
- **C. Regulatory and Policy Issues**
- **D. Infrastructure Options**
- **E. Cost Estimates**
- **F. Funding Opportunities**
- **G. Four Mile Run: The Collaboration Continues...**

## End Notes

## Acknowledgments
List of Figures

1.1 Context Map
1.2 Watershed and Location Map
1.3 Study Area

2.1 Age Breakdown
2.2 Population
2.3 Income
2.4 Median Household Income
2.5 Per Capita Income
2.6 Housing Units
2.7 Renter-Occupied Housing
2.8 Languages
2.9 Languages
2.10 Traces of the Past
2.11 Reaches of the Stream
2.12 The “Most Natural” Channel Alignment
2.13 Stream Alignment Changes over Time
2.14 Historic Aerial Photographs
2.15 Land Use
2.16 Zoning
2.17 Ownership
2.18 Future Development Opportunities
2.19 Transportation and Access
2.20 Recreation Facilities
2.21 Arts and Culture

3.1 Plan Progression
3.2 Visioning Workshop: Synthesis Map
3.3 Framework Plan
3.4 Conceptual Alternatives

4.1 Illustrative Plan
4.2 Flood Control and Hydrology
4.3 Master Plan Layers
4.4 Stormwater Management
4.5 Vegetation
4.6 Circulation and Connection
4.7 Urban Form
4.8 Recreation
4.9 Education Interpretation

6.1 Demonstration Project: Preferred Option and Potential Costs
6.2 Order of Magnitude Cost Estimate Areas
6.3 Order of Magnitude Cost Estimate
Four Mile Run cuts through the heart of the Eighth Congressional District of Virginia, draining an area that encompasses parts of the cities of Alexandria and Falls Church and the counties of Arlington and Fairfax.

The lower part of the stream was once characterized by a broad flood plain, wetlands and abundant fish and wildlife. But settlement came to this area more than 250 years ago. As the area was built up, surfaces hardened and the flood plain filled, and, as a result, floods came more often and at higher levels.

The Corps of Engineers addressed the flooding issues in the lower section of the stream some 30 years ago. Even after this work, however, the area around Four Mile Run continued to be a place where much of the unsightly infrastructure necessary for urban life was located. In this sense, we turned our backs to the stream and ignored what it had become and its potential to be so much more.

But things change. In the late 1980s and early 1990s, the rail yard that crossed the stream at its eastern end was closed and the land sold for development. And, with the arrival of federal financial assistance, citizens from Alexandria and Arlington began to develop new concepts and designs that would transform the areas to the north and south of the stream's lowest section into a vibrant urban place to which people would be drawn by the water and its many possibilities.

This was the beginning of the vision that you see before you in this remarkable Master Plan. Over the past five years, I have been proud to play a part in the major community effort to craft a hopeful vision for Four Mile Run and the communities that surround it.

The stream that once served literally to divide these communities is now seen as a means of uniting them. In the coming years, as the stream bed is re-naturalized and the banks landscaped, the lower two miles of the stream will become a place of community gathering, special events and sports venues. It will be a place where urban dwellers will be able to see wading birds, catch fish, ride a bike and touch the stream. Four Mile Run will become a place of renewal and of community celebration.

This Master Plan is just the beginning of making that dream come true. The plan itself is the result of unparalleled cooperation between the citizens and agencies of Arlington and Alexandria, as well as the Northern Virginia Regional Commission, the Corps of Engineers, the Environmental Protection Agency and a talented team of design professionals led by Rhodeside & Harwell, Incorporated. But now the real work of realizing this plan's dream must begin.

The dream is big. I will do my best to bring to bear the necessary federal resources. Arlington County and the City of Alexandria, in endorsing this Master Plan, will pledge their share as well. I am hopeful that, working together, we will be able to deliver what this Master Plan proposes, which is a wonderful future for Four Mile Run and the communities it will join together.

Congressman James P. Moran
Eight Congressional District
Virginia
INTRODUCTION

The lower Four Mile Run corridor—2.3 miles along the border of Alexandria and Arlington, from Shirlington to the confluence with the Potomac River—constitutes an untapped and largely forgotten resource.

A. Overview

The lower Four Mile Run corridor—2.3 miles along the border of Alexandria and Arlington, from Shirlington to the confluence with the Potomac River—constitutes an untapped and largely forgotten resource. In spite of lingering natural beauty and the inherent attraction of water, the stream corridor functions primarily as a flood control channel—an in-between space defined by its concrete banks, the utility infrastructure lining its shore and the buildings that turn their backs to the stream. Rather than a gathering place, where surrounding neighborhoods of Alexandria and Arlington can celebrate their diversity and vitality, the stream has continued to defy its potential as a source of community pride. Yet Alexandria and Arlington have begun to rediscover the potential of the Four Mile Run corridor, as a new wave of development along the stream corridor and a committed and visionary group of community and elected leaders have sparked renewed energy and creativity in imagining the stream’s glorious potential. This Master Plan report describes the exciting future of a restored Four Mile Run corridor.
“The City of Alexandria is pleased to work with Arlington County, the Joint Task Force and the U.S. Army Corps of Engineers on this innovative restoration project. This project will integrate the design of the channel with the surrounding communities, bringing both our communities closer together.”

Mayor William D. Euille, City of Alexandria

Four Mile Run (9 miles long) and its watershed comprise one of the most heavily urbanized drainage basins in the Northern Virginia region. Although the watershed covers less than 20 square miles, it is home to approximately 183,000 people in adjacent portions of four localities: the counties of Arlington and Fairfax and the cities of Alexandria and Falls Church. Approximately 85 percent of the watershed’s land area has been developed and nearly 40 percent of the watershed is covered with impervious surfaces associated with this development (i.e., buildings and pavement). Wherever present, these man-made impervious surfaces prevent the natural process of groundwater infiltration from occurring. As a result, there is a significant increase in the volume of surface water runoff that Four Mile Run and its few remaining tributaries must carry downstream. The urbanization process has replaced most of the watershed’s natural stream channels with an elaborate network of storm drains. These drains carry the increased volume of surface runoff, along with the many pollutants generated by urban life, much more quickly downstream than would the natural channels that have been replaced. The resulting flows are “flashier” and larger than natural channel flows. Runoff from the Four Mile Run watershed quickly makes its way into the Potomac River, and eventually drains into the Chesapeake Bay.
B. History of the Project

The Four Mile Run Restoration Project emerged through a combination of foresight and good fortune. The first seeds for the effort were planted when the Arlington County Board initiated a study of development options for the Arlington portion of Potomac Yard known as the “South Tract.” Given that Four Mile Run divides the Arlington and Alexandria portions of Potomac Yard and could add great potential to any nearby development, the task force overseeing the project began to ponder the future of the stream. Community leaders from both jurisdictions soon focused their attention on the lower 2.3 miles of the stream, which forms the boundary between Alexandria and Arlington. In the process of sharing ideas and information about the stream’s potential, the leaders were emboldened by data suggesting that physical, ecological and aesthetic improvements to the stream corridor need not compromise the level of flood protection called for as part of the flood control project implemented in the 1970s.

With this knowledge and a vision of Four Mile Run becoming a community amenity, the leaders began to explore funding opportunities to enable both jurisdictions to jointly study the corridor. These ambitions came to fruition through the interest and support of Congressman James Moran. Congressman Moran’s efforts resulted in a $1 million grant from the U.S. Environmental Protection Agency for a joint Arlington-Alexandria study of the corridor. Following this grant, Congress appropriated funds for the U.S. Army Corps of Engineers to conduct a feasibility study for the entire Four Mile Run watershed and to participate in the Agency Coordinating Group overseeing this effort. This Master Plan will serve as a foundation for the more detailed feasibility study currently underway by the Corps of Engineers, which has authority over what happens within the flood control corridor.

C. Restoring our Waterways: National Trends

After years of emphasizing only flood control and erosion protection, communities across the United States have embarked on a new wave of river and stream restoration efforts that reflect a shift in approach and attitude in our relationship with waterways. Until recently, development trends created communities physically separated from their waterfronts, either by physical infrastructure, such as highways, or by the industrial uses and utilities that frequently lined—and isolated—waterways. Moreover, the prevailing approach to flood control left many streams and rivers straightened, deepened and stripped of their vegetation and natural character. An improved understanding of stream evolution in urban environments makes it possible to provide flood control in a more environmentally sensitive and aesthetically satisfying manner than had been possible in the past.
Once resembling an “irrigation ditch” as a result of past channelization, the Sammamish has been restored to its original form. By restoring meanders, riffles and native vegetation, the restoration reintroduced the sights, sounds, smells and habitats of a natural river environment. Regrading the steep banks also improved residents’ access to river, and the new RiverWalk is now a popular destination. Although the community once turned its back on the Sammamish, the river has reclaimed its role as a central part of the City’s identity. The project succeeded in building public support for continued restoration, and Redmond’s City Hall is being re-sited to maximize its river views.

Today, both the federal government and local communities are rediscovering the immense value of these neglected waterways and are undertaking efforts to reclaim rivers and streams as natural, recreational, social and economic assets that can significantly improve quality of life. Many of these restoration efforts begin with a focus on returning streams—stream edges, alignments and overall behavior—to a condition more closely resembling their natural character. Common techniques include restoring the natural meandering pattern in which water tends to flow, as well as re-naturalizing and stabilizing banks with the addition of vegetation. An overarching goal is restoring the natural cycles and diversity of flows and habitats that support a variety of life in and along these waterways.

Restoring rivers and streams also presents opportunities to re-establish these waterways as community focal places. Improving the natural environment, building trails, creating parks, providing access to and connections across the water—all can bring people back to these important natural resources. Moreover, modifying the orientation of the built environment to the stream and designing new public places that celebrate the water can help make rivers and streams “front doors” to the community once again.

In the past decade, the number of river and stream restoration projects nationwide has increased dramatically with federal, state and local recognition of the benefits of restoration and the availability of funding for these types of activities. In turn, the first waves of restoration projects have produced some notable success stories, both across the United States and abroad. Arlington and Alexandria now have the opportunity to seize this momentum, while learning from—and building upon—the innovations of other communities. Some noteworthy local restoration efforts are highlighted as case studies throughout this report.

D. Four Mile Run and the Chesapeake Region

In addition to a wide range of benefits that can result from stream restoration, the redesign and naturalization of Four Mile Run will have broader significance because of its regional impact. Since the Four Mile Run watershed is part of both the Potomac River basin and the Chesapeake Bay watershed, this restoration will play a prominent role in regional efforts to protect both watersheds and especially the endangered Chesapeake Bay. What distinguishes this effort to restore Four Mile Run is how it serves as a model for intergovernmental cooperation that can inspire future efforts to improve the environmental quality of the Chesapeake region.
“This Master Plan exemplifies our efforts to restore Arlington’s streams and the Chesapeake Bay—and to work with our Four Mile Run watershed neighbor, Alexandria, to do so. We are excited to restore the beauty, environmental features and recreational opportunities along Four Mile Run.”

Jay Fisette, Arlington County Board Chairman 2005

- The Stream: Alluvial Reach
- The Power Lines and Sub-Station
- The Stream: Tidal Reach
- Four Mile Run Wetland
In the process of sharing ideas and information about the stream’s potential, the leaders were emboldened by data suggesting that physical, ecological and aesthetic improvements to the stream corridor need not compromise the level of flood protection called for as part of the flood control project implemented in the 1970s.
E. Master Plan Vision for Four Mile Run

The purpose of the Master Plan is to provide a framework and vision for future changes in the Four Mile Run corridor. It does not, however, represent a fiscal commitment; funding sources and a timetable for implementation will be determined at a later date.

The Master Plan envisions that the Four Mile Run corridor will become a model of urban ecological restoration. Through the sensitive and sustainable integration of natural areas with active urban nodes, the Four Mile Run corridor will be a place along which the communities of Arlington County and the City of Alexandria can gather, recreate and celebrate a shared waterfront legacy.

GUIDING PRINCIPLES

The guiding principles for the project, derived from community and governmental input, encompass eight key focus areas: flood protection, environment, aesthetics and design, recreation and urban life, integration and balance, access and connectivity, education and interaction, and the planning horizon.

Flood Protection
• Provide a minimum 100-year event flood protection.
• Examine the current extent of the 100-year flood-prone area.
• Consider flood protection for areas not currently protected.

Environment
• Create a “dynamically stable stream channel” using natural stream channel design techniques.
• Improve corridor habitat and ecology to support native terrestrial and aquatic plant and animal species.
• Develop upstream strategies to improve water quality in the stream and the environmental quality and long-term viability of a restored levee corridor.

Aesthetics and Design
• Improve overall corridor aesthetics and viewshed opportunities.
• Encourage urban design that develops the corridor’s aesthetics and reflects the excitement of the watershed citizenry for this resource.

• Incorporate “green design” principles for all design and development activities within and adjacent to the corridor.
• Incorporate innovative and creative urban design and watershed solutions.

Recreation and Urban Life
• Enhance existing recreational opportunities.
• Create new recreational opportunities that afford interaction with the waters of Four Mile Run.
• Develop urban life opportunities along the Four Mile Run corridor.
• Encourage appropriate siting of recreational facilities in the context of the overall project goals.

Integration and Balance
• Connect the project to the efforts underway in the watershed to improve the water quality of Four Mile Run.
• Integrate the corridor with surrounding communities and proposed adjacent urban development efforts.
• Create a balance between the natural elements of a restored corridor and urban activity areas in order to generate a lively, safe and well-used public resource.
• Coordinate with other ongoing planning activities. Such activities include the Four Mile Run TMDL/Implementation Plan, the local Chesapeake Bay Preservation Act programs, the Potomac Tributary Strategies, affordable housing initiatives, master planning efforts such as the Arlandria and Shirlington planning efforts, and other planning and economic development initiatives.

Access and Connectivity
• Create a place for people to reconnect with water and nature within an urban context.
• Increase pedestrian and bicycle access and amenities.
• Ensure that Four Mile Run is accessible to all who wish to use it.
• Increase connectivity between the two communities.
• Enhance the corridor’s effectiveness as a non-motorized and mass transit corridor.

**Education and Interaction**

• Provide interpretive opportunities to educate and inform the public about the stream corridor.
• Stress the interrelatedness of positive individual, institutional, and political actions and behavior changes with improved water quality and habitat in the corridor.

**Planning Horizon**

• Think big—create a plan that provides the parameters for change over time as opportunities become available.
• Provide a mix of short-term discrete improvements blended with long-term large-scale corridor changes.

The remainder of the Master Plan describes the characteristics of the study corridor today (Chapter 2), the process for developing the Master Plan (Chapter 3), the components of the Master Plan (Chapter 4) and design approaches to help achieve the Master Plan vision (Chapter 5).
The Four Mile Run corridor has changed dramatically over the past century. The watershed and the stream channel itself have been transformed by human development, from a relatively natural river corridor to one shaped and controlled by urban infrastructure.