

West Creek Watershed



Prepared by: *Watershed Coordinator*, **West Creek Preservation Committee**,
July 2005, Revised December 2008,
P.O. Box 347113, Parma, OH 44134
216.749.3720 www.westcreek.org dschafer@westcreek.org

WEST CREEK WATERSHED ACTION PLAN
TABLE OF CONTENTS

| | | |
|------------|--|-----------|
| 1.0 | INTRODUCTION AND EXECUTIVE SUMMARY | 2 |
| 1.1 | The Watershed | 3 |
| 1.2 | Watershed Residents | 3 |
| 1.3 | Watershed Employees | 6 |
| 1.4 | Economic Vitality | 6 |
| 1.5 | Historic Watershed Protection Activities | 6 |
| 2.0 | WATERSHED ACTION PLAN DEVELOPMENT | 7 |
| 2.1 | Background | 7 |
| 2.2 | Watershed Approach | 7 |
| 2.3 | Watershed Partners | 8 |
| 2.4 | West Creek Watershed Community Resolutions of Support and Implementation | 10 |
| 3.0 | WATERSHED INVENTORY | 11 |
| 3.1 | Description of Watershed | 11 |
| 3.1.1 | Topography | 11 |
| 3.1.2 | Geology | 13 |
| 3.1.3 | Soils | 13 |
| 3.1.4 | Glacial History | 18 |
| 3.2 | Biological Features | 19 |
| 3.2.1 | Rare, Threatened, and Endangered Species | 20 |
| 3.2.2 | Fish | 21 |
| 3.2.3 | Mussels | 22 |
| 3.2.4 | Invertebrates | 23 |
| 3.2.5 | Mammals | 23 |
| 3.2.6 | Birds | 24 |
| 3.2.7 | Reptiles and Amphibians | 24 |
| 3.2.8 | Plants | 24 |
| 3.2.9 | Invasive Nonnative Species and Their Potential Impacts | 29 |
| 3.3 | Water Resources | 32 |
| 3.3.1 | Climate and Precipitation | 27 |
| 3.3.2 | Wetlands | 29 |
| 3.3.3 | Streams | 33 |
| 3.3.4 | Lakes and Reservoirs | 34 |
| 3.3.5 | Groundwater | 34 |
| 3.4 | Land Use | 36 |
| 3.4.1 | Land Cover Description | 36 |
| 3.4.1.1 | Urban | 36 |
| 3.4.1.2 | Forest | 49 |
| 3.4.1.3 | Agriculture | 53 |
| 3.4.1.4 | Water | 54 |
| 3.4.1.5 | Barren | 55 |

| | | |
|------------|---|-----------|
| 3.4.2 | Protected Lands | 55 |
| 3.5 | Cultural Resources | 57 |
| 3.5.1 | Early Settlers | 57 |
| 3.5.2 | The Quarries | 57 |
| 3.5.3 | Greenhouse Industry | 58 |
| 3.5.4 | Other Historic Places | 59 |
| 3.5.5 | Ohio & Erie Canal National Heritage Corridor | 60 |
| 3.5.6 | West Creek and Its Many Names | 60 |
| 3.5.7 | West Creek's Early Attempt as a Park | 61 |
| 3.5.8 | Archeology | 61 |
| 3.6 | Previous and Complementary Efforts | 63 |
| 3.7 | Physical Attributes of Streams and Floodplain Areas | 64 |
| 3.7.1 | Early Settlement Conditions | 64 |
| 3.7.2 | Channel and Floodplain Conditions | 64 |
| 3.7.3 | Forested Riparian Conditions | 64 |
| 3.7.4 | Physically Altered Sections of West Creek | 66 |
| 3.7.5 | Eroding, Floodplain Connectivity, and Stream Entrenchment | 66 |
| 3.7.6 | Status and Trends | 70 |
| 3.8 | Water Resource Quality | 70 |
| 3.8.1 | Locationally-Referenced Use Designations/Use Attainment | 70 |
| 3.8.2 | Causes and Sources of Impairment | 71 |
| 3.8.3 | Point Sources | 72 |
| 3.8.3.1 | Permitted Discharges (NPDES) | 72 |
| 3.8.3.2 | Spills and Illicit Discharges | 73 |
| 3.8.4 | Nonpoint Sources | 74 |
| 3.8.4.1 | Home Septic Systems Inventory | 74 |
| 3.8.4.2 | New Home Construction | 75 |
| 3.8.4.3 | Animal Feeding Operations | 76 |
| 3.8.4.4 | Highly Erodible Land | 76 |
| 3.8.4.5 | Culverted Areas of West Creek | 79 |
| 3.8.4.6 | Channelized Sections of West Creek | 78 |
| 3.8.4.7 | Levies Existing Along West Creek | 78 |
| 3.8.4.8 | Areas With Minimal Human Impact | 78 |
| 3.8.4.9 | Impounded Segments of West Creek | 80 |
| 3.8.5 | Stormwater Control | 80 |
| 4.0 | Watershed Impairments and Restoration Goals | 84 |
| 4.1 | Pollutant Loading | 84 |
| 4.1.1 | High Priority Riparian Areas | 91 |
| 4.2 | Habitat Conditions (Dams, Corridors, and Riparian Cover) | 93 |
| 4.3 | Cuyahoga Remedial Action Plan Areas of Concern | 94 |
| 4.4 | Problem Statement | 95 |
| 5.0 | Coastal Nonpoint Pollution Control | 96 |
| 5.1 | Agriculture | 96 |
| 5.2 | Urban | 96 |

| | | |
|------------|---|------------|
| 5.2.1 | Watershed Protection Management Measure | 97 |
| 5.2.2 | Site Development Management Measure | 99 |
| 5.2.3 | New On-Site Disposal Systems | 100 |
| 5.2.4 | Operating On-Site Disposal Systems | 100 |
| 5.2.5 | Planning, Siting, and Developing Roads, Highways and Bridges | 101 |
| 5.2.6 | Bridges (Local Only) | 101 |
| 5.3 | Hydromodification | 102 |
| 5.3.1 | Operation and Maintenance Program for Existing Modified Channels – Protect Surface Water and Restore In-Stream and Riparian Habitat | 102 |
| 5.3.2 | Dam Management – Protection of Surface Water Quality and In-Stream and Riparian Habitat – Request for Exemption | 103 |
| 5.3.4 | Eroding Streambanks and Shorelines | 104 |
| 5.4 | Marinas - Request for Exemption | 104 |
| 6.0 | Watershed Restoration and Protection Goals | 109 |
| 6.1 | Water Quality Goals | 109 |
| 6.1.1 | Aquatic Habitat Goals | 109 |
| 6.1.2 | Biocriteria Goals | 109 |
| 6.1.3 | Water Quality Goals | 109 |
| 6.1.4 | Riparian Habitat Goals | 109 |
| 6.1.5 | Mainstem and Tributary Restoration | 110 |
| 6.1.6 | Wetland Goals | 110 |
| 6.2 | Objectives to Attain Water Quality Goals | 110 |
| 6.2.1 | Community Ordinances | 110 |
| 6.2.2 | Phase II Regulations | 112 |
| 6.2.3 | Construction Best Management Practices | 112 |
| 6.2.4 | Greenspace Protection | 116 |
| 6.2.5 | Additional Initiatives | 116 |
| 6.2.6 | Waterway Restoration Design Measures | 117 |
| 6.2.7 | Currently Occurring Water-Quality Improvement Implementation Efforts | 118 |
| 6.2.8 | The West Creek/Cuyahoga River Confluence Restoration | 119 |
| 6.2.9 | Implementation Objectives | 120 |
| 6.3 | Economic Redevelopment Focus Areas | 121 |
| 6.3.1 | Design Approach | 121 |
| 6.3.2 | Focus Areas | 121 |
| 6.3.3 | Focus Area 1 | 122 |
| 6.3.4 | Focus Area 2 | 126 |
| 7.0 | West Creek Main Trail | 130 |
| 7.1 | West Creek Greenway Trail Concept Plan | 130 |
| 7.2 | Greenway Trail Goals | 130 |
| 7.2.1 | Design Guidelines | 134 |
| 7.2.2 | Building Materials | 134 |

| | | |
|------------|---|------------|
| 7.2.3 | Trail Surface Selection | 135 |
| 7.2.4 | Trail Width Considerations | 136 |
| 7.2.5 | Maintenance/Emergency Vehicle Access | 136 |
| 7.2.6 | Boardwalk/Bridge Structures | 136 |
| 7.2.7 | Signage and Interpretive Exhibits | 137 |
| 7.2.8 | Picnic Pavilions and Other Trail Elements | 138 |
| 7.2.9 | Landscaping | 139 |
| 8.0 | Implementation | 140 |
| 8.1 | Priority Areas of Watershed | 140 |
| 8.2 | Education | 143 |
| 8.3 | Funding | 146 |
| 9.0 | Evaluation of Progress | 148 |
| 9.1 | Biannual Evaluation | 148 |
| 9.2 | Plan Distribution | 149 |
| 9.3 | Conclusion | 149 |

| List of Figures | | Page Number |
|------------------------|--|--------------------|
| Figure 1 | Watershed Locations | 3 |
| Figure 2 | West Creek Watershed Boundary | 4 |
| Figure 3 | Elevations | 12 |
| Figure 4 | Geology | 14 |
| Figure 5 | Topographical Map | 15 |
| Figure 6 | Hydric Soils | 29 |
| Figure 7 | Wetlands Suitability Map | 30 |
| Figure 8 | Identified West Creek Watershed Wetlands | 31 |
| Figure 9 | URS Preservation Priority Map | 33 |
| Figure 10 | Septic System and Landfill Locations Map | 35 |
| Figure 11 | UST/RCRA Sites Map | 35 |
| Figure 12 | Zoning Map | 39 |
| Figure 13 | Reach 1 Map | 40 |
| Figure 14 | Reach 2 Map | 42 |
| Figure 15 | Reach 3 Map | 43 |
| Figure 16 | Reach 4 Map | 45 |
| Figure 17 | Reach 5 Map | 47 |
| Figure 18 | Reach 6 Map | 48 |
| Figure 19 | Reach 7 Map | 50 |
| Figure 20 | WRRSP Projected Stream Restoration Sites | 51 |
| Figure 21 | Historic/Cultural Resources | 62 |
| Figure 22 | 100-Year Floodplain Map | 65 |
| Figure 23 | Plant Communities and Land Covertypes | 67 |
| Figure 24 | Land With Conservation Potential | 68 |

| | | |
|-----------|---|-----|
| Figure 25 | Recommended Preservation and Enhancement Areas | 69 |
| Figure 26 | Culverted Waterways in the West Creek Watershed | 79 |
| Figure 27 | High Erosion Areas | 81 |
| Figure 28 | Davey Resource Group Special Study Areas | 85 |
| Figure 29 | Index of Biotic Integrity | 86 |
| Figure 30 | Macroinvertebrate Health Index | 87 |
| Figure 31 | QHEI Index | 89 |
| Figure 32 | High Priority Riparian Areas | 91 |
| Figure 33 | Instream and Riparian Problem Areas | 92 |
| Figure 34 | Parking Lot Layout Conceptual Design | 113 |
| Figure 35 | Infiltration Basin Conceptual Design | 114 |
| Figure 36 | Stormwater Basin Conceptual Design | 115 |
| Figure 37 | Restoration Design Measures | 117 |
| Figure 38 | The West Creek Confluence Area | 119 |
| Figure 39 | Regional West Creek Confluence Map | 120 |
| Figure 40 | Economic Redevelopment Focus Area 1 - Alternative A | 123 |
| Figure 41 | Economic Redevelopment Focus Area 1 - Alternative B | 124 |
| Figure 42 | Economic Redevelopment Focus Area 1 - Alternative C | 125 |
| Figure 43 | Economic Redevelopment Focus Area 2 - Alternative A | 127 |
| Figure 44 | Economic Redevelopment Focus Area 2 - Alternative B | 128 |
| Figure 45 | West Creek Greenway Trail Conceptual Design | 131 |
| Figure 46 | Conceptual Trail Layout | 132 |
| Figure 47 | Example Boardwalk Design | 137 |
| Figure 48 | Example Educational Panel Design | 138 |

| List of Tables | | Page Number |
|-----------------------|---|--------------------|
| Table 1 | West Creek Watershed Major Soil Types | 16 |
| Table 2 | West Creek Watershed Housing Data | 76 |
| Table 3 | West Creek Watershed Impervious Cover By Land Use | 82 |
| Table 4 | Water Quality Analytical Laboratory and Field Results | 88 |
| Table 5 | Implementation Activities and Objectives | 121 |

List of Appendices

| | |
|-------------------|---|
| Appendix A | Davey Resource Group Biocriteria Study Results |
| Appendix B | Benthic Macroinvertebrate Taxa |
| Appendix C | Bird Inventory |
| Appendix D | Vegetative Communities and Plant Species |
| Appendix E | Maps of Reach Areas |
| Appendix F | Ohio EPA Known Spills Data |
| Appendix G | West Creek Watershed Community Ordinances |
| Appendix H | West Creek Success Stories |

LIST OF ACRONYMS

| Acronym | Full Name |
|----------------|--|
| AWS | Agriculture Water Supply |
| BMP | Best Management Practices |
| CCBH | Cuyahoga County Board of Health |
| CSO | Combined Sewer Outflow |
| CSWCD | Cuyahoga Soil and Water Conservation District |
| DO | Dissolved Oxygen |
| EPA | Environmental Protection Agency |
| HUC | Hydrologic Unit Code |
| IBI | Index of Biotic Integrity |
| ICI | Invertebrate Community Index |
| IWS | Industrial Water Supply |
| MIwB | Modified Index of Well-Being |
| MS4 | Municipal Separate Storm Sewer |
| NEORSDD | Northeast Ohio Regional Sewer District |
| NOACA | Northeast Ohio Areawide Coordinating Agency |
| NPDES | National Pollution Discharge Elimination System |
| NRCS | Natural Resources Conservation Service |
| ODNR | Ohio Department of Natural Resources |
| ODOT | Ohio Department of Natural Resources |
| PCR | Primary Contact Recreation |
| QHEI | Qualitative Habitat Evaluation Index |
| RAP | Remedial Action Plan |
| RCRA | Resource Conservation Recovery Act |
| RIDE | Regional Inter-Community Drainage Evaluation Study |
| TDS | Total Dissolved Solids |
| TMDL | Total Maximum Daily Load |
| Tri-C | Cuyahoga Community College |
| USDA | US Department of Agriculture |
| WCPC | West Creek Preservation Committee |
| WQS | Water Quality Standards |
| WRRSP | Water Resource Restoration Sponsorship Program |
| WWH | Warm Water Habitat |

CHAPTER 1
INTRODUCTION

EXECUTIVE SUMMARY

The West Creek Watershed Action Plan presents the initial processes that ultimately serve public and private community interests for quality of life issues within the watershed as related to neighborhood livability, natural resource protection and restoration, recreational trail expansion, and sustainable economic development that incorporates and protects the natural resources within the watershed. The West Creek watershed and all of Northeast Ohio have significant potential to integrate, connect, and wisely utilize the region’s invaluable natural resources to increase the attractiveness and competitiveness of its communities, while also protecting and improving water quality.

The West Creek Preservation Committee (WCPC) is a citizen-based, grassroots organization whose mission is to conserve, protect and enhance the natural, historical and recreational resources in the West Creek watershed and vicinity through the protection and restoration of natural lands and the development of a greenway trail network, providing an enhanced quality of life for present and future generations. It is WCPC’s goal to work with the watershed communities, their citizens, and stakeholders to realize the vision described in this plan to benefit the health of the environment, its citizens, and its economic future.



1.1 The Watershed

The West Creek Valley is located in the south central section of Cuyahoga County. West Creek travels nine miles through the communities of Brooklyn Heights, Independence, Parma, Seven Hills and small areas of the cities of Cleveland and Broadview Heights, Ohio. West Creek is a tributary to the Cuyahoga River and Lake Erie (Figure 1, page 9). West Creek's 14-digit hydrologic unit code (HUC) is 04110002-060-030 and its state 305(b) identification code is OH 19-066. The watershed, which is defined as an area of land that drains a geographic area into a river or body of water and is not associated with political boundaries, encompasses 14 square miles roughly outlined by State Rd. to I-77 (east to west), and I-480 to just south of Pleasant Valley Rd. (north to south). The West Creek watershed and its communities are shown in Figure 2 on page 10.

Each of the communities within the watershed has distinct roles and poses specific challenges for balancing the elements of maintaining and increasing dynamic neighborhoods, regional economics, and natural resources. The West Creek Watershed Action Plan begins to look at these elements and how they can be integrated for a balanced approach in future planning efforts. The potential of the West Creek Corridor and its watershed is great if the proper tools are in place to guide communities. This plan presents the initial tools to begin this integration process and to become a model for the region as a dynamic center for community livability, economic viability, natural resource protection, and recreational expansion.



1.2 Watershed Residents

According to 1999 population estimates, the West Creek watershed has a population of about 39,700 residents. The City of Parma, the seventh largest city in Ohio, has about two-thirds of the residents residing within the watershed (26,700). Seven Hills has about 22% of the total residents (8,700), while Cleveland has about 7% of the total residents (2,700). Smaller numbers of residents are located in Brooklyn Heights (2.5% - 1,000), Independence (1% - 400), and

Broadview Heights (0.5% - 200). There are an estimated 27,000 households within the West Creek watershed, meaning that there is a significant number of residential areas that have the potential to be connected to a new park and trail system. Of all of the communities within the watershed, Independence is the only one whose watershed population is expected to grow with any significance up to 2030.

Figure 1
Watershed Locations

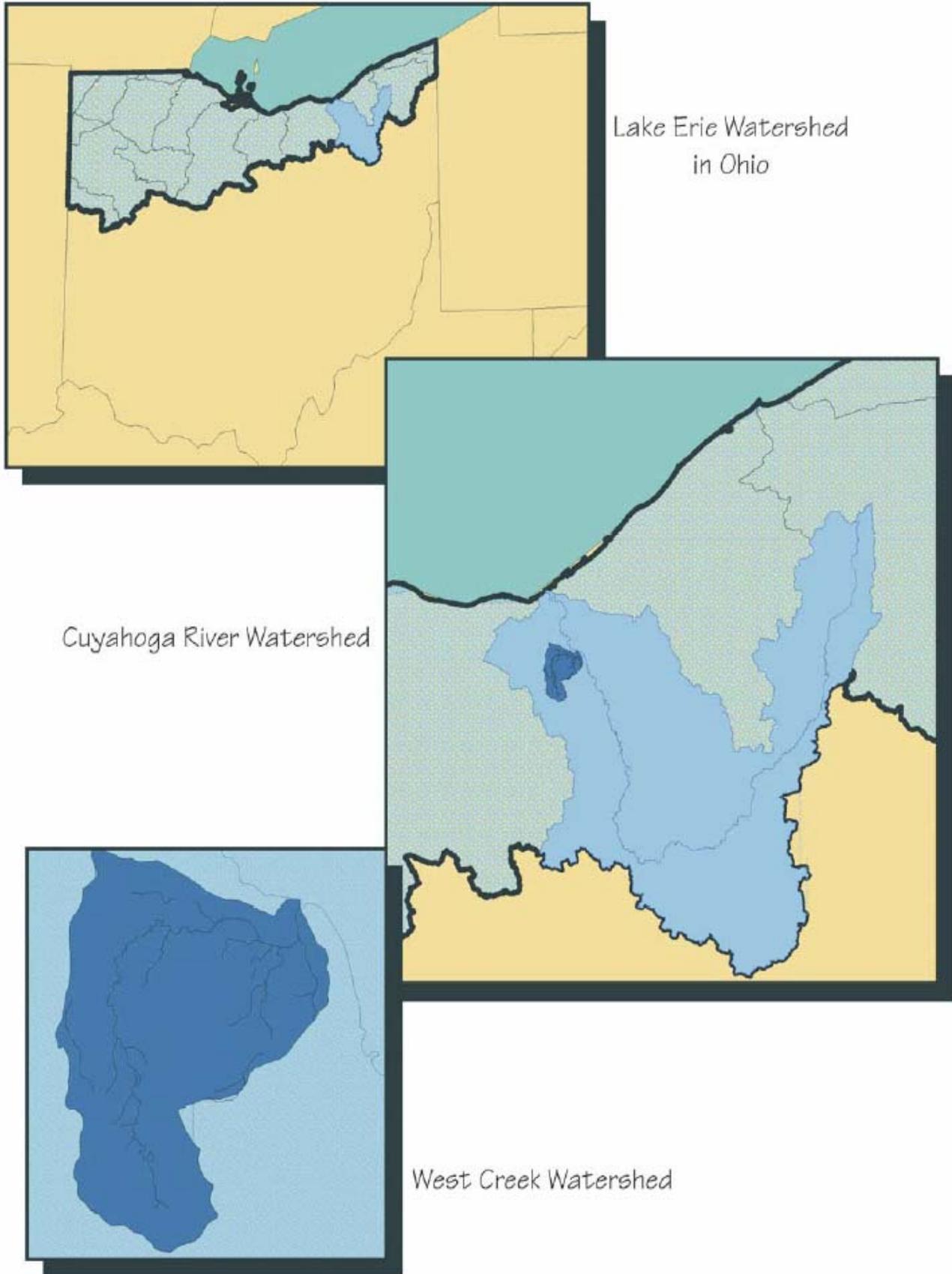
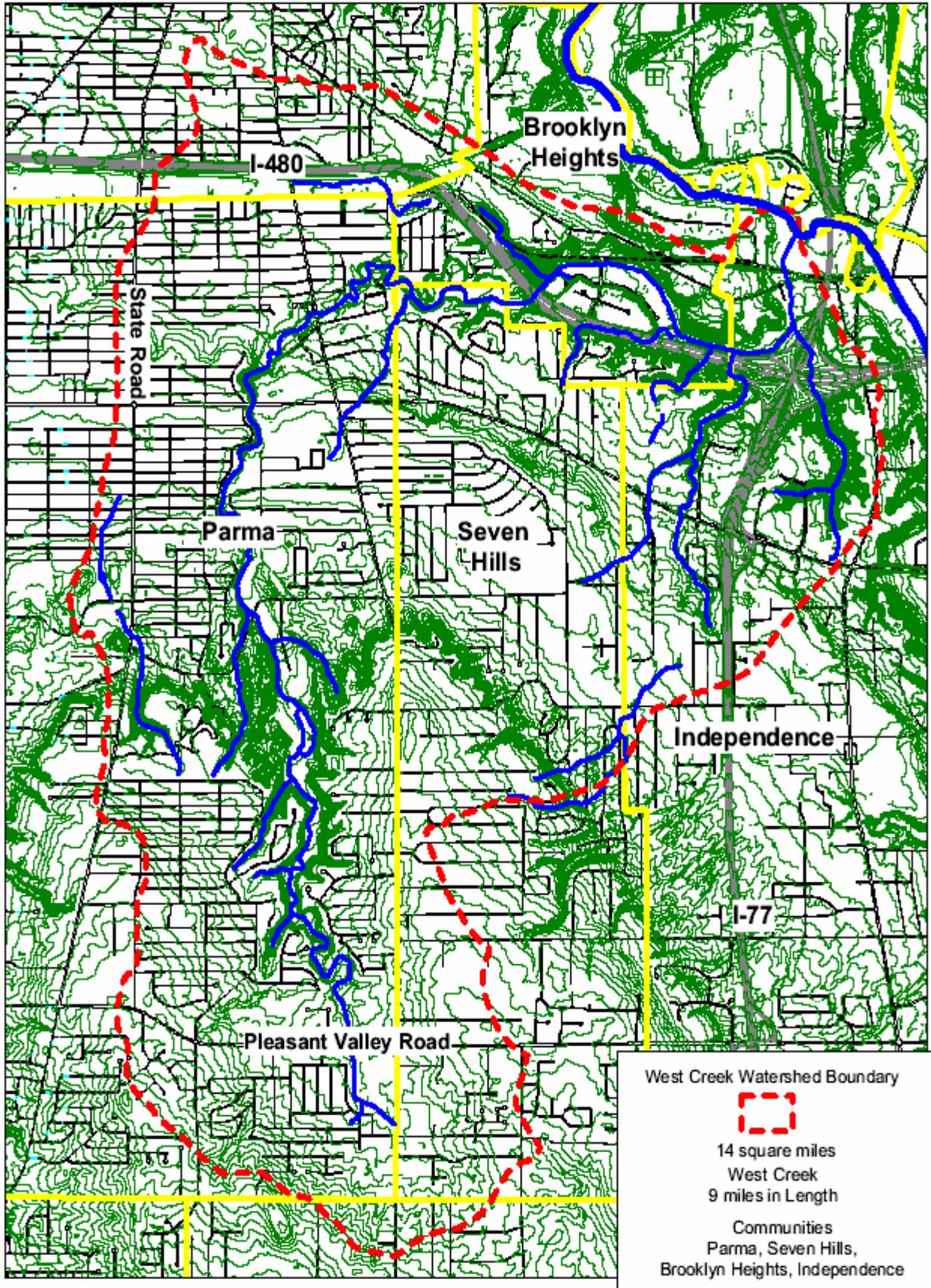


Figure 2
West Creek Watershed Boundary



1.3 Watershed Employees

According to 1999 estimates, there are approximately 24,000 employees working within the watershed. The majority of these employees are concentrated in the I-77/Rockside Road area, which is projected to continue growing as a focal point of office and commercial activity. This employee population and lodging guests, in proximity to the West Creek Valley and the Cuyahoga Valley National Park, create the potential to connect significant numbers of people to recreational resources at various times of the day and evening, both on weekdays and weekends. Creating safe and easy pedestrian connections between these employee generating areas and a trail network will be essential.

1.4 Economic Vitality

Overall, the economy of the West Creek watershed continues to be adequate with its existing establishments and local business hubs, as well as its inclusion of major interstate highways; however, with the exception of specific areas, primarily in the Rockside Road area of Independence, economic activity and population growth are not expected to increase substantially. According to the Northeast Ohio Areawide Coordinating Agency (NOACA) between 2000 and 2030 most areas of the watershed are expected to slightly decrease in population with average income remaining in the \$50,000 to \$80,000 per year range.

Redevelopment options and new economic markets will need to be examined on a continuous basis to determine how they can evolve as an integral part of the watershed recommendations. The watershed has potential to integrate new economics with watershed protection that will sustain the area economically, socially and environmentally.

The West Creek watershed has a variety of resources and issues encompassed within its urban boundary. An awareness of these influences begins the process of assessing the strengths and challenges for the future of the watershed and its communities.

1.5 Historic Watershed Protection Activities

Water quality in the West Creek watershed is impaired by non-point source pollution originating primarily from residential development in an aging suburban environment. Water quality problems in the West Creek watershed were identified and prioritized by the West Creek Preservation Committee as part of the process of developing a Watershed Management Plan (completed in September 2001). Non-point source pollution through the loss of greenspace, stream and riparian modification, and suburban run-off constitute the primary degradation issues.

Several studies have been performed to assess the water quality problems in the West Creek watershed. In 1995 the Northeast Ohio Regional Sewer District (NEORS) completed studies of water chemistry and qualitative habitat assessments. In 1999, the Cuyahoga County Board of Health (CCBH) completed assessments of West Creek including Qualitative Habitat Evaluation Index (QHEI), fecal coliform, total phosphorous, conductivity, and macro-invertebrate

analysis. In 2000, Ohio EPA sampled West Creek as a part of the lower Cuyahoga watershed analysis. This assessment included QHEI, Invertebrate Community Index (ICI), and Index of Biotic Integrity (IBI) including fish and macro-invertebrate assessments. Additionally, as a part of the West Creek Watershed Management Plan, Davey Resource Group completed a riparian corridor assessment for a 400' wide strip along the entire 9-mile length of West Creek. The riparian corridor assessment mapped and categorized riparian zones according to vegetative type, habitat, and protection or restoration potential. The findings from all studies were used to draft management strategies for watershed protection and restoration in the West Creek Watershed Management Plan.

The West Creek watershed has a variety of water quality issues. The three main problems identified in the studies were nutrient enrichment, aquatic habitat modification, and stream channel/riparian degradation. West Creek is classified as "primary contact water" for recreation purposes. Fecal coliform counts at 15 of 20 sampling sites far exceed Ohio EPA standards of 1000 organisms/100 ml. Where high fecal coliform counts were obtained macro-invertebrates were primarily of pollution tolerant varieties. QHEI scores were considered "fair to good" indicating that water quality by non-point source pollution was a primary factor in decreased fish and macro-invertebrate populations and thus affecting the overall health of the creek. West Creek is currently slightly below attainment status for warm water habitat streams; however, it holds high potential for recovery to attainment status if appropriate strategies are implemented.

CHAPTER 2 WATERSHED ACTION PLAN DEVELOPMENT

2.1 Background

This West Creek Watershed Action Plan was initiated through the interests of concerned citizens and communities to improve and restore the remaining natural resources within the protection in the West Creek watershed. The effort incorporates primarily the communities of Parma, Seven Hills, Independence, and Brooklyn Heights, Ohio. This plan was developed with a watershed approach to serve as a framework for the communities as part of the Cuyahoga River system and Lake Erie Basin.

The West Creek Watershed Action Plan was written by the West Creek Preservation Committee, a 501(c)(3) non-profit organization, with regular input by the City of Parma Parks Advisory Council, a Community Committee, which includes representative citizens from each of the four communities. The planning process also included a series of public meetings organized by the Cuyahoga County Planning Commission in 2000 and 2001 to gain input from all residents of interest. The Draft Watershed Action Plan was presented at West Creek Preservation Committee's September 2007 Public Meeting in order to receive public opinions and feedback. West Creek Preservation Committee also holds quarterly public meetings where the Action Plan has been frequently discussed to gauge public interest and respond to public concerns.

Besides improving and restoring West Creek water quality, another goal of this plan is to enhance the quality of life for area residents by creating a vision for the future of the West Creek watershed, including outlining recommendations that will preserve its open space, address its environmental needs, and integrate the valley into the communities as an oasis of natural beauty and recreational opportunities. In connection with this is the commitment to create a connection for recreational access from suburban communities west of the Cuyahoga River Valley to the Ohio & Erie Canal, the Cuyahoga River, and the Towpath Trail.

2.2 The Watershed Approach

This plan has been developed using a watershed approach, which is a "coordinating framework for environmental management that focuses public and private efforts to address the highest priorities within hydrological geographic areas." (U.S. EPA, Division of Water, 2000) The U.S. EPA cites three major principles to utilizing a watershed approach in the planning process: Partnerships, Geographic Focus, and Management Techniques based on Sound Science.

Partnerships include stakeholders most affected by management decisions, involving them throughout the process and shaping key decisions. This will ensure that environmental objectives are integrated with those for economic stability and other social and cultural goals. These partnerships will also assist in streamlining communication and reduce duplicate costs for implementation strategies.



2.3 Watershed Partners

The West Creek Preservation Committee is a grassroots, non-profit 501(c)(3) organization formed in 1997 to preserve the remaining natural habitat, upland forest, wetlands, and stream corridors in the West Creek watershed. It was officially incorporated within the State of Ohio in the year 2000 and is governed by a set of bylaws that dictate organizational structure, which is generally described as follows.

A Board of Trustees representing all communities in the watershed provides direction and coordination for the organization. The Board of Trustees vote on all major issues effecting the organization (i.e. land purchases, grant contracts, mitigation opportunities, etc...), which are passed by a majority (51%) vote of a quorum of the Trustees.

There are four primary officers, including the Director, the Assistant Director, the Secretary, and the Treasurer. These officers also comprise the Executive Committee of the Board of Trustees, which are tasked with certain operational decision-making duties, such as employee compensation.

Several project-specific committees also exist, each led by a Trustee. These committees, such as the Land Conservation Committee, are responsible for conducting and implementing the required activities necessary to successfully complete projects. The Land Conservation Committee, for example, identifies potential conservation properties, contacts and negotiates with landowners, provides for the funding mechanisms necessary to convey real estate, and provides for the post-acquisition monitoring and stewardship of the protected properties.

The organization currently has a staff of two, one full-time Watershed Coordinator (Neal Hess) and a Project Manager (Derek Schafer), whom both can be contacted via the West Creek Preservation Committee at P.O. Box 347113, Parma, Ohio 44134 or via phone at (216) 749-3720. The staff report immediately to the Director on a day-to-day basis and to the entire Board of Trustees on a monthly basis. The staff conduct the daily business of the organization as it pertains to protecting and restoring the water resources of the West Creek watershed. The staff are a part of several of the organization's Committees (i.e. the Watershed Coordinator is on the Land Conservation, Grants, Mitigation, Newsletter, Development, and Trails Committees to name a few).

WCPC is partially funded through individual memberships as well as private donations. WCPC has a membership of several hundred members. Other fundraising activities revolve around participation in community sponsored events. WCPC's revenue is derived from roughly 50% government grants, 40% private grants, and 10% membership dues and other fundraising activities.

WCPC works with numerous watershed partners to achieve their land conservation and clean water initiatives. These partners include:

- The City of Parma
- The Village of Brooklyn Heights
- The City of Seven Hills
- The City of Independence
- The Cuyahoga Soil and Water Conservation District
- Northeast Ohio Regional Sewer District
- Cleveland Metroparks
- Cuyahoga County Board of Health
- The Ohio Environmental Protection Agency
- The Cuyahoga River Remedial Action Plan (Cuyahoga RAP)
- West Creek Watershed Business Community (including but not limited to Ray Fogg Building Methods, Inc., Broadview MultiCare, Independence Excavating, RMS Properties Management, and Visconsi Companies LTD)
- The Parma Area Chamber of Commerce
- The Cuyahoga Valley Chambers of Commerce
- U.S. Congressional Tenth District
- State Representatives: 15th District and 17th District
- State Senators: 23rd District and 24th District
- Brooklyn Heights, Independence, Parma and Seven Hills residents and landowners
- Cuyahoga Community College
- Parma City Schools
- Boy and Girl Scouts of America
- Parma and Seven Hills Historical Societies
- Watershed Churches
- Friends of Big Creek and Friends of Euclid Creek
- Northeast Ohio Areawide Coordinating Agency
- The Ohio Environmental Protection Agency
- The Ohio Department of Natural Resources
- The Ohio Department of Transportation
- The Cuyahoga County Planning Commission
- Northeast Ohio Watershed Council

As a private 501(c)3 nonprofit corporation, WCPC works with these project partners primarily on a project-specific basis. Project decisions are made individually, but with considerable input being provided by and taken into consideration from the partners.

A good example of partnership within the West Creek watershed is the creation of the West Creek Reservation. WCPC, the City of Parma and the Cuyahoga Soil & Water Conservation District (CSWCD) worked to permanently protect over 350 contiguous acres of land within the West Creek Valley. Once protected, they reached an agreement with Cleveland Metroparks so that the park system would manage the lands and utilize them for outdoor educational purposes. NEORS also entered the partnership by committing a monetary and

staff contribution to the development of the West Creek Reservation and its environmental education initiatives.

2.4 West Creek Watershed Community Resolutions of Support and Implementation

The work of WCPC and the improvement of the water resources within the West Creek watershed would not be possible without the support and involvement of all of the watershed communities. To that end the plan's adoption and resolutions of support will be sought and received from the communities of Brooklyn Heights, Independence, Seven Hills, and Parma once the Watershed Action Plan has been finalized and approved by the State of Ohio.

Moving forward, the West Creek Preservation Committee will work with the watershed communities to utilize plan components to protect, improve and restore the water resources of the West Creek watershed.

Together with its partners, WCPC has been implementing the steps laid out within this Watershed Action Plan since the organization's inception in 1997. The organization will continue to implement this Plan and will conduct frequent public education and information sessions on implementation progress and ways that citizens can get involved. These education and information sessions will occur as part of WCPC's quarterly public meetings.

CHAPTER 3 WATERSHED INVENTORY

3.1 Description of the Watershed

The West Creek watershed encompasses 14 square miles and numerous environmental settings including natural areas with a diverse plant and animal habitat, high and moderate density residential housing, and commercial and light industrial facilities. It is located within the Cuyahoga River watershed. The West Creek watershed is located adjacent to the Coastal Zone Management Area of Lake Erie, and is also a part of the Lake Erie Basin. The health of West Creek and its watershed contributes significantly to the overall quality of the region's water resources and networks.

3.1.1 Topography

The West Creek Valley was formed after the last period of glaciation, when a stream cut down through the glacial till, sandstone, and shale deposits predominant throughout this area. The steep nature of many sections of the West Creek Valley indicates that the stream continues to actively incise the local bedrock on its path to the Cuyahoga River.

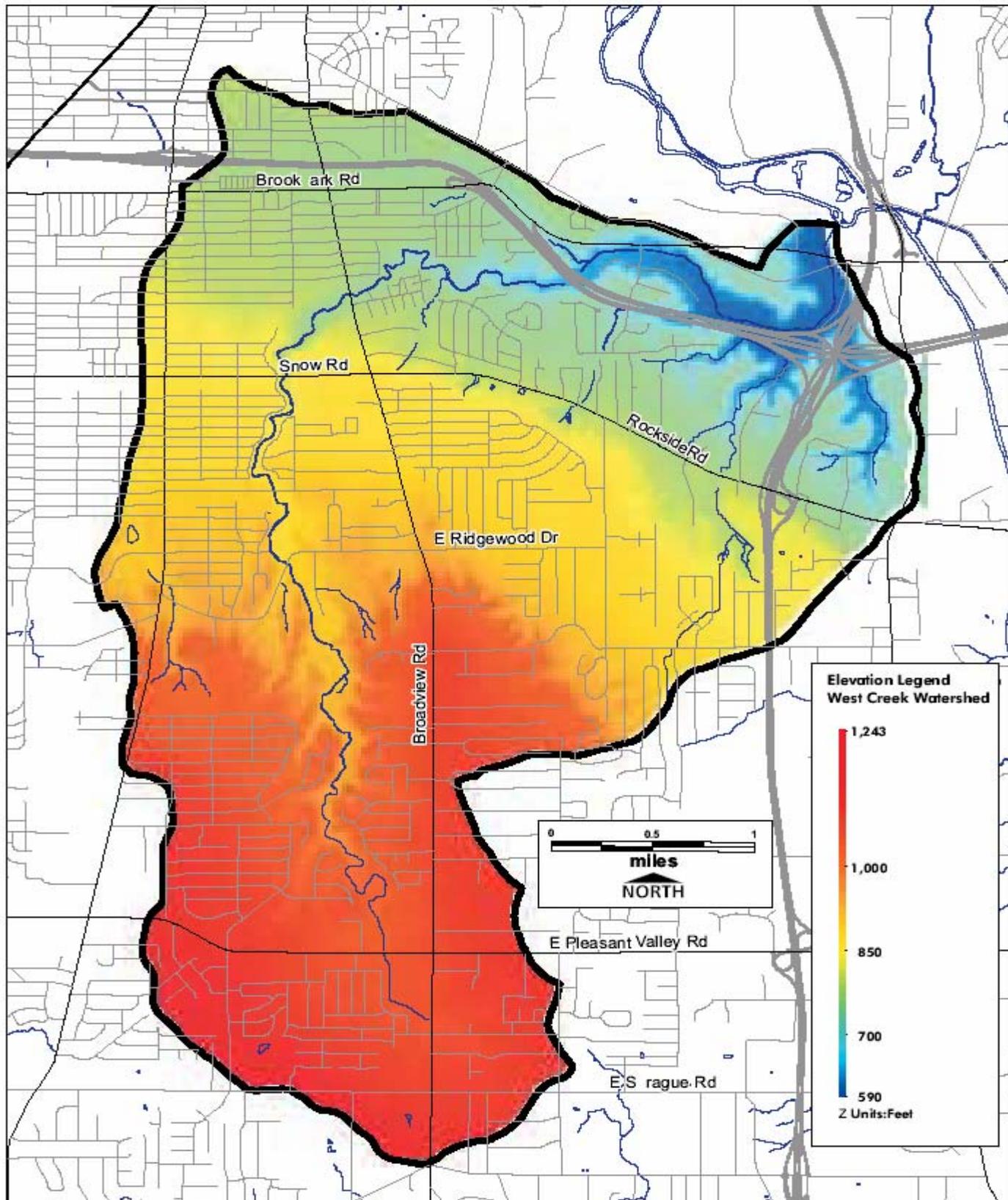
West Creek begins its journey at its headwaters in northernmost Broadview Heights and it continues through the scenic terrain of the West Creek Reservation. North of Ridgewood Drive, the valley runs in a steep but narrow gorge, which flattens out west of Broadview Road. As the creek flows toward U.S. Interstate 480 (I-480), however, the gorge and steep valley walls return in a stunning display. North of I-480 to the Cuyahoga River the creek occupies a smaller channel, the result of realignment and alteration of the stream for development purposes. The confluence of West Creek with the Cuyahoga River, along with the nearby Ohio & Erie Canal, are a remarkable display of water bodies and their influence on the landscape.

The headwaters of the creek near Broadview Road, south of Pleasant Valley Road, are at an elevation of almost 1,100 feet above sea level. As the creek enters the Cuyahoga River north of Granger Road, the streambed has cut itself down to an elevation of 590 feet above sea level. Thus, West Creek drops approximately 510 feet in approximately nine miles.

Near the headwaters alone, West Creek cuts a deep gorge that drops as much as 120 feet. The rim of the gorge offers spectacular views and the steep valley walls isolate the creek bottom and adjacent land from urban encroachment. In this area the creek floodplain creates a flat valley floor that provides invaluable habitat for much local flora and fauna.

The steep valley walls will need to be protected from erosive activities, as they have a major role in the long-term integrity of West Creek. The restoration of topographically altered sites will also need to be carefully planned to ensure proper grading for restoring appropriate contours for the valley.

Figure 3
Elevations



SOURCE: Elevation: USGS; Basemap Features: Cuyahoga County Engineer (1993 Planimetrics); Cleveland State University (Rectified TIGER 97)

3.1.2 Geology

The West Creek watershed lies within the glaciated Allegheny Plateau of the Appalachian Plateaus Province (Soil Survey of Cuyahoga County, Ohio, 1980). West Creek Valley bedrock consists of the Cuyahoga Group shales that were formed from hardened black muds over 300 million years ago in the Mississippian Period of the Paleozoic Era (Figure 4, page 14). These shales have a great diversity in appearance and texture and form the unique features of the West Creek Valley. The Cuyahoga Group layers include the Chagrin shale, Cleveland shale, Bedford shale, Berea sandstone, Orangeville shale, Sharpsville sandstone, Meadville shale, and surficial glacial deposits. All of these layers are highly visible in the West Creek Valley.

Another unique geologic feature of this region is the "contacts," meaning the points of change from one rock layer to another, which are often marked by waterfalls or cascades in the creek. These contacts help identify the geologic process of the valley in a very visible form. Interpretation of these features as part of trail development is strongly encouraged and preservation of these features from future development is recommended.

The hydrology of the West Creek watershed influences adjoining lands and the stream itself (Figure 5, page 15). Alteration of the natural hydrologic patterns can change the characteristics of the streambed and the functionality of the watershed as a comprehensive working mechanism. Unfortunately, this has frequently occurred with West Creek.

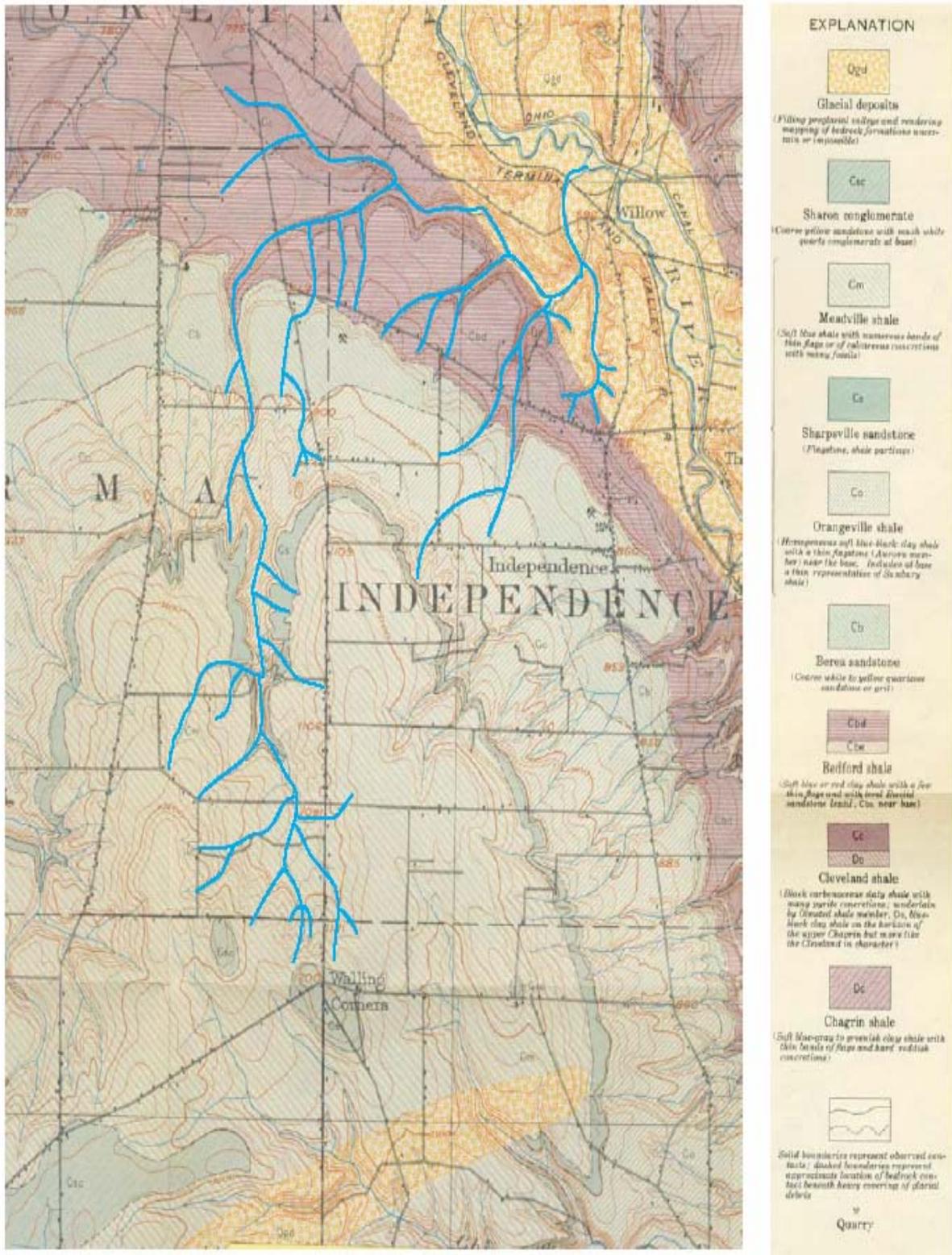
Prior to about 1955, the creek's hydrologic makeup was largely as it had been for generations, with tributaries stretching far into smaller valleys and ravines and the floodplains large and expansive (Figure 5, page 15). Within the past forty years, building development, as well as street and highway construction, have caused the deterioration of the original hydrologic function of the creek and created problems related to stormwater runoff, retention, and loss of biological and aquatic habitats. Areas that have the potential for restoration of the creek hydrology to the period prior to the mid-20th century should be identified and assessed as the first step toward recreating a healthy, dynamic stream.

3.1.3 Soils

Soil types and their characteristics have a great influence on the hydrologic function of the West Creek watershed and impact development. Hydrologic soil groups as classified by the U.S. Department of Agriculture's (USDA) Soil Survey of Cuyahoga County (Figure 6, page 29), are used to estimate runoff from precipitation. They are grouped according to the intake of water when the soils are thoroughly wet and receive long-duration storms. This is important information to note, because it will assist in determining future impacts on West Creek, as well as design and construction procedures for trail and park development.

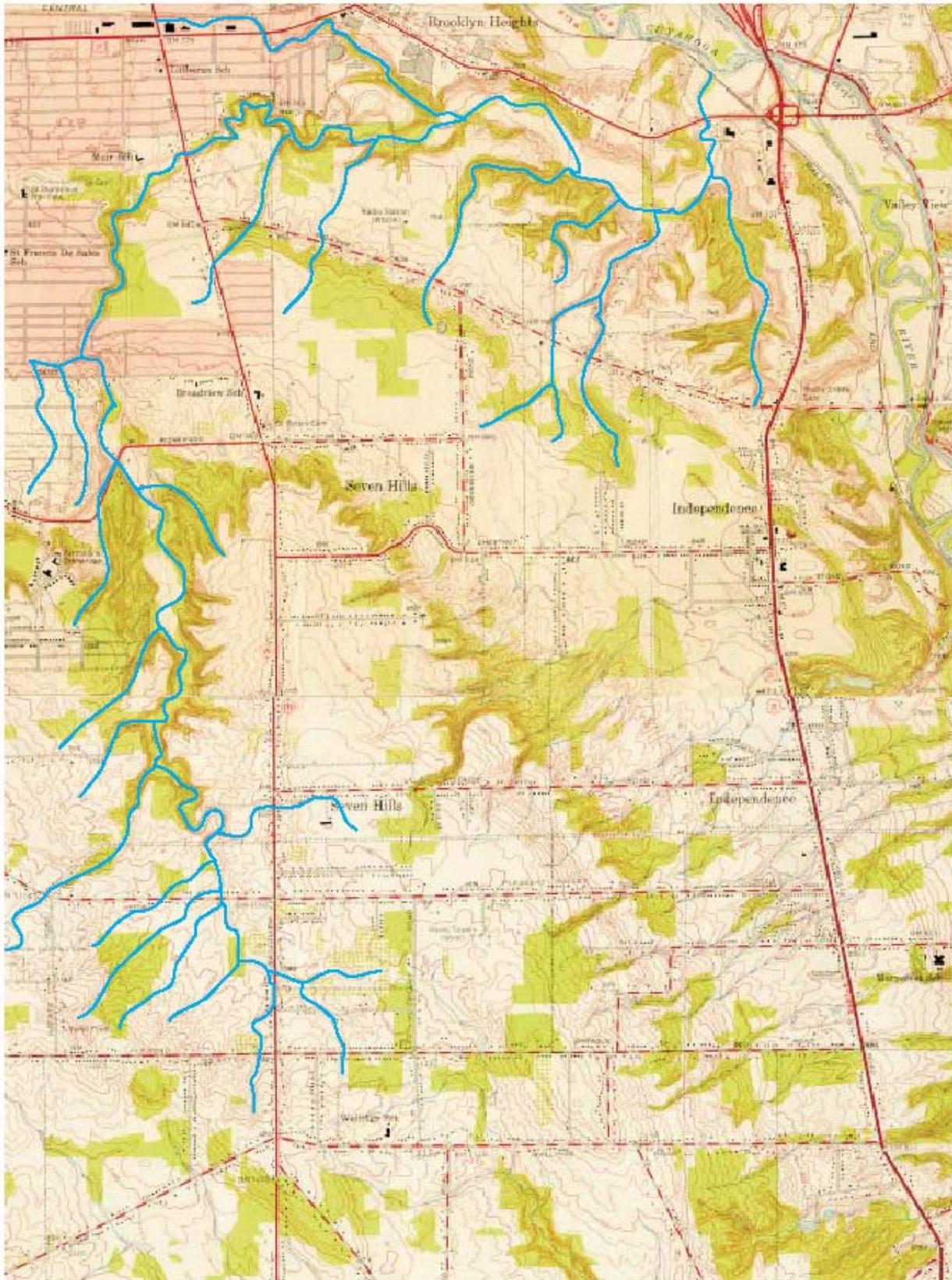
Based on USDA classifications, the West Creek watershed consists of primarily C and D

Figure 4
Geology



SOURCE: Map of the Euclid, Cleveland and Berea Quadrangles, Ohio showing Aerial Geology, 1931. United States Geological Survey Quads Base, 1902.

Figure 5
Topographical Map



SOURCE: United States Geological Survey, 1953

Table 1 West Creek Watershed Major Soil Types

| Soil Symbol | Soil Name | Description |
|--------------------|--------------------------------|---|
| MmB | Mahoning-Urban land complex | Deep, somewhat poorly drained Mahoning soil and Urban land. Permeability is slow or very slow. Limited by a seasonal high water table for use as building sites and sanitary septic systems. |
| MgA | Mahoning silt loam | Deep, nearly level and somewhat poorly drained. Permeability and runoff are slow. Severely limited for most sanitary septic facilities and building sites by a seasonal high water table, low strength and slow permeability. |
| HrC | Hornell silt loam | Moderately deep, sloping and somewhat poorly drained. Permeability is slow and runoff rapid. Severely limited for building sites and sanitary septic facilities due to wetness, slope, and slow permeability. |
| HsC | Hornell-Urban land complex | Moderately deep and somewhat poorly drained. Permeability is slow or very slow. Limited use for building sites and sanitary septic systems due to seasonal wetness, slopes, slow or very slow permeability and shale bedrock at shallow depths. |
| MxB | Mitiwanga-Urban land complex | Moderately deep and somewhat poorly drained. Permeability is moderate. Severely limited for building sites, sanitary septic systems, and some recreational uses by seasonal wetness and hard, shallow bedrock. |
| MtA | Mitiwanga Silt Loam | Moderately deep, nearly level and somewhat poorly drained. Permeability is moderate and runoff slow. Severely limited for building sites for building sites and sanitary septic systems by seasonal wetness and shallow bedrock. |
| BrF | Brecksville Silt Loam | Moderately deep, steep and well drained. Permeability is slow and runoff rapid. Recreation and urban uses very limited due to steep of slopes and slippage. |
| Ua | Udorthents, loamy | Soils in areas of cut or fill. Suitability for building sites and sanitary septic facilities varies. |
| At | Allis-Urban land complex | Moderately deep, nearly level, poorly drained. Somewhat poorly drained. Severely limited for building sites, sanitary septic facilities and recreational uses by seasonal wetness, very slow permeability and shallow shale bedrock. |
| LoB | Loudonville silt loam | Moderately deep, gently sloping and well drained. Permeability is moderate and runoff medium. Severely limited for sanitary septic facilities and some buildings by relatively shallow sandstone bedrock. |
| LuC | Loudonville-Urban land complex | Moderately deep and well drained. Permeability is moderate and runoff is rapid. Limited for building sites, sanitary septic facilities and recreational uses by slope and shallow bedrock. |
| EsC | Ellsworth-Urban land complex | Deep, moderately steep and moderately well drained. Permeability is slow and runoff rapid. Severely limited as a site for buildings and sanitary facilities by slope, slow |

| | | |
|-----|----------------------------|---|
| | | permeability, low strength and seasonal wetness. |
| EIB | Ellsworth silt loam | Deep, gently sloping and moderately well drained. Permeability is slow and runoff medium. Moderately limited as a building site and for sanitary septic facilities due to seasonal wetness, slow permeability and low strength. |
| DkF | Dekalb-Loudonville complex | Moderately deep, steep and well drained soils. Permeability is rapid. Construction for recreation and urban uses is very difficult due to erosion. |
| GeF | Geeburg-Mentor silt loam | Moderately well drained soils. Low permeability. Construction for recreational and urban uses is very difficult due to erosion. |
| OsF | Oshtemo sandy loam | Deep, steep and well drained soil. Permeability is moderately rapid and runoff is rapid. Construction for recreation and urban uses is very difficult due to erosion. |
| CnB | Chili loam | Deep, gently sloping and well drained. Permeability is moderately rapid and runoff medium. Well suited to homebuilders and urban uses. |

Table 1 West Creek Watershed Major Soil Types
The information in this table was referenced from the Soil Survey of Cuyahoga County,

Class soil groups. Both of these classes of soils have slow infiltration rates and a relatively thin soil layer thickness above bedrock. The D Class soils have a high level of clay content, which makes them less permeable to water. There are also small areas of B Class soils within the West Creek Reservation south of Ridgewood, as well as at the northern end of the watershed near the Cuyahoga River. B Class soils have a moderate infiltration rate and consist of deep, well-drained soils (West Creek Valley Management Plan, 2001).

The USDA Soil Survey of Cuyahoga County, Ohio highlights several different types of soils within the watershed. Steep slopes generally have Dekalb-Loudonville Complex in the upper reaches of the watershed, with much of the remaining downstream steep slope areas being Brecksville Silt Loam. These soils are characterized as having low potential for building site development and medium to high potential for woodland and habitat for woodland wildlife. The floodplain areas generally contain Chagrin Silt Loam in the upper reaches of the watershed, with Tioga Loam in the downstream areas (not included in Table 1 due to their minimal extent). These soils have a high potential for woodland and recreation, such as hiking trails. Due to the large volume of stormwater runoff from the urban areas, stream channels are subject to erosion regardless of the soil or bedrock type (West Creek Valley Management Plan, 2001).

Sediment influx and sedimentation are two variables that have significant potential to negatively impact West Creek. Much of West Creek's aquatic habitat is found along its bedrock/cobble bed, which can become filled by excess sediment, thereby reducing or eliminating this important habitat. Based on the soils listed in Table 1 (West Creek Watershed Major Soil Types), the following soils were determined to be "highly erodible" based on a K Value (soil erodibility factor) greater than 0.40, as predicted by RUSLE (the On-Line Soil Erosion Assessment Tool). The "highly erodible" major soils within the West Creek watershed are the Mahoning-Urban land complex, Mahoning silt loam, Hornell silt loam, Hornell-Urban land complex, Brecksville silt loam, Allis-Urban land complex, Ellsworth-Urban land complex, Ellsworth silt loam, and Geeburg-Mentor silt loam. All of the listed "highly erodible" soils had a soil erodibility factor of 0.43, except for the Allis-Urban land complex, which had a soil erodibility factor of 0.49.

As discussed in more detail in Section 3.3.2 (Wetlands), hydric soils, "those soils that are sufficiently wet in the upper part to develop anaerobic conditions during the growing season" as defined by the Natural Resources Conservation Service website, are also of inherent importance due to their association with wetlands. The following major West Creek watershed soil types are prevalently hydric: Mahoning-Urban land complex, Mahoning silt loam, Hornell-Urban land complex, Brecksville silt loam, and the Allis-Urban land complex.

3.1.4 Glacial History

The majority of topographic features within the West Creek Reservation were a result of glaciation, including sedimentary features deposited by the glacier and its outwash and exposed post-glacial bedrock formations altered by the flowing ice. Throughout the region encompassed by the watershed, glacial cover was generally less than 40 feet. In terms of predominant glacial features, the West Creek watershed is located between the Brooklyn and Defiance Moraines.

West Creek itself runs north from its base and then turns parallel to Lake Erie. This configuration is believed to be the result of stream relocation due to a stationary ice margin. The creek inhabits two physiographic units, beginning in the Plateau region and then traveling north through the Escarpment before emptying into the Cuyahoga River.

The Plateau is a rolling upland with elevations ranging from 1000 feet to 1250 feet. The Plateau area is composed of Lavery Till II, which is believed to be 19,000 years in age and range in thickness from 5.2 to 16 ft. The till composition is primarily silt and strongly calcareous, with an average clay content of around 36 percent and less than 20 percent sand.

The Escarpment is composed mainly of shale and sandstone about 100 feet thick and with a base of 800 feet. The shale portion is approximately 30 feet in depth and formed of Cleveland, Chagrin, and Bedford shales. This shale section is mantled with a thin layer of silt and clay from the Pleistocene and recent time periods. Below the shale is a sandstone unit ranging from 20 to 50 feet thick and composed of Cuyahoga and Berea Sandstone

formations from the Mississippian era. Cuyahoga Formation Sandstone contains soft, dark gray layers interbedded with fine-grained, lighter-gray layers. Berea sandstone is bonded by clay and bedded in layers composed of fine to medium grained sand. The escarpment experiences a steep elevation rise of 1150ft.

3.2 Biological Features

The Davey Resource Group conducted a Biocriteria Study and Riparian Corridor Assessment Report of West Creek in 2000. As part of the biocriteria study portion of the report, samples were collected from different sections of the creek and the results compiled in various biological indices. The work includes the following: the Invertebrate Community Index (ICI) which measures water quality health based on assemblages of benthic invertebrates (i.e. aquatic insects and crustaceans), the Index of Biotic Integrity (IBI) which quantitatively measures the health of fish communities, and the Qualitative Habitat Evaluation Index (QHEI) which precisely measures the amount and quality of habitat available for fish and related aquatic habitat (Davey Resource Group Report, 2001). The Ohio EPA also performed samples for similar data in 2000.

The results of the Biocriteria Study performed by the Davey Resource Group, Ohio EPA, and NEORSD can begin the determination of the condition of the Creek. The ICI results from these groups indicate a "stressed ecosystem", scoring below the EPA established minimum standard. However, as the Davey Resource Group reports, "the macroinvertebrate communities of West Creek presently fare better than many urban streams and these data suggest that efforts to improve the water quality of West Creek may result in the return of warmwater communities." The IBI results also show indication of a stressed fish community. "The fish communities of West Creek are dominated by pollution tolerant species. However, two study reaches yielded IBI scores in attainment of warmwater criteria; an encouraging sign for potential recovery of West Creek." (Davey Resource Group, 2001)

The QHEI results show West Creek scoring between 48.5 and 76. "The EPA minimum value of 60 is generally considered capable of supporting communities of fish." The examination by the Davey Resource Group indicates good areas of habitat in areas of the preserve, but impacts of urbanization and channel modification in other reaches attribute to lower QHEI scores. See Appendix A for overall biocriteria results.

Stream Geomorphology was also assessed at three locations as part of the Davey Resource Group report in an effort to begin characterizing the condition of the stream and to assist in identifying proper stream restoration measures. The Davey Resource Group concludes that "water quality is limited by a combination of factors. Point and non-point sources of pollution, failing septic systems, riparian disturbances, and in-stream modifications all act in concert to lower the quality of water of West Creek. Efforts to improve these conditions should focus on activities within the entire watershed."

The riparian assessment of West Creek was conducted to create an understanding of the physical and ecological condition of the creek and its riparian zone. The study area included a

corridor approximately 400 feet wide-200 feet on each side of the channel for the entire main stem of West Creek (Davey Resource Group Report, 2001). The assessment identified ten Problem Areas as existing disturbances to the riparian zone. The Assessment also identified three Preservation Areas that were considered of high ecological significance and merit special attention. Finally, the Assessment outlined fourteen Enhancement Areas as initial locations to prioritize stream restoration efforts. This Assessment needs to be coordinated with trail development and other initiatives recommended in this plan (West Creek Valley Management Plan, 2001).

3.2.1 Rare, Threatened, and Endangered Species

According to the Ohio Department of Natural Resources (ODNR), there are no documented endangered species within the West Creek Reservation. However, the Biocriteria Study and Riparian Corridor Assessment Report performed by Davey Resource Group notes that two federally listed endangered species and one federal candidate species have a range inclusive of the West Creek watershed even if they have not been documented within it. The two endangered species whose range is inclusive of the West Creek watershed are the Indiana bat (*Myotis sodalis*) and piping plover (*Charadrius melodus*), and the federal candidate species is the eastern massasauga. Suitable habitat for the piping plover and eastern massasauga does not exist within the West Creek watershed and they are thus not likely to exist within it. However, suitable habitat does exist for the Indiana bat in the West Creek watershed and since breeding Indiana bats have been identified at the nearby Rocky River Reservation, the possibility exists that similar colonies could exist within the West Creek watershed.

The species that are confirmed to exist within the West Creek Reservation are rare within Cuyahoga County. For example, scarlet oaks are present, which is unusual in that very few forests remain with a large number of scarlet oaks. In addition, the umbrella magnolia is native to the forest existing in the Reservation, but rarely remains in forests of Cuyahoga County. There are three documented rare plants within the Reservation: Hayscented Fern, Sandalwood tree, and Panickgrass. There are also a number of varieties of asters that display the diversity of the habitat and woodland forests, as well as the abundant ferns on the lowland on the west side of the Valley, which represent more species than many other places in Cuyahoga County. Steps to protect and provide educational opportunities for these resources are recommended.

The forest area along the west side of West Creek, north of the Channel 55 service road, is the most diverse area with the least disturbance within the Reservation. The fern species and hickory in this dry oak forest are examples of its diversity. If left undisturbed for another 30-50 years, this forest has the potential to be unique in the area. Any measures to protect or inhibit activity within this section of the forest is preferred.

The forest cover along the West Creek Valley beyond the Preserve occupies a narrow band, primarily serving as a riparian habitat for the creek. The forest species are similar to the Reservation with oaks and maples. The habitat may not have the diversity of the

Reservation due to its limited area, however it should be noted that no extensive inventory of these areas has been conducted to gain full knowledge of the plant communities present. Further study and inventory of the remaining valley is encouraged.

Furthermore, butternut trees (*Juglans cinerea*) and a single mountain maple tree (*Acer spicatum*) were visually identified in the Biocriterial Study and Riparian Corridor Assessment Report. Butternut trees were found between Ridgewood Road and Pleasant Valley Road in Parma, and are considered to be potentially threatened in Ohio. A fungal disease is threatening butternut tree populations (a few trees in the watershed showed evidence of infection), and those identified within the watershed were diagnosed in healthy to poor condition. The sole mountain maple tree (shrub-like) was discovered on a sandstone cliff near Rockside Road. It is not listed as endangered, but is very unusual for this area. The report notes that sandstone and shale cliffs within the watershed “may harbor additional rare and unusual plants.”

3.2.2 Fish

The presence of aquatic life within West Creek is limited due to water quality issues, lack of riparian habitat in some areas, and the presence of several dams in the waterway. As previously discussed, the IBI results for West Creek are indicative of a stressed fish community. The Biocriteria Study and Riparian Corridor Assessment Report (Davy Resource



Source Miami University Fish Data Archives
Central Stoneroller

Group, 2001) identified ten fish species in West Creek. "Overall species diversity is low, there is a high percentage of pollution tolerant and omnivorous species, and the number and percentage of simple lithophiles (scatter their eggs in gravel and clean substrates and provide no parental care) is low."

Central stonerollers were the dominant West Creek fish type at each sampling location during the study. The central stoneroller does not have an official Ohio EPA pollution tolerance classification, however the inordinately greater percentage of this species suggests an unbalanced ecosystem. Other fish species identified by Davey Resource Group and the Ohio EPA include white sucker, creek chub, blacknose dace, bluntnose minnow, common shiner, northern hog sucker, sand shiner, yellow bullhead, and johnny darter.

The results of this study should be used to enhance aquatic habitat by improving water quality, protecting riparian buffers, and introducing structures such as fish ladders.

3.2.3 Mussels

Many freshwater mussels are endangered throughout North America. Lake Erie and its surrounding tributaries provide refuge for over 45 different species. These organisms are composed of a soft, fleshy interior protected by two calcareous shells. Mollusks can range in size from a quarter to a pie plate. Their exterior shells are found in a range of colors and are composed of varying ridges and undulations. Mussels have a lifespan of 30 to 40 years. Endangered species in the Ohio area include the fanshell, Washboard, butterfly, and Ohio pigtoe mussel. The three horned warty back and fawn's foot mussel are classified as being threatened.

The health and diversity of a mussel population is a direct indicator of the water quality. Mussels bury themselves in the sand, silt, or mud on the bottom of a riverbed, making them unable to move and escape environmental changes. Mussels are at the bottom of the food chain and survive by filtering food, such as zooplankton, detritus, and occasionally silt and



Source: *Partners for Ohio River Mussels*
Fanshell Mussel

algal mixtures out of water. Therefore, pollutants in a waterbody will be present in the soft tissues of the mussel. Additionally, mussels are parasitic during the larval stage and require a host fish in order to obtain the necessary nutrients to develop. Some mussels require one fish throughout development while others need a variety of species to act as hosts. Thus, the number of mussels also indicates the health of the local fish population.

The human development of dams and impoundments has directly effected the survival rate of mussel species. Impoundments increase the depth of water, altering the water temperature and inhibiting their reproductive cycle. Furthermore, high rates of siltation will cover and suffocate mussels,

while simultaneously decreasing the amount of dissolved oxygen that their host fish depend on.

Some mussels are very tolerant of pollutants and will act as natural filters; however, others cannot survive in such conditions. Especially destructive to mussel diversity in Northern Ohio are the exotic species of Zebra and Quagga mussels. Able to better withstand pollution, these mussels have survived and reproduced much faster than native species. These invasive mussels are now dominating habitat, especially in Lake Erie.

A study of the exact mussel species present and their health and diversity has not been conducted in West Creek or its tributaries to date, but is highly recommended.

3.2.4 Invertebrates

The ICI evaluation is performed through the placement of an artificial substrate on the stream floor for macroinvertebrate habitation. Therefore, the ICI is primarily dependent on the chemical water quality of a stream. As previously discussed, the ICI results from West Creek indicate a “stressed ecosystem”. However, as the Davey Resource Group reports, “the macroinvertebrate communities of West Creek presently fare better than many urban streams and these data suggest that efforts to improve the water quality of West Creek may result in the return of warmwater communities.” A table summarizing the benthic macroinvertebrate taxa identified by the Davey Resource Group during the study is located in Appendix B.

3.2.5 Mammals

The urbanization of land in Cuyahoga County has altered plant and wildlife communities and fragmented forested corridors, limiting the diversity and stability of these communities. The West Creek Valley has a vital role in the future of the region for maintaining wildlife corridors for mammals, birds, and aquatic life. The most diverse animal communities exist in the West Creek Reservation area due to its size and variety of natural conditions, but the rest of the corridor also provides habitats. As reported in the Cleveland Metroparks Informational Study, the large grassy areas of the landfill site provide opportunity for ground nesting songbirds and are favored by small mammals such as voles, red fox, and weasel. West Creek and its floodplain enhance diversity by providing habitat for raccoon, muskrat, and beaver. The wooded slopes that produce acorns, hickory nuts, and understory plants support white-tail deer, squirrels, and various other small mammals. A formal inventory of animals within the West Creek Reservation and watershed has not yet been conducted. It is recommended to continue working with natural resource specialists and wildlife managers to assess the existing animal communities and formulate protection and management guidelines for the future of the valley.



White Tail Deer in the West Creek Preserve

Deer are prevalent in the West Creek Valley, and without a management plan they can hinder the growth of forest understory plants. Additionally, the deer may overpopulate, which could cause problems in adjacent neighborhoods. Working with the local park agencies to develop a long-term plan for deer management is recommended.

3.2.6 Birds

An extensive survey of birds within the Reservation area has been conducted in 2000 and 2001, identifying over 115 species of birds within the Reservation, including the great blue heron, red tail hawk, peregrine falcon, red-bellied woodpecker, and the song sparrow. A comprehensive list of this inventory is found in Appendix C. Although the species identified do not include endangered birds, it does illustrate the range of existing habitats that is rare in an urban setting. Nesting habits, food sources, and migratory patterns should be protected and enhanced to further encourage the use of this corridor for birds.



3.2.7 Reptiles and Amphibians

A formal inventory of the reptile and amphibian populations within the West Creek Reservation and watershed has not yet been conducted. Amphibians, in particular, are important indicators of environmental problems. The skin of amphibians is permeable to airborne gases, and they live both on land and in water at various life-cycle stages. Furthermore, amphibians are relatively high in the food chain and are thus susceptible to accumulation of toxic materials from the consumption of fauna lower in the food chain. The WCPC will work with natural resource specialists and wildlife managers to assess the existing reptile and amphibian populations and formulate protection and management guidelines for the future of the watershed.

3.2.8 Plants

The upland and riparian areas of West Creek were studied as a part of the Biocriteria Study and Riparian Corridor Assessment Report. A complete list of various vegetative communities and individual plant species identified by Davey Resource Group during the study is located in Appendix D. The following are a brief description of the various vegetative communities identified within the West Creek watershed during the study.

- **Disturbed Areas** are numerous throughout the watershed. They include residential, commercial, industrial areas, and the vegetation is primarily limited to lawn and landscape plantings that have little ecological value.
- **Old Fields** are found throughout the watershed, and are considered to be formerly disturbed areas that are slowly recovering. Scattered trees, shrubs, and saplings occasionally occur and, if not disturbed, will revert to forest areas. The area of the closed landfill south of Ridgewood Road is where the largest old fields occur. The landfill occupies approximately 30 acres and has the potential to sustain a meadow habitat if restoration and reclamation procedures are properly initiated. Plants are typically a mixture of native and invasive species, however old fields are considered important species habitat.

- **Shrub Thickets** are present in the watershed and are also found in formerly disturbed areas. Invasive species such as multiflora rose, honeysuckle, and European buckthorn typically dominate the flora. Birds and mammals occupy shrub thicket habitats.
- **Successional Woods** are present along West Creek and in the watershed, and are typified by young to moderate-aged trees that will mature if allowed. The majority of the flora is native, and the successional woods have a large diversity of plant and animal species.
- **Upland Woods** are usually found adjacent to West Creek in steeply sloping areas not prone to development. Mature trees and a diversity of wildflowers are common in this setting. Invasive species may occur, but native flora dominates.
- **Lowland Woods** are found in several areas adjacent to West Creek. These are “moderate quality wetlands” that are primarily fed by surface water runoff, and which commonly contain American elm and green ash trees.
- **Scrub/Shrub Wetlands** are fairly common in the watershed, and represent a successional stage prior to lowland woods or successional woods. These areas contain a mixture of shrubs, saplings, young trees, and woody plants with the invasive species European buckthorn prevalent in some areas. These areas range from low to moderate quality within the watershed.
- **Wet Meadows** occasionally occur within the watershed in formerly disturbed low-lying areas. Woody plants dominate these areas which are typically low in quality.

The West Creek Reservation, due to its size and lack of disturbance during the last twenty years, has the largest forest cover within the West Creek Valley. These two factors combine



West Creek Preserve

to make the Reservation the most biologically productive and important habitat in Parma (Cleveland Metroparks, Informational Study, 1995). The forest cover is primarily along the valley walls and upland areas. This is primarily a beech-maple forest with dominant species including elm, ash, maple, oak, sycamore, and locust. The majority of the forest cover is secondary growth. The valley walls are dominated by oaks, and the upland area to the east side of the Reservation is dominated by ash, elm, and maple (Cleveland Metroparks Informational Study, 1995). Due to the end of farming and wood cutting practices earlier in the 20th century, the forest is experiencing varying stages of succession throughout the Reservation. The Reservation is more diverse than a typical beech-maple forest, with indications of diverse plant

communities that are disappearing in Cuyahoga County.

3.2.9 Invasive Nonnative Species and Their Potential Impacts



Source: U.S. Dept. of Agriculture
Garlic Mustard

Several varieties of invasive species occur within the West Creek Valley. Though not currently a significant problem, invasive species do occur and will continue to overtake the native flora if not addressed. Removal and management of invasives is recommended for the future health of the native forest community. Invasive plant species eradication should focus on the relatively undisturbed upland woods areas where native flora predominates.

Invasive plant species of primary concern include phragmites, Japanese knotweed, grapevines, bush honeysuckle, multiflora rose, dame's rocket, and garlic mustard, which are present within the West Creek Reservation and throughout the watershed.

Recommended control options include hand removal, suppressive mulching, and herbicide application. Herbicides should only be used in limited areas by methods that direct herbicide exposure precisely to targeted plants, and with application by trained personnel. Further inventory and assessment of the extent and types of invasive species is recommended in order to implement appropriate management practices for the West Creek Valley.

The gypsy moth is another invasive species that has affected oak forests throughout the region by eating the leaves and infesting trees. Due to the existence of oak forests within the Reservation and West Creek Valley, as well as the migration of the moth northward near Pleasant Valley Road, it is likely that gypsy moths will impact this forest in the near future.



Source: U.S. Dept. of Agriculture
Gypsy Moth

3.3 Water Resources

West Creek illustrates the dichotomy of an urban stream having numerous and varying influences on its daily function. West Creek not only serves as the method of choice for carrying stormwater runoff from developed areas, but also as a place whose topography preserves diverse natural habitats.

NEORSD performed a hydrologic model for West Creek as part of their current Regional Inter-Community Drainage Evaluation (RIDE) study. This model assesses the impact of impervious surface cover in the watershed, such as buildings, roads, and parking areas, and estimates changes to the waterway by modeling baseline and future conditions. The RIDE study data confirm that rainfall events result in relatively rapid stormwater influxes to West Creek, which

can cause sudden and significant increases in West Creek flow volume and velocity. This information will significantly assist the West Creek watershed communities in determining future urban impacts on West Creek, as well as act as a data source applicable for trail development for the designing of a safe and properly engineered trail system in the West Creek Valley.

3.3.1 Climate and Precipitation

The amount of precipitation that falls in the West Creek watershed can have a significant influence on the volume of water that enters the creek and how the creek reacts to this volume. The precipitation for the year 2000, as measured at the Parma City Hall rain gauge was 48.41 inches. The highest month for precipitation in that year was May with 10.38 inches. The average annual temperature for Cuyahoga County is 58.7 degrees, with 29 degrees being the average temperature in the winter and 70 degrees the average temperature in the summer (*Soil Survey of Cuyahoga County*, 1980). Information in Table 2 below outlines rain gauge data provided by NEORS from 1998 through 2000.

Large annual storm events (i.e. summer thunderstorms or long duration downpours) have the largest impact on a small waterway such as West Creek. These events can quickly produce a high volume of water that moves rapidly downstream (also called a storm surge), potentially increasing flooding, hastening streambed erosion, and creating an influx of diluted manmade pollution such as fertilizers and human waste. Being conscious of these rainfall event impacts during creek restoration efforts and the trail development stage is recommended. Introducing techniques, such as bioretention basins, to the watershed communities that will decrease the volume of surface water runoff will also be undertaken as a part of this plan.

Table 2 Monthly Precipitation Data, 1998-2000

| Year/Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Total |
|------------|------|------|------|------|-------|------|------|------|------|------|------|------|-------|
| 1998 | 4.14 | 2.01 | 2.45 | 6.22 | 1.96 | 3.08 | 2.1 | 4.95 | 0.56 | 2.74 | 1.98 | 1.63 | 33.82 |
| 1999 | 2.13 | 1.44 | 1.42 | 3.41 | 1.47 | 1.98 | 5.73 | 2.42 | 2.53 | 5.17 | 2.18 | 3.82 | 33.7 |
| 2000 | 0.26 | 1.22 | 2.03 | 3.61 | 10.38 | 5.11 | 5.81 | 7.73 | 3.09 | 3.91 | 2.48 | 2.78 | 48.41 |

SOURCE: Northeast Ohio Regional Sewer District Precipitation Report, 1998-2000, Rain Gauge Location: Parma City Hall

Table 2 Monthly Precipitation Data, 1998-2000
Data provided by the City of Parma

3.3.2 Wetlands

Wetlands are distinct natural ecosystems with their own set of physical and biological processes. The distinguishing features of wetlands are that (1) there exists a measurable and continual source of water; (2) the existence of soils that are unique from soils in upland areas; and (3) the presence of hydrophytic vegetation (Cuyahoga Watershed

Demonstration Project, 1998). Wetlands are a resource for water quality improvement, stormwater management, and diversity of plant, animal, and aquatic habitats within a stream corridor. One of the major determinants of wetland locations is the presence of hydric soils (Figure 6, page 29). A hydric soil is defined as a soil that in its undrained condition is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation (Natural Resources Conservation Service (NRCS), 1985).

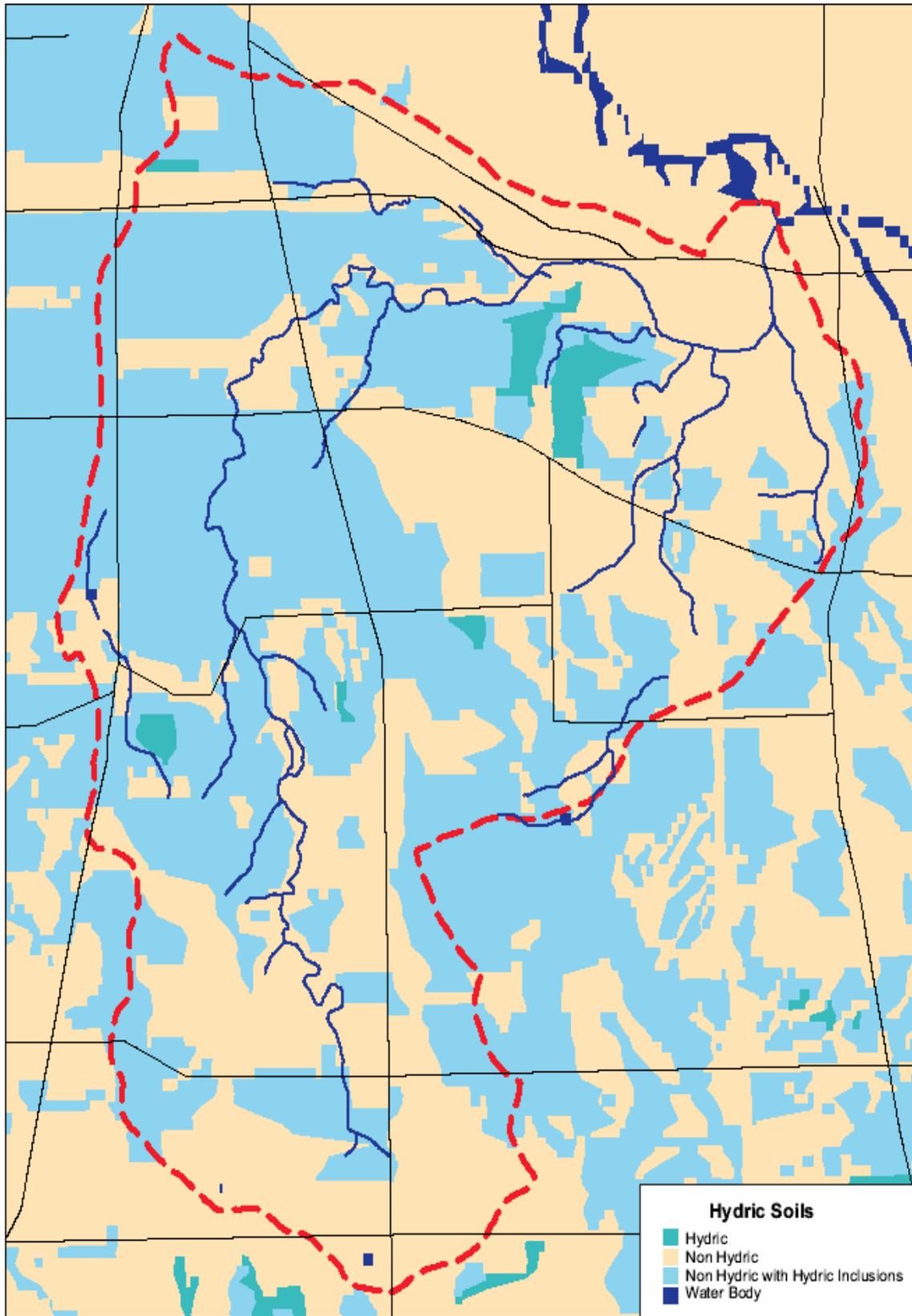
As a result of the urban context and alteration of the original streambed, many of the West Creek watershed's original wetlands may have been removed or altered, eliminating or restricting their full potential as a viable ecosystem and a water resource management tool. A survey of wetlands and hydric soils within the Cuyahoga River watershed, which includes the West Creek watershed, was conducted by the Ohio EPA in 1998. Furthermore, a wetland delineation report for the West Creek Corridor in the City of Parma was conducted by the URS Corporation for the West Creek Preservation Committee in 2004. Twenty-one wetland areas were identified during the 2004 investigation (with one additional wetland area that was previously identified), comprising approximately 6.5 acres of wetland habitat within the City of Parma West Creek watershed area (Figure 8, Page 31). The largest and highest quality wetland area encompasses 1.84 acres and is located south of West Ridgewood Road and approximately 1,000 feet west of Broadview Road (Wetland Delineation Report for the West Creek Corridor, 2004).

Both of the aforementioned wetland delineation surveys will aid in locating existing wetland sites to protect or further enhance. A future goal of this action plan will be to also have detailed wetland delineation surveys conducted in all of the other communities within the West Creek watershed.

Wetland restoration can also play a major role in improving the water quality and ecological integrity of the West Creek watershed. The 1998 Ohio EPA wetland delineation report also identified suitable sites for wetlands restoration. This study utilized a model based on criteria that included land use, soils, and hydrologic characteristics of the waterways in determining preliminary sites for potential restoration. The Ohio EPA is currently field checking this model within the Cuyahoga River Basin on selective sites that may include West Creek.

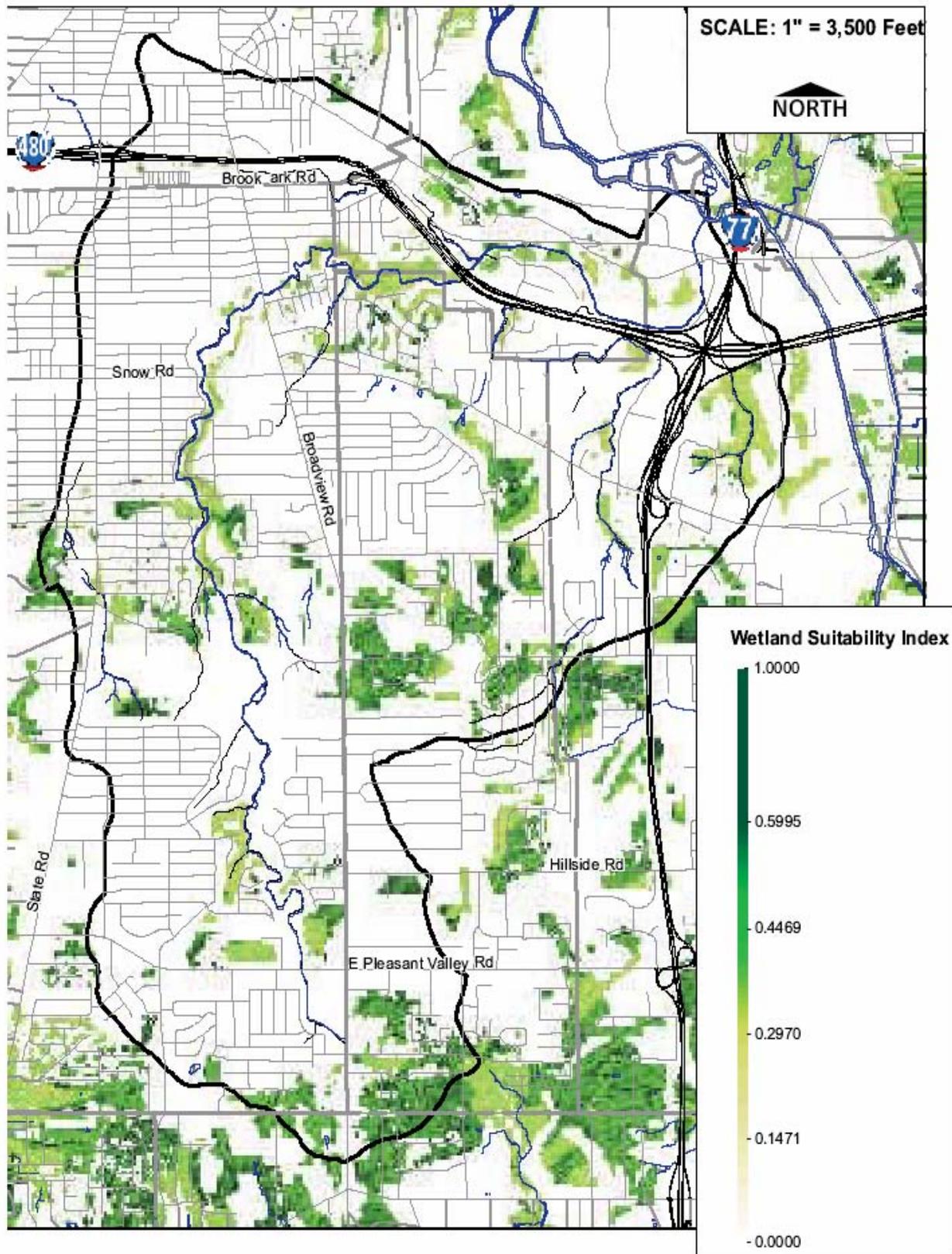
The WCPC has completed two wetland restoration projects, each two acres in size, to date within the West Creek Reservation, and an additional five wetland mitigation locations have been identified in the West Creek Stream and Wetland Mitigation Prospectus (2004) performed by the URS Corporation. The continued identification of wetland areas for preservation and restoration within the West Creek watershed, as well as employing the appropriate techniques for creating successful ecosystems, will continue to be important goals for the WCPC.

Figure 6
Hydric Soils



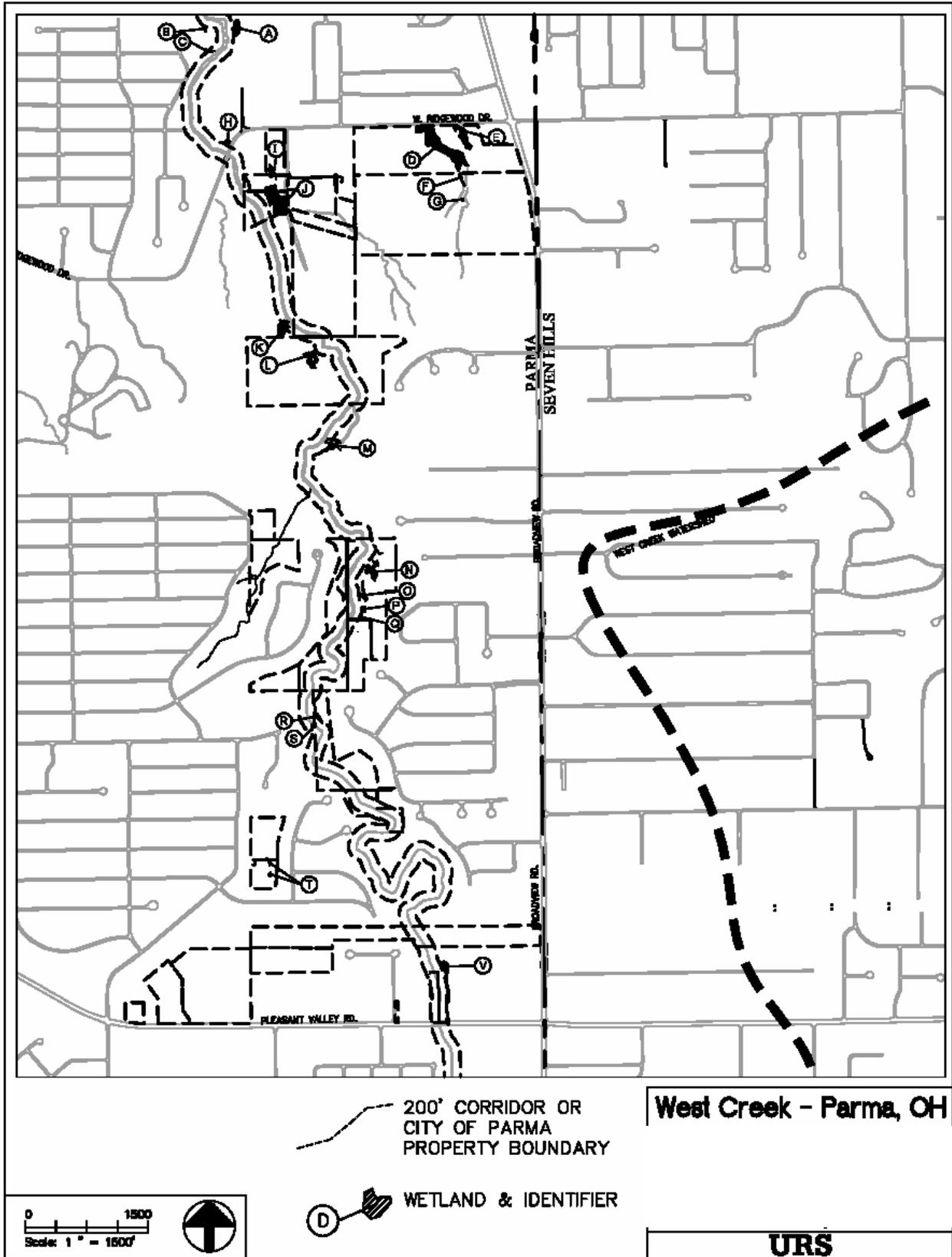
SOURCE: USDA, Soil Survey of Cuyahoga County, Ohio, List of Hydric Soils and Supplemental List of Non-Hydric Soil Map Units with Hydric Components/Inclusions, March, 1999

Figure 7
Wetlands Suitability Map



SOURCE: Ohio EPA, Cuyahoga Wetland Demonstration Project, 1998

Figure 8
 Identified West Creek Watershed Wetlands



3.3.3 Streams

West Creek courses through the communities of Parma, Seven Hills, Brooklyn Heights, and Independence and serves as a tributary to the Cuyahoga River. The watershed of West Creek also includes small portions of the City of Cleveland and Broadview Heights, and encompasses approximately 14 square miles.

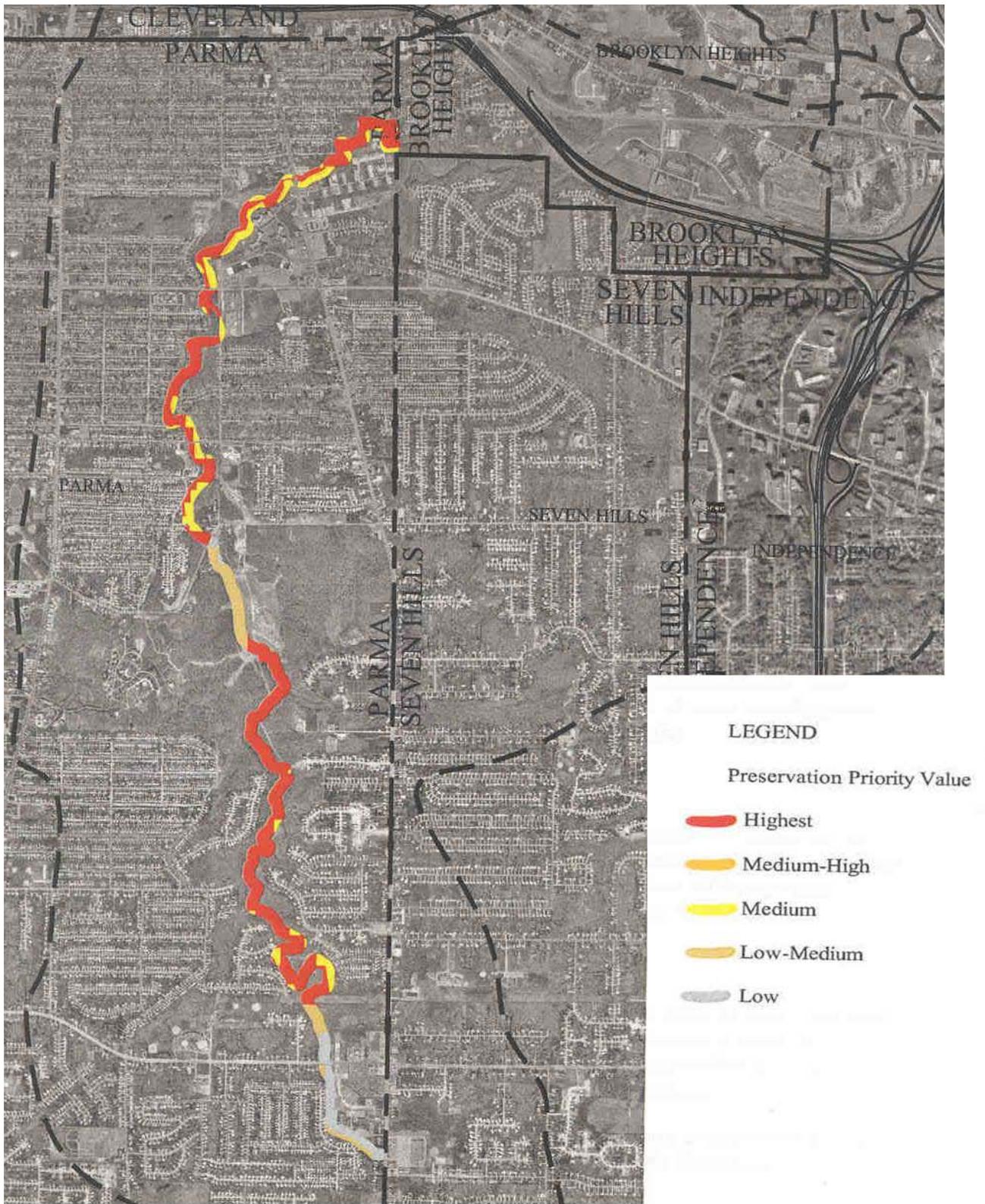
The West Creek corridor is comprised of approximately 48,170 lineal feet of the mainstem stream. All but approximately 12,170 lineal feet (25 percent) of the mainstem stream length is located within the City of Parma. The City of Parma owns and has protected approximately 11,200 lineal feet of the West Creek mainstem. An additional estimated 4,000 lineal feet of mainstem stream within the City of Parma has been identified as having the potential for preservation (Figure 9, page 33). Identifying additional portions of the mainstem stream that may be preserved within the communities of Seven Hills, Brooklyn Heights, and Independence will be a future priority of the WCPC.

A formal study on the specific tributaries of West Creek has not been conducted to date. However, 11,300 lineal feet of tributaries have been identified in the City of Parma, of which approximately 2,100 lineal feet have been protected. There is over 65,000 lineal feet of tributary to West Creek within the watershed, none of which have received official name designations, nor have they been assessed for water quality. Average tributary length is in the 6,500 lineal feet range; however, a couple larger tributaries to lower West Creek have lengths between 13,000 and 15,000 lineal feet. No further tributary data (i.e. watershed size, flow rates, floodplain areas, sinuosity, or entrenchment) has been analyzed or is available, but would be worthwhile for future planning and study initiatives.

The floodplain is an important part of the creek's daily function and helps to control water during storm events; it is the area of land adjacent to a stream channel and beyond to an elevation that reaches a flood peak of a given frequency, such as a 100-year flood. The area immediately adjacent to the baseflow channel and within the channel can also serve as a floodplain for shorter, but more intense storms that can occur annually or biannually. The West Creek floodplain has been significantly altered in some locations due to development. Restoration of the floodplain, where feasible,



Figure 9
URS Preservation Priority Map



Source: URS West Creek Stream and Wetland Conceptual Restoration Master Plan (2004)

and protection measures for the remaining functional floodplains should be considered as part of the restoration and trail development process.

Sinuosity and entrenchment indices have not yet been determined for West Creek or the tributaries within its watershed.

Aquatic Use Designations – The aquatic life habitat, water supply, and recreational use designations are provided in Ohio Administrative Code (OAC) 3745-1-26 for the Cuyahoga River watershed, which includes West Creek. West Creek is classified as a warm water habitat (WWH), agricultural water supply (AWS), industrial water supply (IWS), and primary contact recreation (PCR) waterway.

3.3.4 Lakes and Reservoirs

There are no applicable lakes or reservoirs within the West Creek watershed.

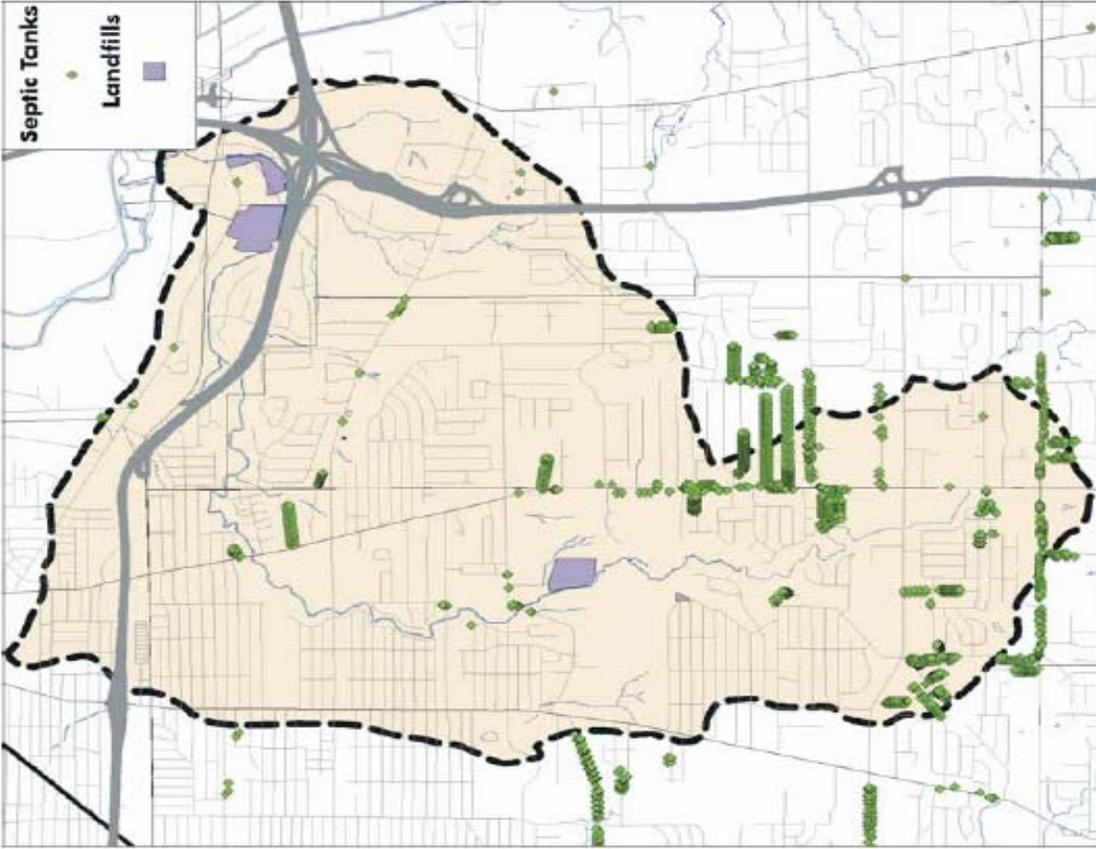
3.3.5 Groundwater

Due to the urban and industrial history of Cuyahoga County, there are various land uses that have the potential to cause groundwater pollution. Landfills within the watershed are one source of potential pollution. Two other types of locations that have the potential to cause pollution, and are therefore monitored in order to prevent, detect, and correct problems, are underground storage tank sites (USTs) and Resource Conservation and Recovery Act (RCRA) sites. USTs are sites where underground storage tanks exist for fuel storage. The most common location for USTs are service stations, as well as industrial sites that have vehicle fleets or use specific types of fuel for heating or manufacturing purposes. These sites have the potential to leak fuel substances into the ground, which could migrate to infiltrate groundwater or waterways.

There are currently 25 known UST sites within the watershed registered with the State of Ohio Bureau of Underground Storage Tanks. The Bureau, through the State Fire Marshal, evaluates and monitors the existing and proposed tanks. There is no systematic inspection of these facilities, and it is the owner's responsibility to notify the state of any alteration, installation, or removal of a tank. A local fire department can also inspect sites if a concern arises. Continued awareness and evaluation of these sites to prevent groundwater contamination into the watershed is encouraged.

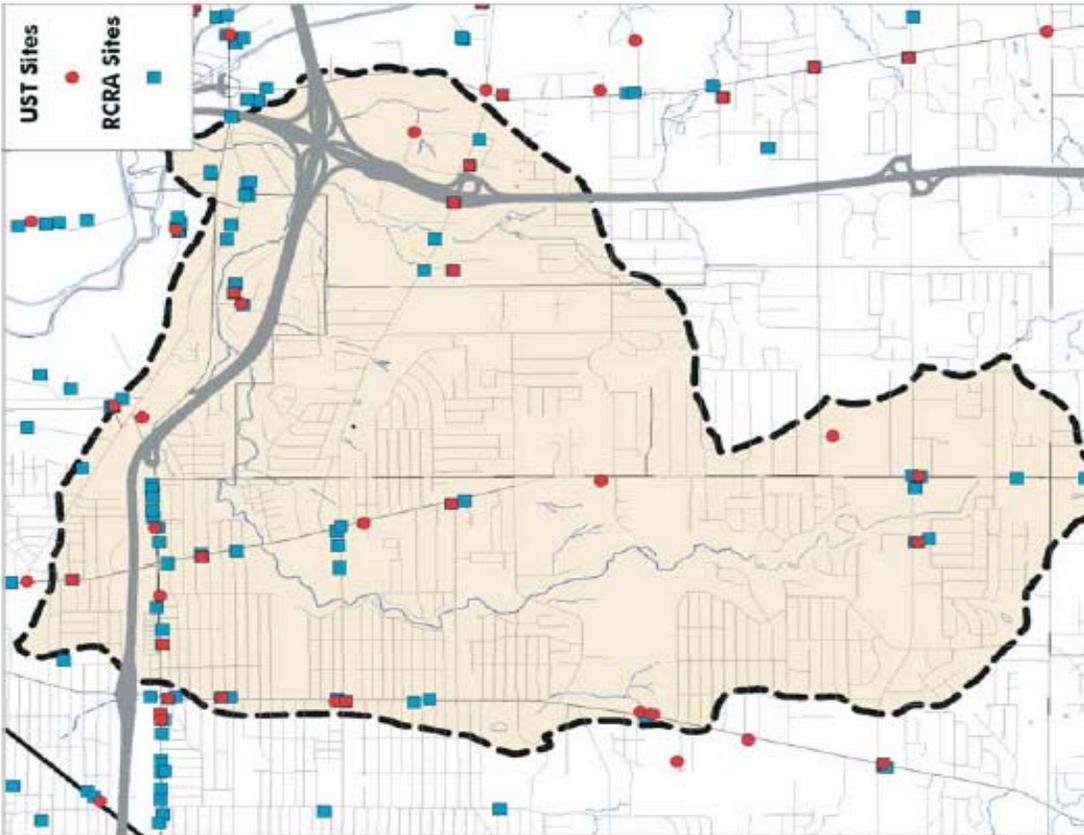
RCRA, administered by the U.S. EPA, assists in controlling the "generation, transportation, treatment, storage, and disposal of hazardous waste." RCRA sites are locations where businesses use hazardous substances in their operations. Examples of RCRA sites are dry cleaners, automotive repair businesses, and a variety of manufacturers. There are currently 62 facilities within the watershed that are registered with the Ohio EPA to ensure proper management and disposal of these wastes. If not properly managed, hazardous waste could become airborne, contaminate soil, or reach ground-

Figure 10
Septic System and Landfill Locations Map



Source: Cuyahoga County Board of Health, March, 2000

Figure 11
UST/RCRA Sites Map



Sources:
 UST - Ohio Department of Commerce
 State Fire Marshal's Office
 Bureau of Underground Storage Tanks, August, 2000
 RCRA - United States Environmental Protection Agency, 1999

water or waterways. Pollution prevention needs to be ensured by continued communication with EPA concerning the list of facilities and their activities.

According to communications with Donna Childs, Water Quality Program Specialist with CCBH, no drinking water wells continue to exist within the West Creek watershed. As of 1997, 29 registered wells were shown to exist; however, according to CCBH none of them are currently active. Due to this, CCBH does not monitor groundwater quality within the West Creek watershed nor does it maintain general groundwater quality information.

According to the Groundwater Resources of Cuyahoga County Ohio Map, the entirety of the West Creek watershed lies within areas where less than 3 gallons per minute of water can be developed due to relatively impermeable sedimentary strata such as shale. No part of the West Creek watershed lies within a wellhead protection area as identified by Ohio's drinking water source assessment program. Furthermore, a review of the Ground-Water Pollution Potential of Cuyahoga County indicates that the watershed is in a low to medium pollution potential range with indexes in the 80 to 100 range.

3.4 Land Use

After World War II, the West Creek region duplicated the national trend of a building boom that developed suburbs. Improved local roads and the construction of interstate highways improved connections in the Greater Cleveland area. This pattern rapidly changed during the 1950's and 1960's, encircling the valley. Development during the 1980's and 1990's has created a number of locations where houses are situated on the rim, directly overlooking the valley. The following sections outline the evolution of land use patterns and demographics since the mid-20th century.

3.4.1 Land Cover Description

The developed land coverage in the watershed includes single-family residential (55%), commercial (10%), and industrial (3%). These uses, along with community facilities, multi-family housing, and road networks, have created a landscape that has significantly changed the watershed and how it functions. Even after a two-generation surge in development, some of the remaining forested land within the watershed is threatened. New residential and commercial development has crept to the rim of the valley and has often severely altered tributaries. It is recommended that future development should explore the use of design guidelines for new construction and rehabilitation work and take into consideration its impact on West Creek and the watershed.

3.4.1.1 Urban

With the construction of Interstates 77 and 480 in the 1970's and 1980's, the West Creek area has been highly impacted by the daily transportation activities of the region. The

construction of these facilities, as well as the development they have spurred, has altered tributaries of West Creek that flowed northward from the Rockside Road area. In addition, the original streambed of West Creek, located on the north side of I-480, has been altered and realigned from the Brooklyn Heights Park eastward to Schaaf Road. This alteration has hampered the biologic health and aesthetic qualities of the creek and its valley. Furthermore, the drainage systems for these roadways have impeded the natural processes of the stream due to the insertion of structures in the channel and increasing stormwater volume and velocity. The transportation network also impacts air pollution, increasing the quantities of particulate matter and nitrogen oxide. These factors and impacts need to be considered and suggestions to improve the quality of life surrounding these transportation facilities need to be explored.

Zoning is the local regulatory blueprint that determines the categories of specific uses, where specific uses can be located, and the layout and physical characteristics of those uses. Therefore, zoning will have an important influence on the future of the West Creek Valley, how it will be developed, and how it can be preserved. The current zoning within the watershed is primarily single-family residential, comprising of 69% of the total land area. These single-family residential zones consist mostly of lot sizes under one-half acre, with many areas allowing lots under 15,000 square feet in size. Several areas are zoned multi-family, primarily along State Road and Broadview Road north of Snow Road. Multi-family zoning areas comprise about 2% of the land area within the watershed. The areas of land zoned commercial, approximately 12% of the land within the watershed, are located along arterial roads such as Broadview Road and State Road, as well as concentrated in the Rockside Road corridor in the vicinity of Interstate 77. Finally, the industrial zoning areas are located along the Brookpark Road/Granger Road corridor, accounting for 6% of the total watershed land area. How these areas evolve through their current zoning regulations, change based on modifications to regulations, or change based on rezoning to different uses, may impact West Creek in relation to issues such as stormwater runoff volumes, hillside and tree preservation, impervious surface cover, and habitat disturbance.



New residential homes on Ravine Boulevard in Parma

Impervious surfaces and their effect on stormwater within the West Creek watershed are located in Section 3.8.5. Current codes within the communities may not focus on creating a watershed approach to develop standards that assist in stormwater management, open space protection, water quality improvement, and design tools. An exploration of local planning and zoning codes of the West Creek watershed communities is recommended to inventory existing initiatives as well recommendations for modifications to assist in achieving the outlined goals.

The West Creek corridor has been separated into “reaches” that enables areas to be grouped

according to similar attributes and conditions. West Creek has been divided into seven reaches that will be described as appropriate in the following sections.

Reach 1 (Figure 13, page 40) - This reach of the stream, the headwaters of West Creek, is approximately 4,220 feet in length. West of Broadview Road is the first daylight of the stream, and it travels between residential and commercial developments until reaching Pleasant Valley Road (maps of each “Reach” area are located in Appendix E. North of Pleasant Valley the West Creek begins to change back to an unaltered natural state, meandering and becoming diverse in habitat as it approaches the forested area of the West Creek Preserve. The stream is relatively narrow and actively downcutting with elevation at the first daylight point at 1,080 feet above mean sea level, descending to 1,050 feet as it reaches the West Creek Preserve area.

This reach of the stream is polluted with debris and shopping carts from adjacent commercial and residential uses. Due to the commercial uses, there are large areas of impervious surfaces such as parking lots contributing additional contaminants, sediment, and runoff into the stream. There is also vacant land just north of Pleasant Valley Road zoned commercial, which would threaten existing wetland habitat and jeopardize the stream channel volume if the area is developed in a non-sustainable manner. A formal study on the amount and means of decreasing impervious surface area in this reach of the watershed is a future goal of the WCPC.

Reach 2 (Figure 14, page 42) - The stream travels approximately 10,400 feet in this reach of West Creek, with elevations dropping from 1,050 feet to 920 feet. This reach is the Reservation section of the West Creek Valley and has some of the most diverse and scenic elements within the entire valley. It is the most unaltered section of the creek’s nine miles, revealing habitat that is disappearing in Cuyahoga County. This reach has many small water cascades that accentuate the beauty and uniqueness to the valley.

The Crile Landfill located under Center Park, a municipal park in Parma off of Park Drive, was used by the Crile Veteran’s Administration Hospital that existed from 1943 to 1964 at the present location of Cuyahoga Community College’s Western Campus. The precise dates of landfill use are not known. There is an abundance of debris such as pottery and glassware that is leaching into the stream at this location. Testing for presence of heavy metal compounds needs to be performed to assess whether there have been any chemical impacts on the stream, groundwater, and soil. In general, the land use in this reach is single-family residential, along with a number of churches. The area has high potential for access to and from neighborhoods, as well as the institutions. A major impact within the valley, a sanitary sewer line along with a service road running generally north-south, has been

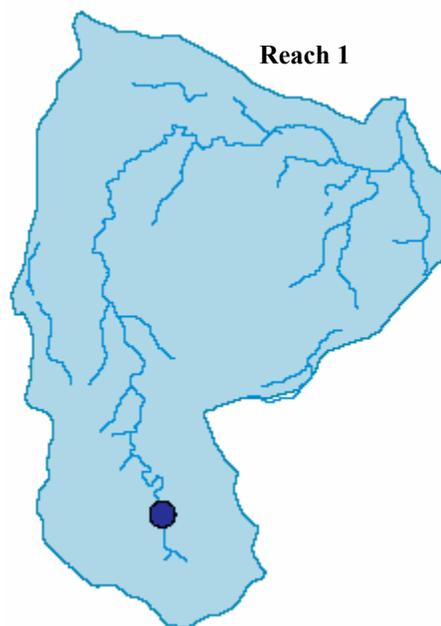
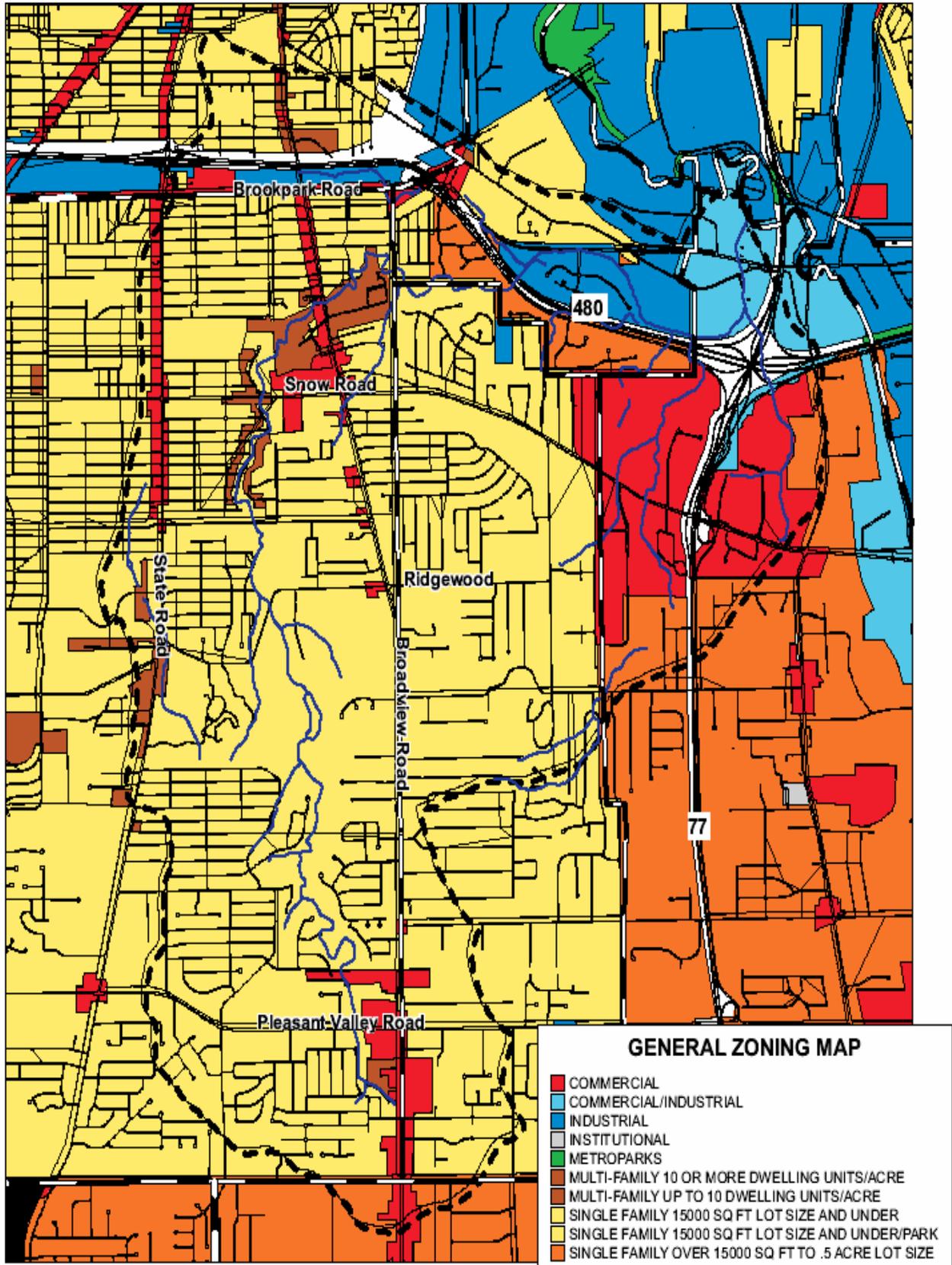


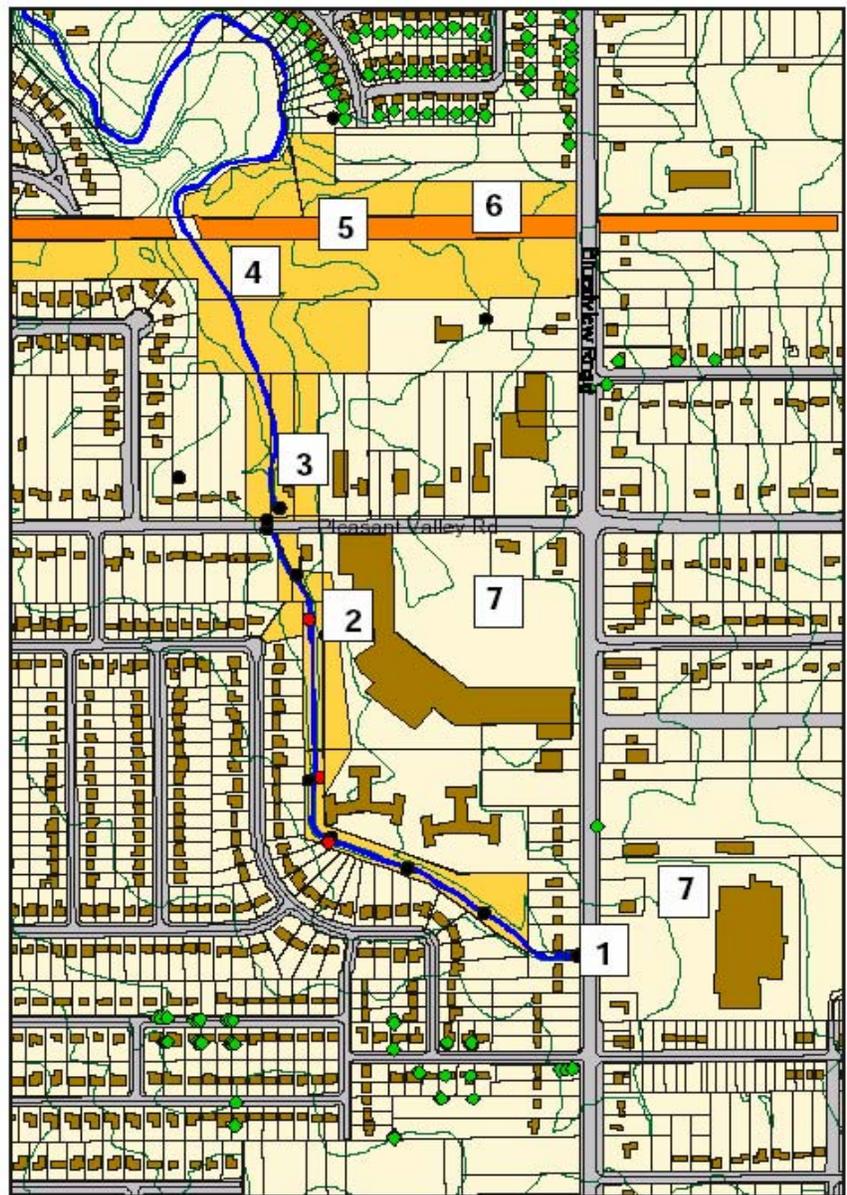
Figure 12
Zoning Map



SOURCE: Cuyahoga County Planning Commission, 1997

Figure 13
Reach 1 Map

Headwaters at
Reach 1: Broadview Road to
Utility ROW



- 1 Daylight of West Creek.
 - 2 Existing Pedestrian Bridge to Neighborhood.
 - 3 Vacant Lot - Potential Trailhead Location.
 - 4 Diverse habitat to protect but with severe erosion problems.
 - 5 First Energy Utility ROW Regional Trail Connector Potential.
 - 6 Vacant Lot with Wetlands.
 - 7 Large Areas of Impervious Surfaces.
- Vacant Private Land
 - First Energy Utility ROW
- Sewers
- ◆ Septic Systems
 - Outfall into West Creek
 - Outfall into West Creek with Fecal Coliform concentrations greater than 10,000 colonies, per 1000 ml

Reach 2



addressed. Near-term protection of the sanitary sewer line was created by armoring with stream bank with a log crib and creating a series of wetlands pools along the eroded area. Finally, this reach does have some inappropriate current activities, such as all-terrain vehicle use, that is damaging plant life and causing hillside erosion.

Reach 3 (Figure 15, page 43) - This reach of West Creek is one of the most altered sections and most impacted of the entire length of the stream. It begins at the south end of the closed sanitary landfill and ends at West Ridgewood Drive. The reach stretches for approximately 3,730 feet, with elevations lowering from 920 feet to 890 feet where it meets West Ridgewood Drive. This section of West Creek was moved west from its original location in the 1950's to create a site for the landfill.

The greatest impact in this area is the sanitary landfill that closed in 1988. There are numerous issues that the landfill poses for this reach. Due to the age of the landfill and its closure prior to the establishment of stricter solid waste state regulations, the landfill has three major issues that may influence future restoration or recreational use: leachate, methane, and subsidence. First, when the landfill opened in the 1950's, there was no requirement to install a clay liner on the bottom, nor was there a requirement to install a clay or synthetic cap when the landfill closed. The landfill has a non-compacted soil cap and soil bottom, therefore rainwater and melting snow pass relatively unimpeded through the landfill. As water filters through the landfill, it extracts soluble substances from the trash and carries these substances into the ground water and West Creek. This liquid, known as leachate, poses quality issues for both water and vegetation downstream of the landfill.

A second issue is methane, which is a gas produced as part of the decomposition of organic material, which comprises much of a landfill's contents. It is a colorless, odorless, flammable gas that migrates to the top of a landfill and quickly dissipates in the air. The moderate size of this landfill, as well as its shallow depth, means that the methane is not harmful in the outdoor environment. Safety precautions need to be taken with enclosed structures however, where the indoor build-up of methane may create the potential for an explosion. A visual indication of methane presence are areas on the landfill surface devoid of vegetation.

The final issue is the settling of the landfill as the organic contents decompose and compact, which is known as subsidence. With its closure about twenty years ago, the landfill may be moving into its period of peak subsidence, and settling in general may continue for another ten to fifteen years. For example, it is informally estimated that the landfill has settled approximately two feet in the vicinity of the television transmission tower since the construction of the tower about fifteen years ago. Continued settling poses issues regarding the installation of permanent structures or pavements on the landfill. The settling and

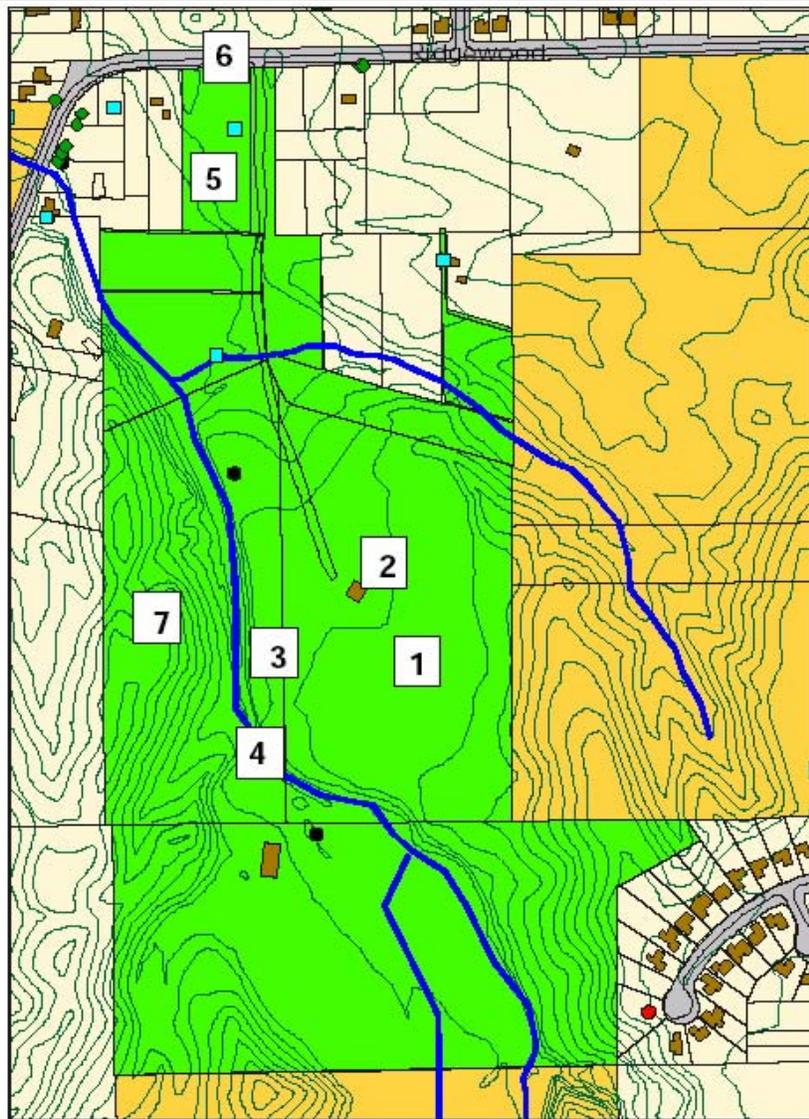
Figure 14
Reach 2 Map

Reach 2:
North of Utility ROW
to South End of Closed
Landfill



Figure 15
Reach 3 Map

Reach 3:
South End of
Closed Landfill to
West Ridgewood
Drive



- 1** Closed Landfill.
- 2** TV Tower and Service Road
- 3** Unstable Slope Along Landfill.
- 4** Realigned Streambed.
- 5** Existing Parking Area and Trail Spur.
- 6** Entrance with Limited Sightlines.
- 7** Diverse Forest Habitat.

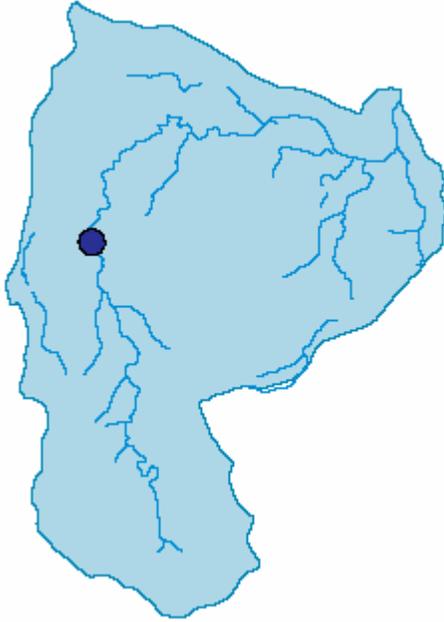
- Vacant Public Land
- Vacant Private Land

Wells

Sewers

- Septic Systems
- Outfall into West Creek
- Outfall into West Creek with Fecal Coliform concentrations greater than 10,000 colonies, per 100 ml

Reach 3



movement of the landfill has also created serious erosion problems abutting West Creek that need to be addressed to prevent the contents of the landfill from coming into contact with flowing water. In addition, the presence of a television transmission tower and equipment building within the landfill raises safety and access issues concerning recreational uses and will need to be considered in the final park planning. Both the tower and building are anchored to bedrock below the landfill, meaning they are not subject to harm as the landfill settles.

Reach 4 (Figure 16, page 45) - This reach of West Creek extends 7,150 feet from West Ridgewood Drive to Snow Road with its elevation dropping from 890 feet to 800 feet. The creek is bordered by residences, with a school and two churches nearby in this section. Just north of Ridgewood is a low flat area, followed by a segment in which the stream becomes part of a deep ravine. The

natural character of the creek is protected by its steep topography and heavy vegetation. As the stream approaches Snow Road, land uses begin to change to commercial activity.

The location of houses does limit public access and viewing of the stream. In addition, the stream is impacted by stormwater runoff and pollutants from the adjacent neighborhoods. The presence of bridge structures at Grantwood Drive and Snow Road creates a challenge for continuous access along the creek corridor. Finally, concrete debris in some portions of the stream bed inhibits the aesthetic quality and mechanics of the creek.

Reach 5 (Figure 17, page 47) - This reach has one of the most diverse land use patterns adjacent to the 3,470 feet of creek. As the creek drops in elevation from 800 feet to 750 feet it traverses an area of various land uses, including shopping centers, restaurants, single-family residential, a school, a nursing home, and apartment buildings. This reach has the opportunity to become a centerpiece in this mixture of community uses, rather than a forgotten asset.

Stormwater runoff from adjacent land uses is significantly impacting the stream and its banks. This reach has a high concentration of impervious surfaces such as parking lots and building roofs, which create a large volume of rapidly moving runoff into the stream. Strategies to slow runoff from these surfaces need to be explored. In addition, there are two small concrete dams in West Creek just west of Broadview Road. It appears that their use may have been associated with agriculture, due to their age and



Reach 4

Figure 16
Reach 4 Map

West Ridgewood
Reach 4:
Drive to Snow
Road



- 1** Floodplain provides relief from stream overflow.
 - 2** Restricted access due to topography and existing development.
 - 3** Existing Pedestrian Walkway Connector.
 - 4** Natural Water Cascade and Geologic Formation.
 - 5** Public Library and New Garden Path.
 - 6** Existing Park. Potential Trailhead.
 - 7** Road Crossing.
- Vacant Public Land
 - Vacant Private Land
 - Wells
- Sewers
- Septic Systems
 - Outfall into West Creek
 - Outfall into West Creek with Fecal Coliform concentrations greater than 10,000 colonies per 100 ml

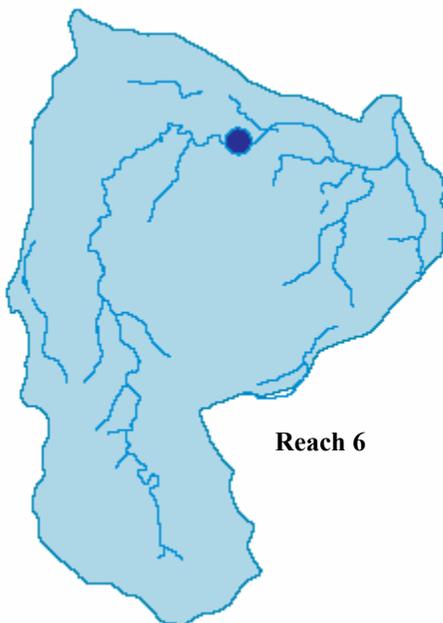
appearance. Today, they serve no purpose and inhibit the dynamics of West Creek for both hydrologic function and aquatic habitat.

Reach 6 (Figure 18, page 48) - As West Creek continues its journey to the Cuyahoga River, it returns to a more natural environment between Broadview Road and I-480. This reach of the stream travels 8,400 feet, with elevations lowering from 750 feet to 660 feet. The land use returns to a residential area with steep terrain and the glorious sounds of West Creek flowing downstream. As it approaches I-480, the stream is a focal point of the community park in Brooklyn Heights, which also has pedestrian access from Seven Hills.



Urban impact is most apparent near Broadview Road where development is situated adjacent to the stream.

For example, there is a large concrete retaining wall on the south side of the stream just east of Broadview Road. The wall is intended to prevent erosion and stabilize the parking lot above; however, the wall also increases the velocity of the water, and the parking area is beginning to subside. In addition, the cluster housing development on the south side of the valley, with its large amount of impervious street and parking surfaces, impacts the creek due to the increased volume of water runoff these surfaces generate. At I-480, the stream enters a culvert to cross under the highway to the north side. The culvert bottom hinders aquatic habitat.

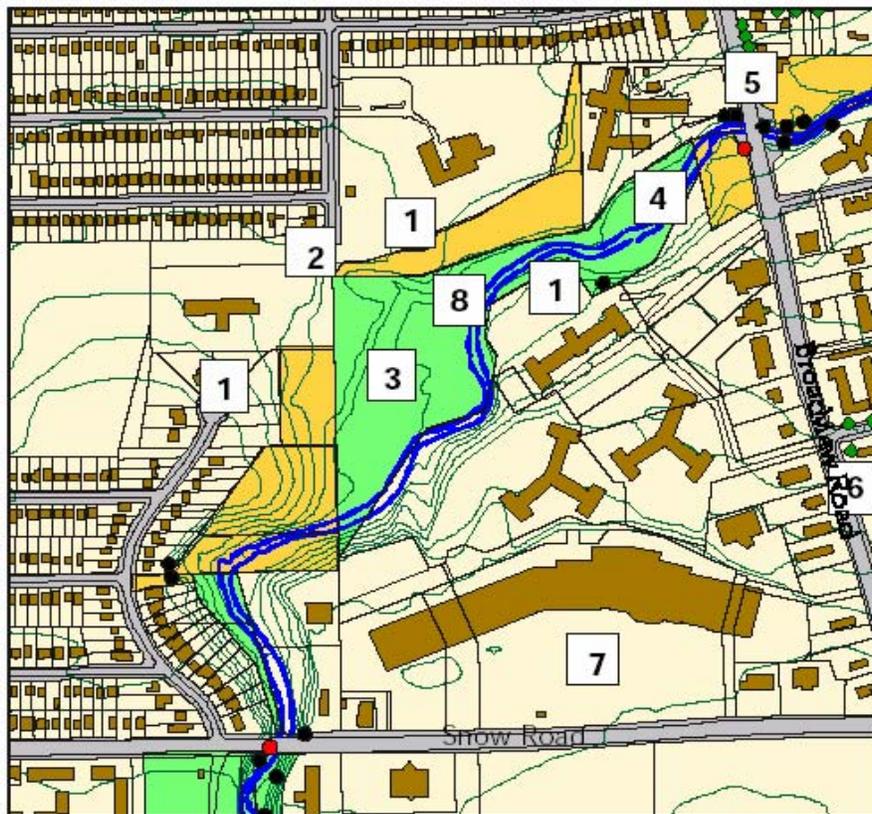


Reach 7 (Figure 19, page 50) - West Creek is perhaps most challenged on its final 10,800 feet to the Cuyahoga River, where elevations lower from 660 feet to 590 feet at the Cuyahoga River. This reach is highly industrialized along the stream banks. West Creek has been altered significantly in this reach during the past 35 years due to highway construction and building development. These projects have influenced the function of the creek as a waterway and have impacted the habitat for wildlife and plants. West Creek enters the Cuyahoga River as a narrow channel under a railroad bridge.

The development of offices and industrial use poses concerns for air and water quality along this reach. The sanitary landfill in Brooklyn Heights, closed in 1994, will need continued monitoring to address sedimentation in the creek caused by erosion of the landfill cap. Human impact on the creek itself has been significant, including the culvert/dam on the north side of I-480, the rerouting of the creek in the Resource Drive area, the failing culvert and modular retaining wall at Lancaster

Figure 17
Reach 5 Map

Reach 5: Snow Road to Broadview Road



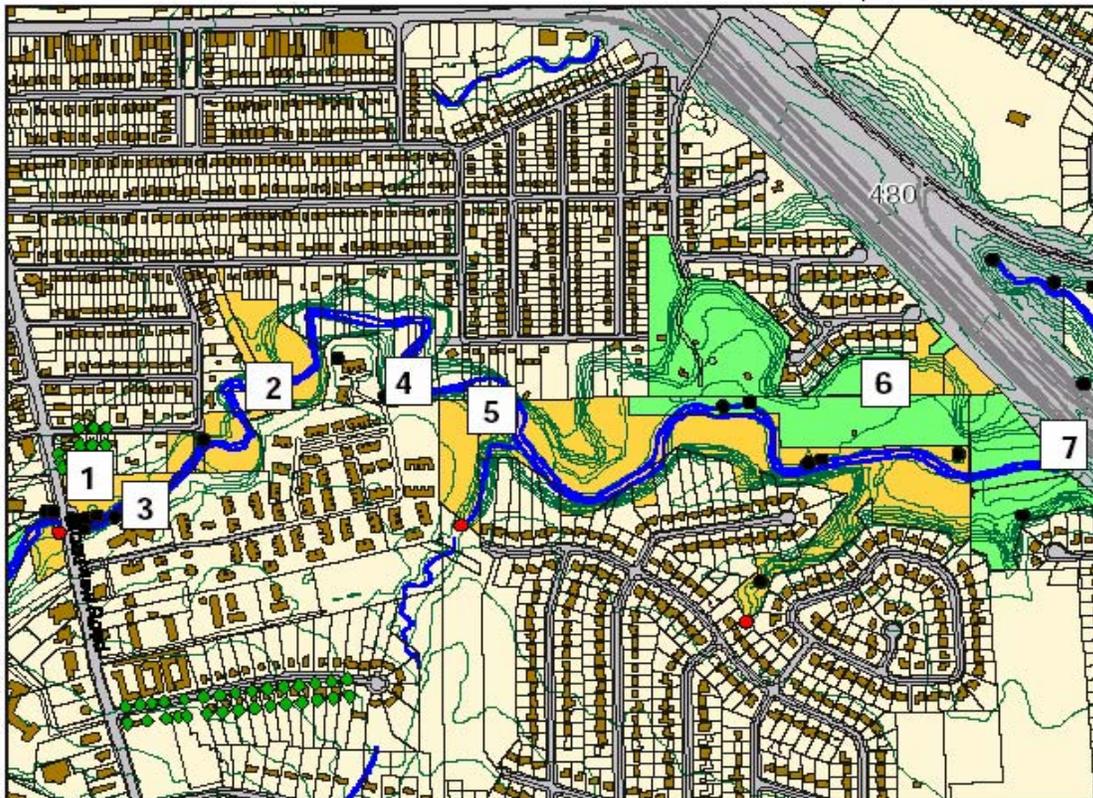
- 1 Neighborhood Access
 - 2 Potential Connector to Big Creek Parkway
 - 3 Floodplain and Forested Area.
 - 4 Existing Dam Structures.
 - 5 Broadview Road Crossing.
 - 6 Henninger House.
 - 7 Large Areas of Impervious Surfaces.
 - 8 Erosion Areas with Debris.
- Vacant Public Land
 - Vacant Private Land
- Sewers
- Septic Systems
 - Outfall into West Creek
 - Outfall into West Creek with Fecal Coliform concentrations greater than 10,000 colonies, per 100 ml

Figure 18
Reach 6 Map

Reach 6: Broadview Road to I-480



- | | | |
|-------------------------------------|--|---|
| 1 Potential Trailhead. | 5 Natural Water Feature and Geologic Formation. | Vacant Public Land |
| 2 Interurban Rail Artifacts. | 6 Public Park Access. | Vacant Private Land |
| 3 Retaining Wall. | 7 I-480 Culvert - Restricted Crossing. | <u>Sewers</u> |
| 4 Steep Terrain. | | Septic Systems |
| | | Outfall into West Creek |
| | | Outfall into West Creek with Fecal Coliform concentrations greater than 10,000 colonies per 100 ml |



Drive, and the concrete channelization and pool just west of the sanitary landfill. A construction and demolition debris landfill exists along the creek bank just east of the sanitary landfill. The vicinity of the mouth of West Creek also has various industrial and commercial uses, plus substantial truck activity.



Restoration activities in this reach of West Creek are occurring through a partnership between WCPC and the NEORSD. Six sections of West Creek (Figure 20, page 51) are planning to be restored through the introduction of meanders into channelized sections, fish steps at the culvert/dam barrier, streambank stabilization, the removal of a concrete flume, and protection of the creek through the acquisition of conservation easements. Continued work needs to occur in this stretch; redevelopment options should be explored where land uses are not optimal, particularly in flood prone areas, such as conversion to recreation and open space. Goals for this reach should include identifying solutions to business practices causing problems and cooperatively creating a recreational resource focused on West Creek.

3.4.1.2 Forest

Forested areas are extremely important for water quality and watershed health. Besides the habitat and nutrient value they provide, recent studies also suggest that tree canopies and forested areas can reduce stormwater runoff by up to 75 percent. For watersheds like West Creek that are heavily impacted by high stormwater runoff, the protection and reintroduction of healthy forests can significantly improve future efforts.

Several islands of forested areas exist within the West Creek watershed, the largest of which is the West Creek Reservation. The forested areas within the Reservation are primarily composed of beech-maple forests with dominant species including elm, ash, maple, oak, sycamore, and locust trees. The majority of the forest cover is secondary growth. The valley walls are dominated by oaks and the upland area to the east side of the Reservation is dominated by ash, elm, and maple trees.

Small islands of forested area also exist outside of the West Creek Reservation. These small forested islands have the capability of being ecological oases within the highly urbanized watershed and will be further investigated for conservation possibilities.

Many forested areas within the West Creek watershed exist in the riparian zones along West Creek and its tributaries. This riparian habitat is vital to the ecological sustainability of the creek and the watershed. Riparian forested areas maintain high water quality, provide habitat for diverse populations of wildlife and fish, lower water temperature by shading the

Figure 19
Reach 7 Map

**I-480 to Cuyahoga
Reach 7: River North of
Granger Road**



- | | | |
|--|---|---|
| 1 Culvert and Dam. | 5 Closed Sanitary Landfill. |  Vacant Public Land |
| 2 High Erosion Area. | 6 Road and Bridge Crossings. |  Vacant Private Land |
| 3 Failed Retaining Wall and Culvert. | 7 ODOT Property - Potential Restoration. | <u>Sewers</u> |
| 4 Concrete Channel and Pool. | 8 West Creek Meets Cuyahoga River. |  Outfall into West Creek |
| 9 Existing Construction and Demolition Landfill | |  Outfall into West Creek with Fecal Coliform concentrations greater than 10,000 colonies, per 100 ml |

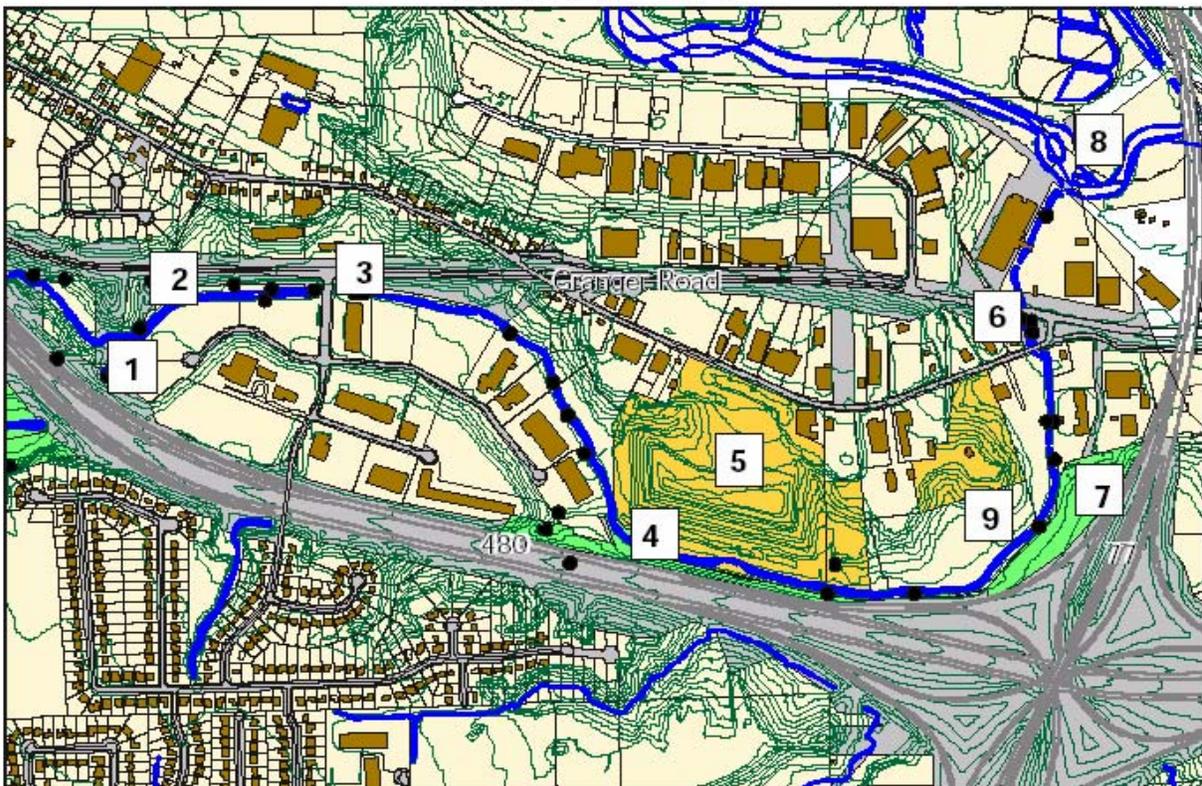
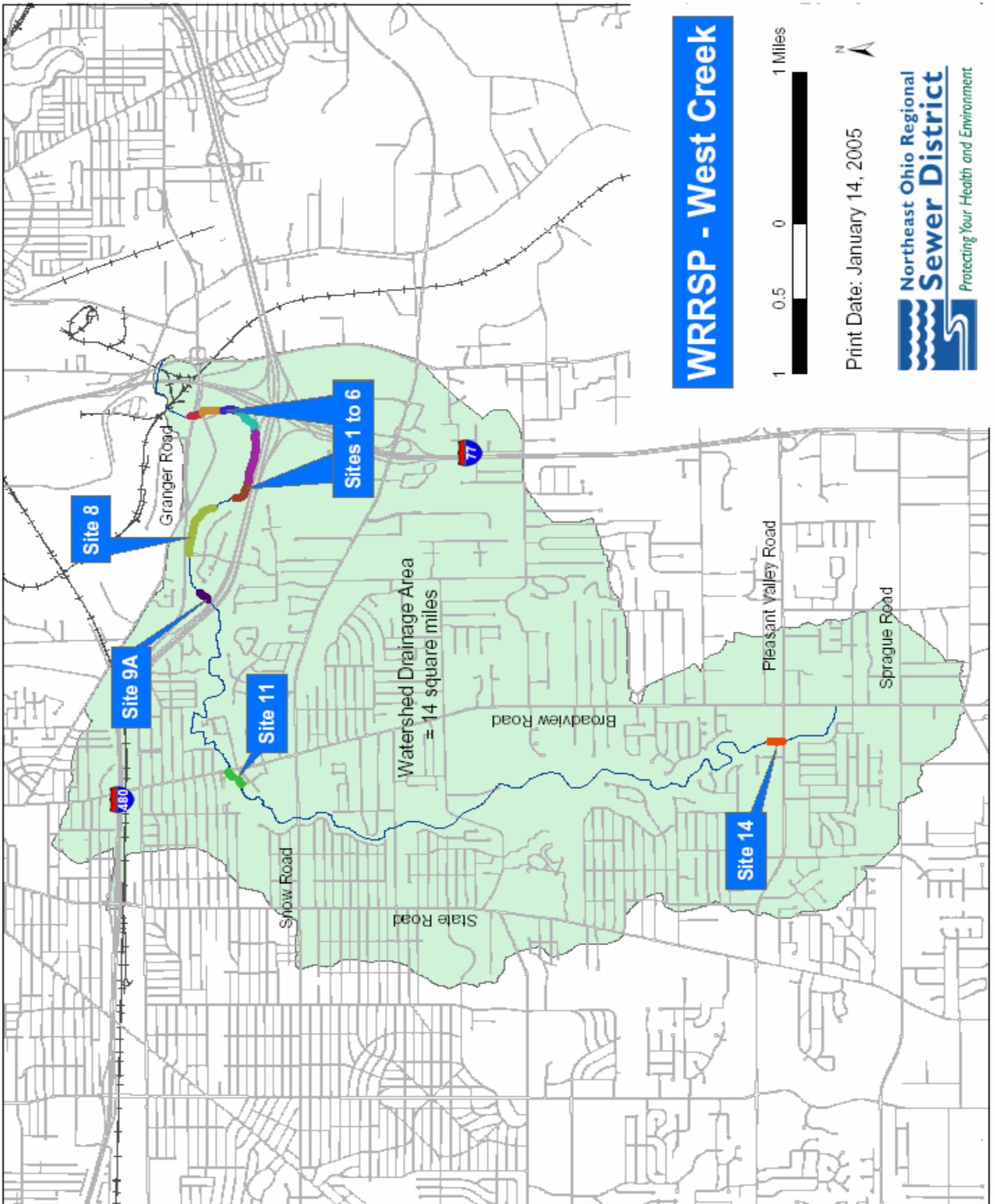


Figure 20
WRRSP Projected Stream Restoration Sites



stream, and stabilize its banks (Ohio's Streamside Forests, ODNR, Div. Of Natural Areas and Preserves, 1998). A survey of the condition of the riparian habitat throughout the seven identified reaches of the West Creek Valley are presented below.

Reach 1 (See Figure 13, page 40) - This section of the channel is highly urbanized, but the banks of the creek have a good base of trees and grasses that help slow the erosion process. This is predominantly a grassy meadow area which is different from many of the other habitats of West Creek, providing habitat for diverse species due to its characteristics.

There is severe erosion along some areas of the streambanks that will need to be addressed to maintain the stream diversity and mechanics. Overall, however, the vegetation shading the creek moderates the water temperature. There are some invasive vines and trees within this area that are hindering the ability of the native vegetation to thrive.

Reach 2 (See Figure 14, page 42) - This reach has upland and lowland forest cover that consists of a beech-maple mix. The forest is diverse, with plant habitats that include scarlet maples, oaks, magnolias, a variety of ferns, sedges, and grasses, as well as wildflowers such as the white flowered goldenrod. Sections of the forests are at different stages of plant succession and have different growing conditions due to sun orientation, topography, and previous activities such as farming and logging. As a result, some sections of the forest have a diversity of understory plantings and tree saplings in contrast to other areas that have little understory due to the succession stage, deer browsing, and/or human impact. There are invasive species in this reach primarily along the service road, such as Japanese knotweed, that need to be eradicated.



Reach 3 (See Figure 15, page 43) – Most of this reach is also a part of the West Creek Reservation; however, there are sections of forest that still need to be protected and preserved. The dry upland forest west of the creek is especially diverse and has had minimal disturbance by man. Although it is not a virgin forest, it is one of the few locations that illustrate the forest type that was prevalent in Cuyahoga County prior to widespread farming and land clearance. Plant species such as hickory, chestnut, and ferns are prime examples of the diverse variety in this forest.

To the east of the closed landfill, the forest is a beech-maple mix, also with diverse plant

species, but it has been disturbed to a greater extent. This area has numerous species of small mammals, birds, and reptiles. The common presence of deer is illustrated by the browse line visible at the forest edge, which has been caused by deer eating all the foliage from low hanging tree branches. The open field, which is the top of the closed landfill, has no significant plant species but has habitat restoration potential.

Reach 4 (See Figure 16, page 45) - Due to the proximity of residential development to the ravine in this reach, vegetation is limited to the streambanks and ravine rim, forming a narrow riparian corridor. The stream is shaded by the vegetation, which improves stream habitat and moderates water temperature.

Reach 5 (See Figure 17, page 47) - To the northwest of the stream is a forested floodplain, which assists in stormwater control; however, it contains informal trails that have disturbed the understory and groundcover on the forest floor. Situated in a deep ravine just north of Snow Road, the topography abruptly changes near the school and apartment buildings, with the stream becoming easily accessible.

The protection and enhancement of the West Creek Valley as a corridor has significant potential as a biological linkage to other corridors in all directions from the valley, such as the Cuyahoga River, Big Creek, Chippewa Creek, Mill Creek, Tinkers Creek, and Lake Erie. These possible linkages should be taken into consideration when planning the future of the West Creek Valley. In another context, the fragmented wildlife corridor and urban setting pose different management concerns for the protection of plant and animal habitats, as well as the safety and quality of life of the neighborhoods and communities.

Reach 6 (See Figure 18, page 48) - The terrain is steep along this stretch, but is heavily forested. Unlike other residential sections of the stream, most residential structures are located farther from the creek due to the configuration of the valley, thus a broader forested buffer exists between the creek and its bank. The Brooklyn Heights Community Park is highly forested with a beech-maple mix and abundant understory plants.

Reach 7 (See Figure 19, page 50) - The extensive development in this reach has left little forest cover, except for the area west of the closed sanitary landfill. Generally, the trees that exist along the streambank have been impacted by runoff, sedimentation, and erosion due to adjacent industrial land usage. Invasive plants exist along the banks, and the presence of rubble and concrete on these banks inhibits creation of a solid base on which to establish an aesthetically pleasing landscape.

3.4.1.3 Agriculture

Due to the high degree of urbanization within the West Creek watershed, agricultural operations and their associated impacts are not a concern.

3.4.1.4 Water

The watershed contains numerous topographic features, however the focal point of attention remains the main waterway, West Creek. Its features are varied as it meanders to the Cuyahoga River. Its natural form is illustrated primarily in the Reservation area, with a winding course and open floodplains. The stream bed is full of sediment deposits that occur naturally along bends of the creek. Natural ripples and pools provide areas for aquatic animal and plant life.

Areas with these characteristics have the greatest diversity of plant and animal habitats, slope protection from erosion, and natural flood control mechanisms for large storm events. These natural stream features within the Reservation contrast with the altered state of the waterway in other areas, where it has been relocated, buried, and/or had its broad floodplain filled for development purposes. These areas limit aquatic life and native plant habitats. Structures such as dams and culverts have impeded the natural hydrologic function of the creek, which interferes with other natural processes. These areas are identified in more detail with a discussion of each reach below.

Reach 1 (Figure 13, page 40) – The headwaters of West Creek begin in culverted sections in Broadview Heights. West of Broadview Road, in the City of Parma, is where West Creek initially daylight. It flows through various residential and commercial developments before reverting back to a more natural state at the northern section of Reach 1. Fallen natural debris blocks the stream channel in various locations along this reach. Along the section north of Pleasant Valley Road, the stream is being re-channeled due to natural processes and/or adjacent development. It is attempting to find a new main channel, and in the meantime has various meanders and branches finding their way downstream.

Reach 2 (Figure 14, page 42) – This reach is the most unaltered section of West Creek within the entire valley. It has many small water cascades that accentuate the beauty and uniqueness to the valley. The floodplain in this reach is intact and undeveloped, and functions properly as all floodplains are supposed to do. There are pockets of wetlands and areas that have wetland potential, such as the washout area of West Creek, which was restored with aquafilic vegetation to reduce erosion. Additional areas such as this offer opportunities to enhance water quality and habitat, as well as mitigate the negative effects of high water volume and velocity.

Reach 3 (Figure 15, page 43) – The southern portion of this reach begins in the West Creek Reservation and moves into residential and commercial development as it flows north. This reach of West



Creek is one of the most altered sections and most impacted of the entire length of the waterway. A portion of the creek was even moved from its original location in the 1950's to create a landfill site.

Reach 4 (Figure 16, page 45) – This reach of West Creek travels primarily through residential neighborhoods. After a low flat stretch, the stream becomes part of a deep ravine where the natural character of the creek is protected by the steep topography. There are water cascades along this portion of West Creek, with one of the most impressive located between Grantwood and Snow Roads, which is visible from South Park Boulevard. Due to the rapid elevation changes, which increase water velocity, erosion and stormwater protection measures should be considered.

Reach 5 (Figure 17, page 47) – West Creek flows through areas of diverse land use in this reach, including residential, restaurants, shopping centers, a school, a nursing home, and apartment buildings. The steep topography continues in this reach, coupled with the easily erodible soils, and rapid stormwater discharges, making the streambanks highly susceptible to erosion.

Reach 6 (Figure 18, page 48) – Land use in this section of West Creek is predominantly residential. The topography remains steep and the riparian zone is forested. In this area the creek has wonderful cascades, prominent geologic features, and streamside footpaths in a serene setting.

Reach 7 (Figure 19, page 50) – This highly industrialized section of West Creek has been significantly altered throughout the past 35 years due to highway construction and building development. The elimination of the natural floodplain by urban development has significantly affected the ecological integrity and hydrologic function of this reach. The ODOT acreage adjacent to Interstates 77 and 480 currently planted in grass has the potential to be restored to a prairie grass meadow, which would improve habitat and aesthetics without compromising motorist safety.

3.4.1.5 Barren

Typically, barren lands are relegated to construction or development sites where the vegetation has been cleared or otherwise disturbed at the ground surface. Cleared areas tend to vegetate rather quickly in the local climate, even if the vegetation is not of a native variety.

3.4.2 Protected Lands

The WCPC is committed to preserving ecologically and socially important greenspace and riparian habitat within the West Creek watershed. Integrating the watershed approach with a greenway vision offers a unique plan for the future of West Creek. A greenway has been defined as “a linear open space established along a natural corridor: any natural or landscaped course for pedestrian or bicycle passage; an open space connector linking parks, nature reserves, cultural features and other significant sites with each other” (Greenways for

America, Charles Little).

The West Creek Reservation is a large expanse of land “preserved for the purpose of conservation and passive, low impact recreation” south of E. Ridgewood Road and west of Broadview Road in Parma (Parma Park Preserve Concept Plan). It is the largest public natural area in the West Creek watershed and it was saved from commercial development by an overwhelmingly successful citywide ballot initiative spearheaded by the WCPC. The land within the Reservation is being managed by Cleveland Metroparks as part of a lease deal that is capable of being renewed for the next 300 years.

Within the West Creek watershed in the Village of Brooklyn Heights, 60 acres of mostly forested land was preserved, and is now a part of the Brooklyn Heights Park, through which West Creek flows. Approximately 3,865 linear feet of West Creek mainstem stream and 320 linear feet of tributaries are protected by the Brooklyn Heights Park. This park is owned by the Village, and a recent 27 acre addition was preserved at the behest of the WCPC prior to residential housing development.



The West Creek Preserve

The local communities within the watershed have provided other local recreational areas for their residents over the past fifty years. These areas however, are largely active recreational areas and do not focus on passive recreation facilities for hiking, bicycling, bird watching, and interpretation. The potential of the West Creek Reservation and the creation of the West Creek Greenway Trail up to the Cuyahoga River would provide a new venue of recreation for the watershed communities.

WCPC has preserved approximately 500 acres of greenspace within the City of Parma and other watershed communities. This land is owned by either the city or WCPC, or has been protected through the placement of conservation easements. Most of the preserved land either encompasses West Creek or contains precious riparian habitat. Approximately 60 acres of that protected land has been preserved within the Village of Brooklyn Heights and is a part of the Brooklyn Heights Park. Approximately 3,865 feet of West Creek mainstem and 320 feet of tributaries have been protected as a part of the Brooklyn Heights Park acquisition and approximately 15,000 linear feet of stream has been protected overall.

One of WCPC’s ultimate goals is to protect the entirety of West Creek and its tributaries encompassing the cities of Parma, Brooklyn Heights, Independence, and Seven Hills. To



Brooklyn Heights Village Park

achieve this goal within the City of Parma alone, approximately 200 land transactions must take place containing approximately 140 acres of land. Preliminarily, an area of 200 feet from bankfull on either side of the main stream channel has been identified for immediate protection consideration. The WCPC, in concert with its partner organizations, continues to identify and acquire properties that fit into its stated mission.

3.5 Cultural Resources

The West Creek watershed has influenced settlement and development patterns in this portion of Cuyahoga County for two centuries. In addition, the watershed has been associated with two significant industries, stone quarrying and greenhouses. Residential areas began to be created in the watershed in the early 20th century, a trend which has accelerated since the 1950's.

3.5.1 Early Settlers

When the Connecticut Land Company laid out the townships of the Western Reserve during the mid-1790's, the West Creek watershed became part of what were later known as Parma Township and Independence Township. Two of the earliest settlers in the area were Asher Norton and Benjamin Norton from Rutland Vermont, who brought their families to the area in 1823 and set up farms on the Independence-Parma Township line road (now Broadview Road).

Independence Township, which straddled the Cuyahoga River, includes the current communities west of the river: Independence, Seven Hills, and Brooklyn Heights. The earliest settler west of the Cuyahoga River was Ichabod Lord Skinner, who arrived in 1818 and began purchasing land for farming near the mouth of West Creek in the vicinity of Fuhrmeyer and Schaaf Roads (Miller et al, *The Story of Independence*, 1979).

3.5.2 The Quarries

In 1827, the section of the Ohio & Erie Canal from Cleveland to Akron was completed, including locks at present-day Pleasant Valley, Hillside and Rockside Roads in Independence Township. The canal was completed to Portsmouth and the Ohio River in 1832. This major transportation project opened up local agricultural lands to southern markets via the Ohio and Mississippi Rivers, as well as eastern markets via Lake Erie and the Erie Canal through New York State. Although agriculture became the primary business in the West Creek watershed, dominated by farms generally in the 80-100 acre size, stone quarrying also became an important industry. Quarrying was a major industry in Independence Township from the 1840's through about 1905. The crescent of area extending through

Independence Township from the Cuyahoga River east of the center of Independence, through the West Creek watershed generally on the south side of Rockside Road westward to the Broadview Road area in Seven Hills, had an abundance of Berea Sandstone. Berea Sandstone was used as facing stone for buildings, sidewalks, and particularly industrial grindstones, for which it earned a widespread reputation. Local sandstone was also used in the construction of locks on the Ohio & Erie Canal and later the Cleveland harbor breakwall. Much of the stone was shipped via the canal to Cleveland. A direct connection to West Creek is the Wilson & Hughes Stone Company, located at what is now the top of Lafayette Boulevard. The firm began operating in 1860 under the supervision of Thomas Smith and Ephriam West, a member of the family after which West Creek is named.



West Creek, Parma, 1912

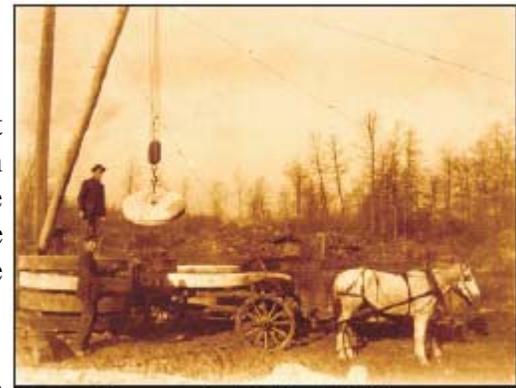
By the early 1900's, the use of concrete as a building material, as well as the introduction of emery and carborundum industrial grinding wheels, diminished the demand for sandstone products. In addition, the smaller operations in Independence Township had difficulty competing with larger firms in the metropolitan area. The industrial heritage of the quarrying industry is still visible in the West Creek watershed, including abandoned quarries and the homes of quarry owners such as Henninger and Kuenzer. Two houses built with sandstone blocks remain in the watershed: the Henninger House on Broadview Road just north of Rockside Road, and the Froehlich House on Broadview Road just north of Hillside Road.



Kuenzer Quarry near Rockside Road in Seven Hills, Early 1900's

3.5.3 Greenhouse Industry

Another prominent historical feature of the West Creek Valley is the greenhouse district in Brooklyn Heights. Schaaf Road had been laid out on the beach ridge of a lake that preceded modern Lake Erie. The rich sandy soil and good drainage made the area an excellent choice for agriculture.



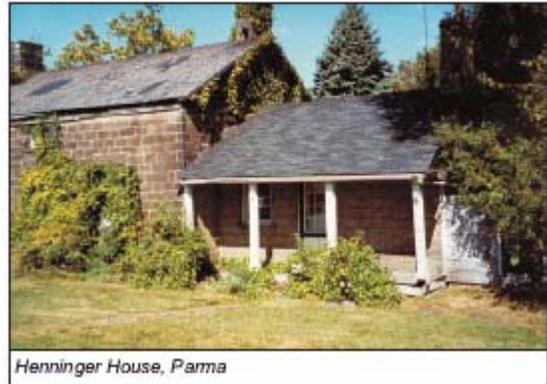
Kuenzer Quarry near Rockside Road, 1899

Martin L. Ruetenik apparently built Cleveland's first commercial vegetable greenhouse in the mid-1880's and began raising leaf lettuce and tomatoes, later adding celery. Ruetenik's use of scientific methods of cultivation made him an industry leader both locally and nationally. During the 1920's greenhouses enclosed an estimated 100 acres in the Schaaf Road area,

producing vegetables for the local market. By the mid-1960's, about 60 acres remained under glass. During the 1970's and 1980's, the substantial and permanent rise in the price of natural gas forced many growers out of business. A smaller local industry remains today, specializing primarily in tomatoes and smaller quantities of cucumbers, lettuce varieties, and herbs.

3.5.4 Other Historic Places

There are a number of places within the West Creek watershed that continue to exhibit the history of the watershed. There is one building listed on the National Register of Historic Places, the Joseph Kuenzer house on Rockside Road in Seven Hills. There are fifteen buildings in the watershed that have been inventoried as part of the Ohio Historic Inventory, a research inventory completed under the auspices of the Ohio Historic Preservation Office. These listings include mostly 19th century single-



Henninger House, Parma

family houses, several 19th century churches, and several early 20th century buildings. There are also six cemeteries located in the watershed, ranging from small family cemeteries such as West and Darrow to larger burial grounds. Many of the notable early families of the four communities have members buried in these cemeteries. Historic sites within the watershed should be protected and given more public attention in order to celebrate the history of the area.

Finally, the historic Henninger House is the oldest remaining structure in the city. Threatened with demolition in order to prepare the property for commercial sale and expanding development, the building was saved by a grass-roots effort. Now, the emphasis changes to the preservation and restoration of this local landmark.

The stone Greek revival-style house was built in 1849 by Philip and Sophia Henninger with sandstone block that was mined from Philip's own quarry at the southeast end of his property along what is now Rockside Road. The Henninger's quarry, at the intersection of then Town Line and Rockside Roads, also provided some of the stone for the Ohio & Erie Canal locks and bypasses, and later, stones for the Lake Erie breakwall.

The Henninger House sits atop a scenic ridge that allowed an impressive view in all directions. To the North, it witnessed the growth of an early City of Cleveland, a hub of commerce where the Ohio & Erie Canal's busy northern terminus met with Lake Erie. To the East, a view of the splendor of the Cuyahoga River Valley and the neighboring Township of Independence. To the South, the wooded and rolling hills leading to the Continental Divide in the vicinity of Akron. To the West, it bore witness to the early settlers, farmers and tradesmen that turned an inhospitable frontier into the established and productive community of Parma.

Now, after surviving 153 years of history and four generations of Henningers, the house has been saved from development and will be restored for the enjoyment and education of many future generations of area residents. In partnership with the West Creek Preservation Committee and the Ohio Historical Society, the City of Parma hired an architectural firm to design the renovation. Public input was solicited and proposed uses for the site and buildings were presented. Plans include converting the house into a visitor center, a historic site, and a trailhead for the West Creek Main Trail system.

3.5.5 Ohio & Erie Canal National Heritage Corridor

The Ohio & Erie Canal National Heritage Corridor was designated by the United States Congress in 1996. The management plan for the corridor, completed in 2000, was undertaken to “recommend actions and outline programs for conservation, funding, management, and development of the Corridor for the first six years of the Plan.” The Corridor Management Plan presents a



The Henninger House

“comprehensive vision and offers a collaborative framework that will celebrate the culture and resources of the region, attract visitors, energize investment, and further extend the powerful legacy of the Canal into the future” (O&E Canal National Heritage Corridor Management Plan, 2000). The West Creek Valley has been included in the Heritage Corridor boundary because of its “urban settings with close associations

to the Canal and its legacy of transportation, industrial and community development.” The significance of this inclusion should be celebrated and continue coordination of the future of the West Creek watershed with the vision of the Heritage Corridor’s Plan is recommended.

3.5.6 West Creek and Its Many Names

In the history of the West Creek watershed, various names have been used for the creek. For example, Skinner’s Run was an early name listed on maps after the Skinner family who settled about 1820 near the mouth of West Creek in the vicinity of Fuhrmeyer and Schaaf Roads. Quarry Creek was also used as a name, probably due to the sandstone quarries that became common in the area during the 1840’s and 1850’s.

Eventually the name West Creek became established, named after the West family. Ephriam West was a supervisor at a stone quarry on Rockside Road in the 1860’s. In addi-

tion, the 1874 *Atlas of Cuyahoga County, Ohio* shows parcels owned by “E. West” and “Thos. West” along a tributary of West Creek in the vicinity of what is now West Creek Road in Independence. The West Family Cemetery is located just east of Interstate 77. Other creek names include Glen Creek and South Park Creek as part of its history, the latter name perhaps associated with South Park Boulevard in Parma, which overlooks a scenic section of the creek. The evolving names illustrate the families, history, and development of the watershed.

3.5.7 West Creek’s Early Attempts as a Park

The West Creek Valley has been studied previously for potential park development, reinforcing the long-term awareness of its beauty, natural features, and environmental importance. In 1919, the Board of Park Commissioners considered the establishment of the West Creek Valley as part of the Cleveland Metropolitan Park District. The 1920 annual report the park district states that “Nature seems to have endowed this section with all the advantages of a natural park. Rocks and rills and templed hills are found in abundance covering some two hundred acres.”

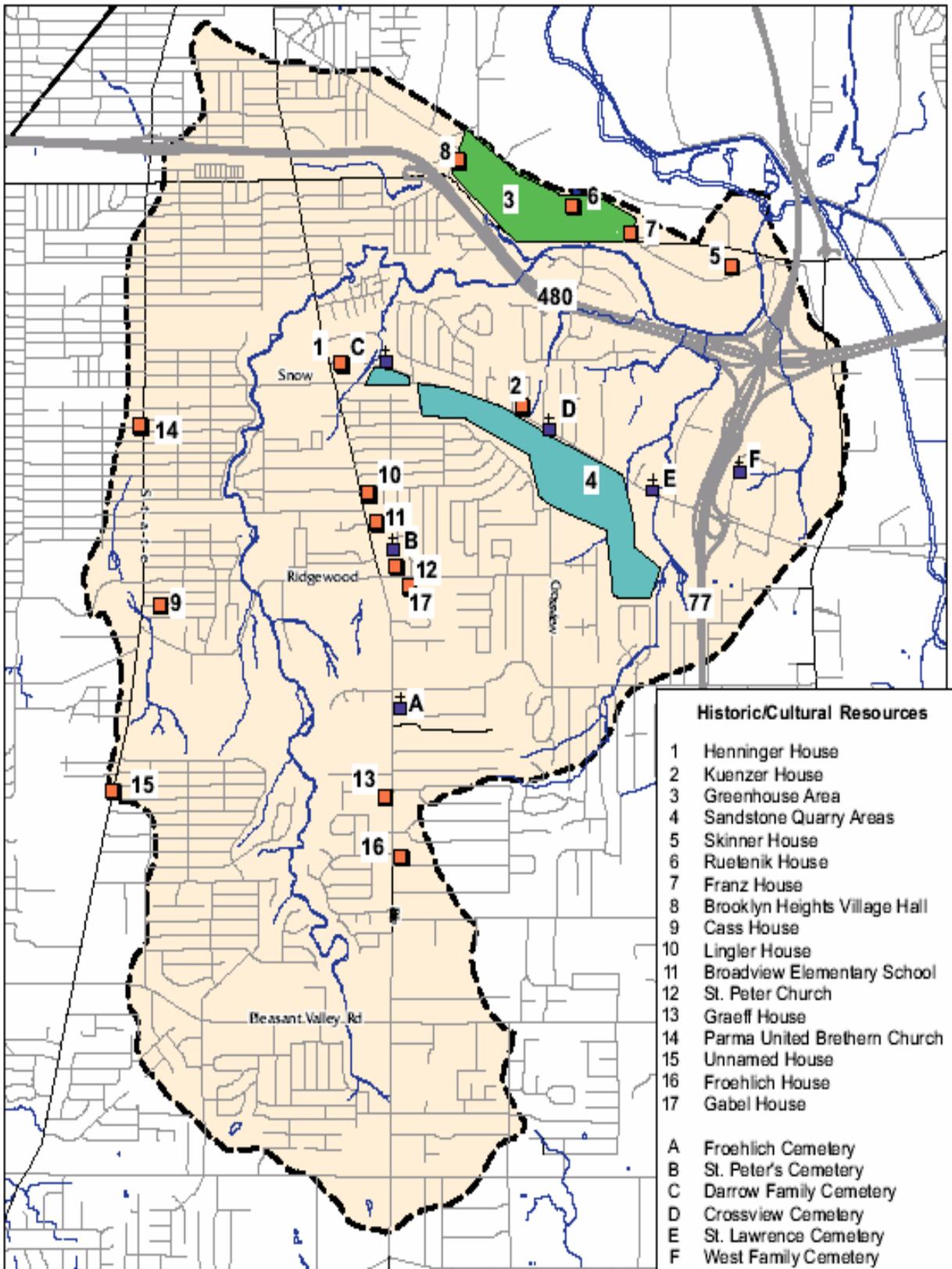
During the same time period, Don Helwick proposed a “garden city” development similar to Shaker Heights. He envisioned the West Creek area as a park setting and surrounding the Valley with boulevards and homes for wealthy and middle-income families. The development includes the layout of South Park Boulevard and Ravine Boulevard between Snow Road and Grantwood Drive. These two innovative concepts did not become reality. The Cleveland Metropolitan Park District was unsuccessful in negotiating purchase prices from the landowners. Mr. Helwick’s development plan was thwarted by the Great Depression and never completed.

3.5.8 Archeology

Archeology helps complete the timeline of history of a place and reveals how humans have interacted with their natural environment over time. The topography and the presence of forests and a stream suggest the possibility of finding sites along ridgelines or in the valley near rock shelters. It is unlikely a well developed settlement was present in the West Creek Valley due to the small size of the valley and stream compared to the Cuyahoga River Valley, where larger settlements have been identified in the Independence area. It is possible however, that items such as spearpoints, knives, or pottery shards could be found, or seasonal camps could be identified. In addition, there are surviving artifacts from the period since the formation of the Western Reserve that merit analysis, such as the large hewn timbers embedded in the stream bank upstream of the Broadview Road overpass.

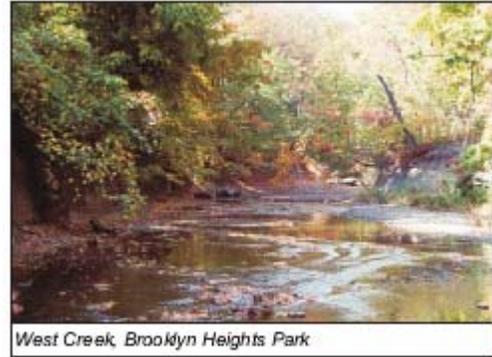
An official Phase I Archeological Assessment, which is a literature search and database search of the Ohio Archeological Inventory through the State Historic Preservation Office, has not been performed on the West Creek Valley. However, the Cleveland Museum of History records show no recorded prehistoric sites in the West Creek Valley, and it has never been surveyed. Due to the topography of the Valley, an on-site archeological inspec-

Figure 21
Historic/Cultural Resources



SOURCES: Ohio Historic Inventory, National Register of Historic Places. *The History of Parma*, Ernest R. Kubasek, 1976. *Independence Township Cemeteries*, Cuyahoga Valley Geological Society, 1998.

tion during trail construction and other restoration activities is recommended in order to determine the presence of significant features. As regional trail connections are considered, attention to potential archeological sites along the ridges near the Cuyahoga Valley is recommended, for both the purposes of protection and possible interpretation.

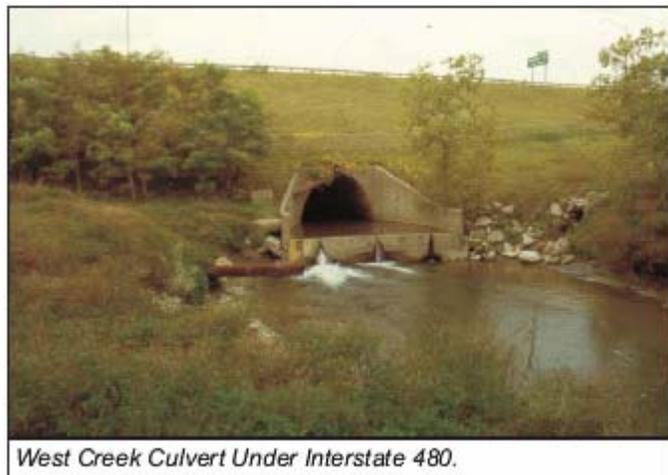


3.6 Previous and Complementary Efforts

Environmental restoration and protection activities began in earnest with the formation of WCPC in 1997. This group was instrumental in preserving what is now the West Creek Reservation through a citywide ballot initiative, and also in helping the City of Brooklyn Heights preserve a large area of West Creek riparian corridor in what is now a part of the Brooklyn Heights Park.

There are several current activities within the West Creek watershed that will increase water and habitat quality and be of benefit to those that live and work within the watershed. WCPC is partnering with the NEORSD, and, in cooperation with landowners along West Creek within the project areas, on a Water Resource Restoration Sponsorship Program (WRRSP) project to restore previously impaired sections of the waterway. As a part of this project two fish barriers will be eliminated (an approximately four foot culvert drop-off at Lancaster Road will be minimized by the construction of a gradual step-pool and the removal of a lowhead dam in the vicinity of the Mid-Town Apartments in the City of Parma). A concrete flume near the closed Schaaf Road Landfill is slated to be removed as a part of this project, meanders will be reintroduced into several channelized sections of the creek, and slope stabilization will be occurring in areas of high erosion, and riparian habitat will be improved where possible.

Wetlands reconstruction and restoration projects have been conducted in the West Creek Reservation including the construction of a wetlands that intercepts and detains stormwater drained from a highly urbanized subdivision in the City of Parma (The West Creek Preserve Urban Wetland Project, Greathouse). A wetlands area was also created where a highly eroded artificial stream channel had formed by following an exposed sewer line. Future wetlands creation and restoration projects are planned throughout the watershed that will decrease stormwater runoff and increase pollutant filtration and biological habitat.



The protection of riparian land along West Creek and its tributaries is ongoing through land acquisition and conservation easements. The WCPC has protected land

throughout the West Creek watershed and will continue to do so. Some of this land may also be incorporated into the formation of the main trail through the West Creek watershed.

The WCPC has begun an environmental education component through partnerships with organizations such as Cuyahoga Community College (Tri-C) and local high schools. The West Creek Urban Wetlands is a collaborative project with Tri-C that lets students get hands on experience with topics such as wildlife study, water quality analysis, and wetlands restoration. Local high schools occasionally use areas of West Creek as a field laboratory where students are given projects to research regarding water quality, fish health, and macroinvertebrate populations.

WCPC is also working with community members within the West Creek watershed to expand development and best management practices along West Creek and its tributaries that not only are protective of water and habitat quality, but also that are aesthetically pleasing to patrons and members of the community.

3.7 Physical Attributes of Streams and Floodplain Areas That Support Habitat, Recreation, Water Quality, Etc...

3.7.1 Early Settlement Conditions

Refer to Sections 3.5.1 through 3.5.3 for a thorough description of the early settlement conditions of the West Creek watershed.

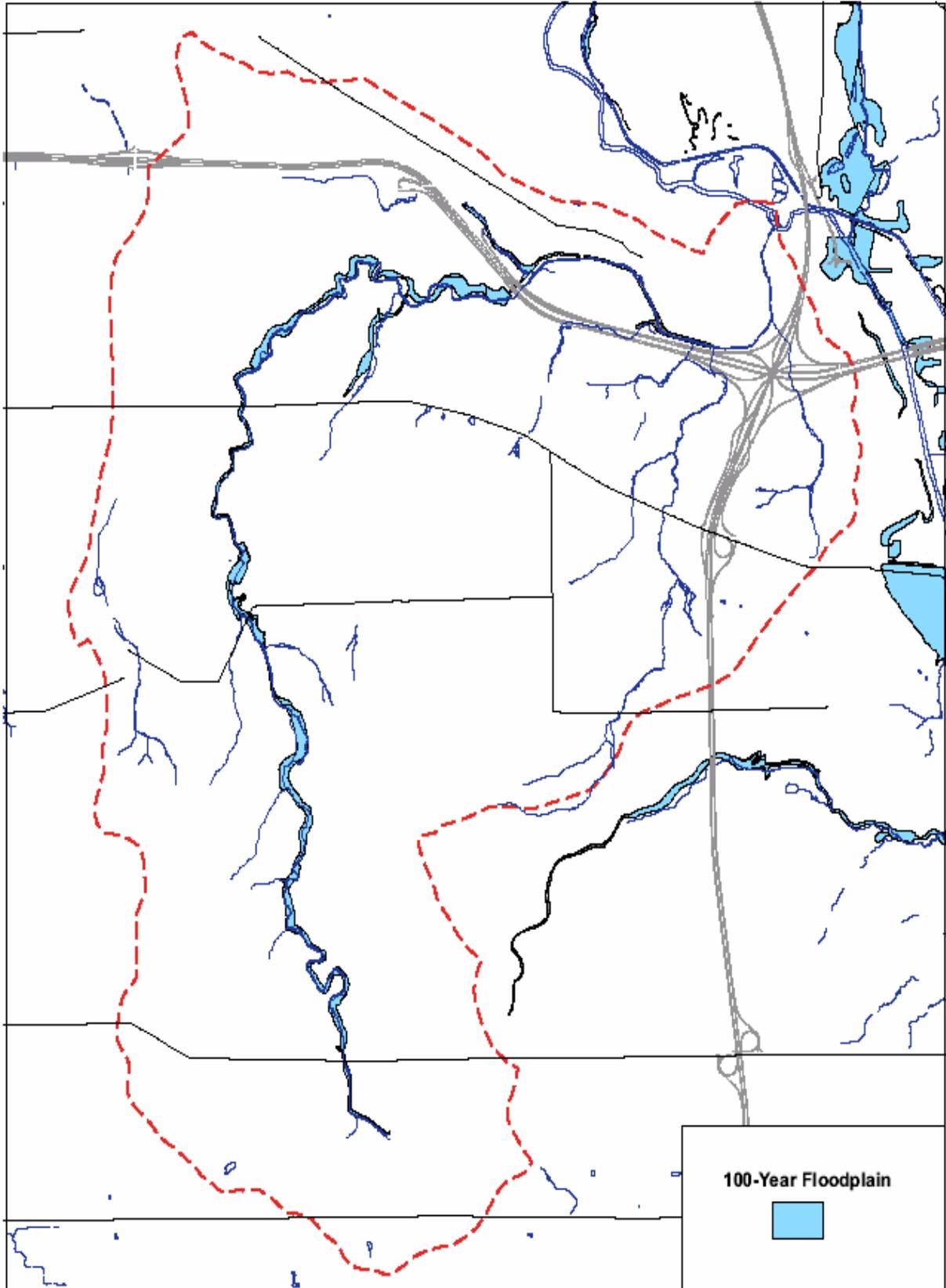
3.7.2 Channel and Floodplain Conditions

West Creek channel and floodplain conditions vary throughout the watershed. Due to the urbanized nature of the watershed, construction activities have occurred in many areas of the floodplain. Furthermore, several areas of the waterway are entrenched and do not have adequate access to the floodplain. West Creek and its associated 100-year floodplain are shown in Figure 22. A quantifiable amount of floodplain area that has been developed is not currently available and should be the subject for future investigations.

3.7.3 Forested Riparian Corridor

Riparian land is situated alongside the bank of a waterway or waterbody. These lands have been shown to have a profound impact on the water and biological quality of the waterways by which they reside. Riparian areas that are significantly vegetated, in a relatively natural state, and of a sufficient width, can drastically increase water quality through reducing the amount of runoff that reaches the waterway, filtering pollutants in said runoff, providing critical biological habitat, allowing floodplain access, and reducing the water temperature via shade from overhanging vegetation. Riparian areas devoid of vegetation or that have been commercially developed can have very negative impacts upon the adjacent waterway

Figure 22
100-Year Floodplain Map



SOURCE: Federal Emergency Management Agency

by increasing stormwater runoff, sediment, and pollutant load.

Due to widespread development within the West Creek watershed impaired riparian areas are common; however, relatively natural and healthy areas of riparian corridor still exist and have either already been preserved or have potential for preservation (Figure 24 displays potential riparian conservation areas). The Biocriteria Study and Riparian Corridor Assessment Report (2001) further identified three riparian areas of high ecological significance (one of which in the West Creek Reservation has already been preserved) that merit special attention and fourteen additional “enhancement areas” that act as initial locations to prioritize riparian restoration projects (Figure 25, page 69).

The exact amount of riparian area that exists as natural forested area, wetland communities, and altered or developed land has not been calculated; however, Figure 23 from the Biocriteria Study and Riparian Corridor Assessment Report (2001) provides a visual description of the aforementioned areas. As previously discussed in Section 3.4.2, approximately 11,200 lineal feet of West Creek mainstem has been protected through land acquisition or conservation easement in the City of Parma and approximately 3,865 lineal feet of mainstem has been preserved in the City of Brooklyn Heights.

3.7.4 Physically Altered Sections of West Creek

Many, but not all, physical impairments to West Creek are shown on Figures 13 to 19. For example, significant portions of West Creek have been channelized in Reach 6 (Figure 18, page 48) during the construction of the Brooklyn Heights Business Park and Schaaf Road Landfill in Brooklyn Heights. There are additional segments of the waterway that have been channelized throughout its length; however, the exact amount has not been quantified and all channelized locations have not been identified to date. A search of U.S. Army Corps of Engineers records to determine the exact sections of West Creek that have been channelized or otherwise altered should be conducted so that future restoration activities can occur on those identified areas. Additional manmade alterations and impairments to West Creek are further discussed in Sections 3.8.2 and 3.8.4.10.

3.7.5 Eroding, Floodplain Connectivity, and Stream Entrenchment

There are several areas of severe erosion along West Creek due to strong flow during storm events associated with a large amount of impervious area within the watershed. Specific locations of streambank erosion should be identified and the amount of sediment produced as a result quantified so that future projects can be dedicated to stabilize the streambanks and reduce stormwater influx.

There are no known levees that have been constructed along West Creek. Nevertheless, several segments of West Creek display low levels of entrenchment (the degree to which a stream is confined to its natural channel during a peak flow event) due to the high degree of downcutting that is occurring in many areas of the waterway. Therefore, much of the water

Figure 23
Plant Communities and Land Covertypes

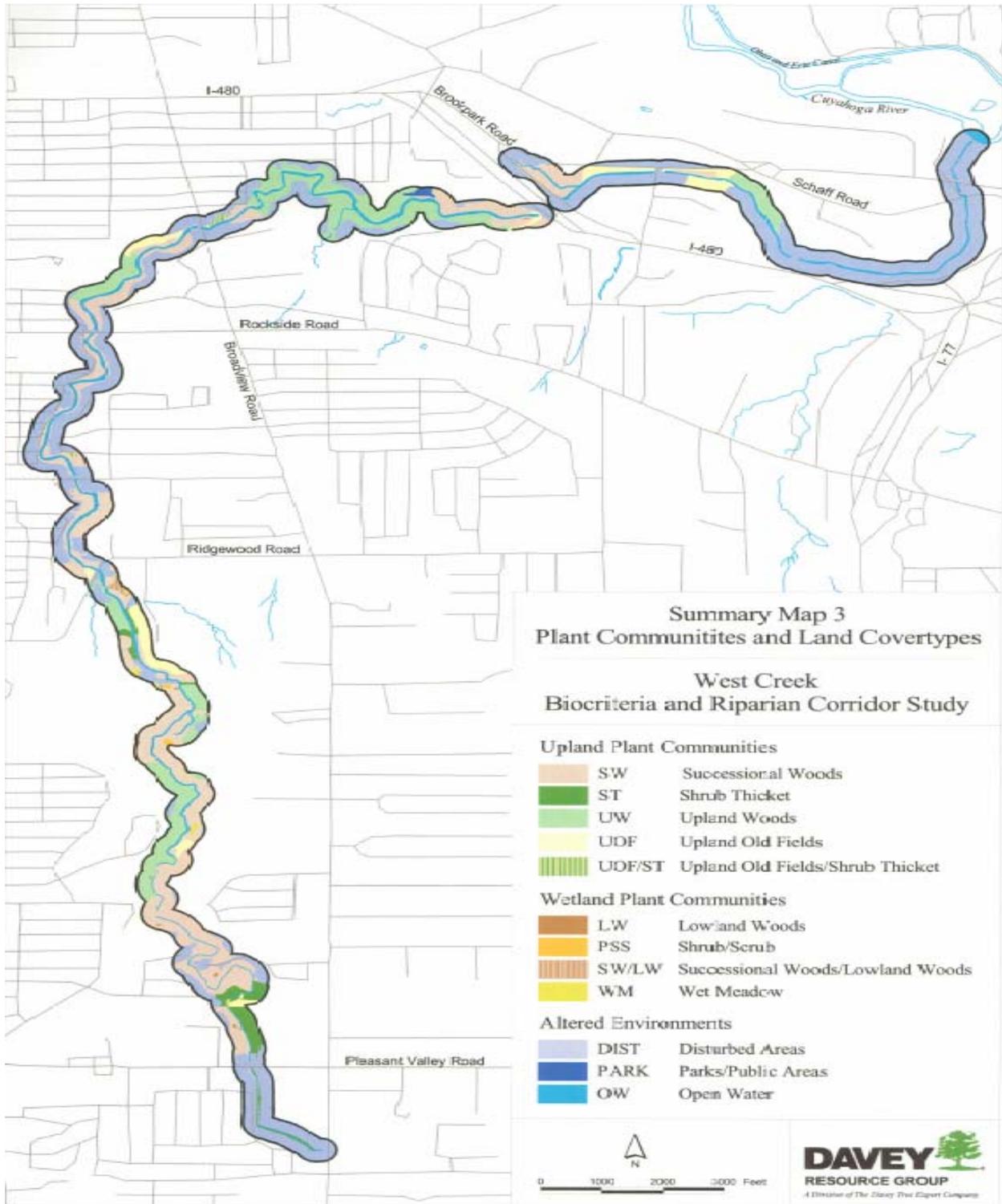


Figure 24
Land with Conservation Potential

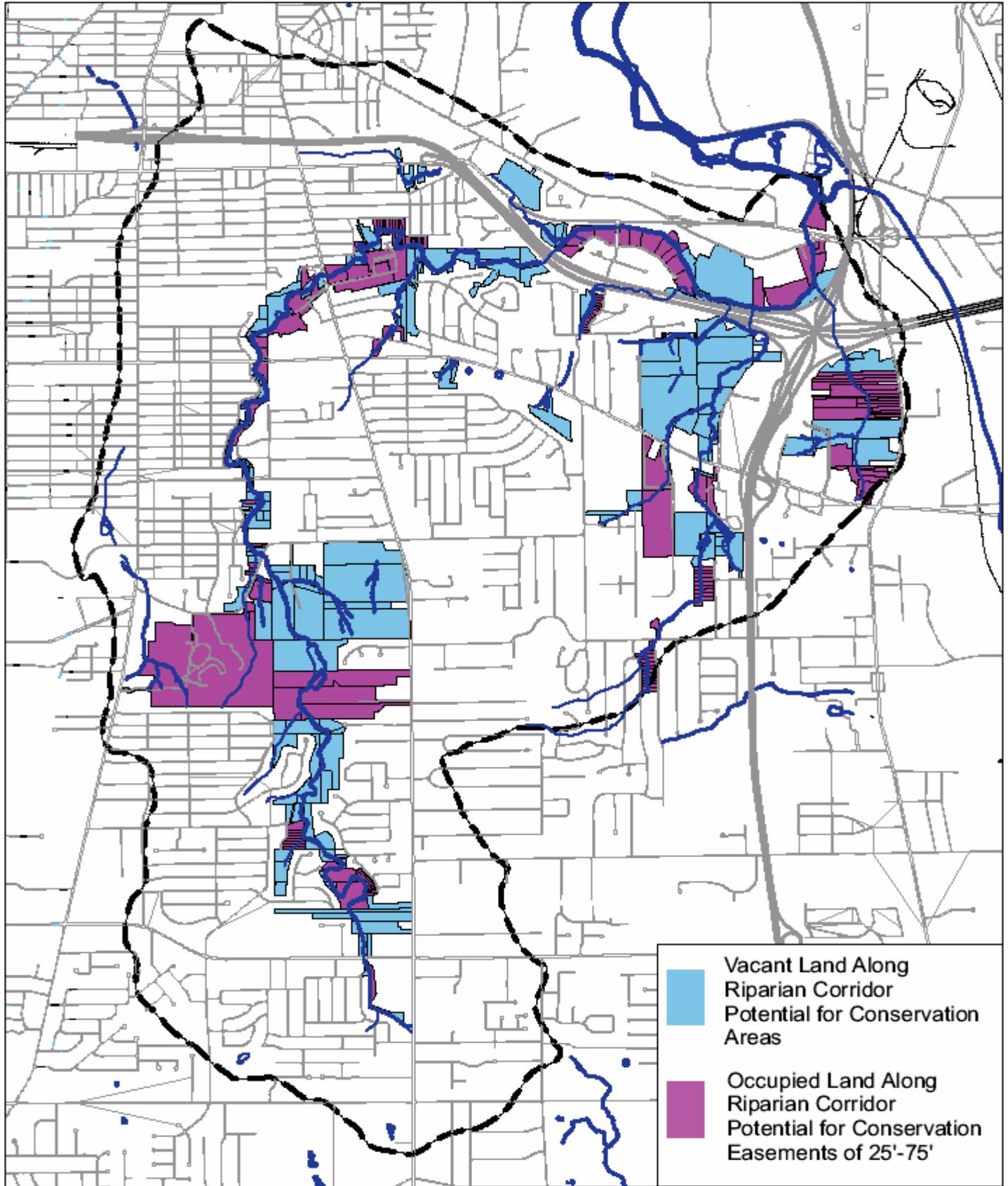
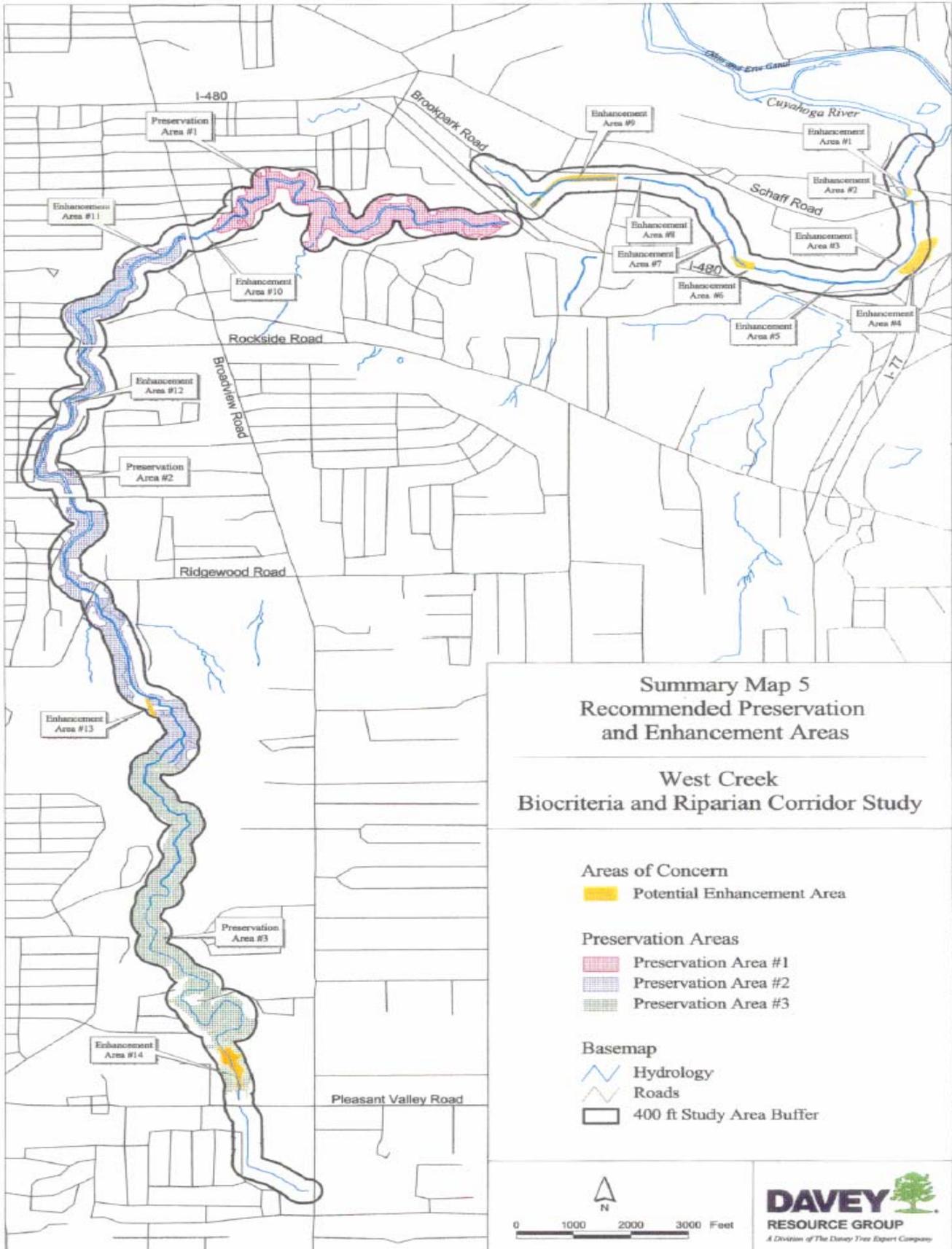


Figure 25
 Recommended Preservation and Enhancement Areas



velocity and erosive energy possessed by the stream during high flow events are concentrated in the stream channel rather than being dissipated into the floodplain. Furthermore, some areas of West Creek's floodplain (particularly near the confluence with the Cuyahoga River) have been developed resulting in frequent property damage during flood events. The amount of entrenchment that occurs along the West Creek Valley has not been quantified.

3.7.6 Status and Trends

Increased floodplain development within the West Creek mainstem is not expected. If anything, a small amount of previously developed floodplain area may be reverted back to a more natural state. Future West Creek restoration plans also include the removal of the previously discussed lowhead dams, the introduction of meanders and other natural features into channelized areas, and various streambank stabilization projects. However, projected commercial development within the watershed will likely result in continued increases in stormwater discharges to the waterway resulting in continued stresses to the ecosystem.

3.8 Water Resource Quality

3.8.1 Locationally-Referenced Use Designations/Use Attainment

Based on an Ohio EPA classification within the *Total Maximum Daily Loads for the Lower Cuyahoga River* (2003) report and upon verbal communications with Ohio EPA Division of Surface Water personnel, the segment of West Creek from its confluence with the Cuyahoga River to approximately 3.5 river miles upstream is classified as being in partial attainment of the biological and chemical Water Quality Standards (WQS). However, from the headwaters of West Creek to the point 3.5 river miles upstream of the confluence with the Cuyahoga River is designated as being in non-attainment. (Total Maximum Daily Load Lower Cuyahoga Report, 2003) Thus, approximately 4.5 miles of West Creek are in non-attainment. None of West Creek is classified as being in full attainment.

Attainment is determined in two ways, which include WQS concentrations for certain pollutants are compared to site-specific sampling data, and by measuring fish and aquatic insect biocriteria standards. The biocriteria standards are as follows: IBI, the modified Index of Well-being (MIwb) also for fish, and ICI for insects, and QHEI for the habitat's ability to support fauna. If none of the three biocriteria measurements are achieved then the waterway is considered to be in non-attainment; if some but not all of the biocriteria are met the waterway is in partial attainment; and if a waterway meets all of the biocriteria it is in full attainment. (Total Maximum Daily Load Lower Cuyahoga Report, 2003) The lower section of West Creek that achieved partial attainment had a passing IBI index, but did not achieve the required ICI score.

Other water quality testing within West Creek confirms Ohio EPA designation. For example, NEORS sampling of West Creek between the years of 1991 and 1998 reveal that

water quality has declined significantly based upon the condition of macroinvertebrate communities within the creek during the sampling period.

3.8.2 Causes and Sources of Impairment

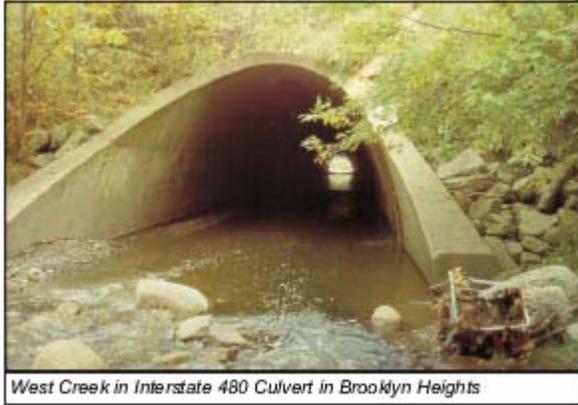
An official Clean Water Act Section 303(d) impairment status does not currently exist for West Creek or its tributaries. Nevertheless, a nearby waterway like Big Creek (also a Cuyahoga River tributary) that exists within an urban watershed can be used for comparative purposes in regards to impairment causes. Furthermore, the Total Maximum Daily Load Lower Cuyahoga Report (2003) provides the Total Daily Maximum Load (TMDL), which is a “calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards,” for the entire Lower Cuyahoga River watershed, including West Creek.

The primary causes for Big Creek impairment include organic enrichment, nutrient enrichment, low dissolved oxygen content, siltation, habitat degradation, and high bacteria levels. These same factors are also primary causes for West Creek impairment. (Total Maximum Daily Load Lower Cuyahoga Report, 2003)

Organic and nutrient enrichment is primarily due to the high volume of urban water runoff, and also contributions from the possible existence of a Combined Sewer Overflow (CSO) and known residential septic tanks (also a leading contributor to high bacteria levels). Low dissolved oxygen content of the waterway is an indirect result of the high nutrient enrichment level, as algae propagates profusely, using much of the water’s dissolved oxygen as it grows. Siltation is also a significant problem within West Creek as sediment from disturbed areas (i.e. construction sites and non-vegetated slopes) settles on the creek bottom, filling in the cracks and crevices of the natural rock channel, and decreasing aquatic habitat. Sediment is sometimes also brought into the creek when large, rapid stormwater influxes erode into the stream bank. Also, Ohio EPA chemical analysis of surface water samples near the mouth of West Creek revealed several exceedences for certain heavy metals, which could possibly be a result of the increased industrial activity in this



Source: Davey Resources Group Biocriteria Study
Twin culvert pipes on a heavily altered tributary of West Creek



West Creek in Interstate 480 Culvert in Brooklyn Heights

segment of the creek.

Habitat destruction and alteration has occurred in several segments of West Creek. Three lowhead dams exist throughout the creek, one of which has been naturally breached by the stream. Additional fish blocking structures exist throughout the waterway including an approximately five feet high concrete culvert under Interstate 480, a concrete flume installed by the Ohio Department of Transportation in the vicinity of the closed Parma Landfill. Besides blocking fish

migration routes, lowhead dams also adversely impact waterways by increasing water temperature and decreasing the dissolved oxygen content behind the dam pool, and significantly altering the flow regime of the waterway.

Additional habitat degradation has occurred along numerous segments of West Creek in the form of stream channelization and the development of wetland areas.



Source: Davey Resource Group Biocriteria Study
Lowhead Dam on West Creek

3.8.3 Point Sources

Point source pollution is that which comes from a definite, identifiable source. Generally, most point source pollution comes from industrial sources or sewage treatment plants.

3.8.3.1 Permitted Discharges (NPDES)

The National Pollutant Discharge Elimination System (NPDES), introduced in 1972 with authority from the Clean Water Act, attempts to help control pollution through the regulation of point source pollutant discharges. Point sources are distinctly identifiable sources where pollutants are discharged from, into a waterway (i.e. pipe or sedimentation basin outflow). An electronic search of the U.S. EPA “Envirofacts Warehouse” did not detect any NPDES permit holders within the confines of the West Creek watershed.

With the 1999 promulgation (Phase II) of the existing NPDES Storm Water Program, approximately 280 small urban municipalities were included in the program, which mandated six minimum control measures including:

- Public education and outreach on stormwater impacts and reduction techniques,
- Public involvement and participation in the Storm Water Management Plan process,
- Elimination of illicit discharges,
- Creating construction site stormwater ordinances utilizing best management practices, stormwater management plans, and penalties for non-compliance,
- Creating post-construction ordinances requiring the continued use and upkeep of best management practices as they relate to the development, and
- The reduction of stormwater pollution from the municipal operations.

All of the municipalities within the West Creek watershed are currently covered by the Phase II Stormwater Regulations.

Stormwater and combined sewer overflows are additional types of point sources that are not covered by NPDES permits. NEORSD has identified the existing outfalls to West Creek, meaning the location of pipes protruding from the steeply sloping valley walls that drain areas from above the rim of the valley. This 1998 NEORSD inventory compiled data to assess pollution levels and erosion issues, as well as structural concerns with the outlet pipes and surrounding support walls. In addition, NEORSD identified one CSO located within the Village of Brooklyn Heights and which has been identified as CSO 063. This CSO overflows approximately 75 times a year with a total estimated outfall volume of approximately 29 million gallons, or approximately 390,000 gallons per event.

Some sections of Cuyahoga County were developed with a single sewer pipe to carry both wastewater and stormwater to a treatment plant. A combined sewer overflow is an outlet pipe that opens during heavy rain events to divert the “overflow” volume—still a mixture of wastewater and stormwater—directly into a watercourse, such as West Creek. These structural concerns of the aging systems and the location of potential pollution sources will need to be addressed for the future quality of West Creek and its watershed. The NEORSD continues to work with communities to assess the storm and sanitary sewer systems. As discussed previously in Section 3.3, the RIDE study conducted by NEORSD confirms that rainfall events result in relatively rapid stormwater influxes to West Creek, which can cause sudden and significant increases in West Creek flow volume and velocity. This information will significantly assist the West Creek watershed communities in determining future urban impacts on West Creek, as well as act as a data source applicable for trail development for the designing of a safe and properly engineered trail system in the West Creek Valley.

3.8.3.2 Spills and Illicit Discharges

An Ohio EPA short report on known spills within the West Creek watershed yielded four results (located in Appendix F). The spills occurred in either sanitary or storm sewers and most likely did not result in long term impacts upon the watershed.

3.8.4 Nonpoint Sources

Nonpoint source pollution comes from many, various diffuse sources. It is a major cause of poor water quality, and it is a source of pollution where virtually everyone within the watershed plays a part.

3.8.4.1 Home Septic Systems Inventory

Based on a 1999 CCBH report, the West Creek watershed contains 872 home septic systems (Figure 10, Page 35). Between 1999 and the issuance of this report the number of home septic systems within the watershed should not have changed significantly based upon verbal communications with the CCBH. However, plans exist for a reduction in the number of systems within the watershed. For example, a City of Seven Hills proposal titled the Broadview Road Sewer Program is scheduled to provide sanitary sewer service to approximately 200 households currently utilizing home septic systems by 2009. The Broadview Road area of Parma in the vicinity of the Giant Eagle grocery store is also undergoing several septic system conversions; however, detailed maps of planned conversion areas are not available.

These systems, which include septic tanks, aeration systems, leaching fields, filter beds, or evapo-transpiration systems, were installed many years ago prior to the established municipal infrastructure system of sanitary sewer piping. According to the CCBH, the most common septic systems within the West Creek watershed are the filter bed system and the aeration system: "These systems are similar in their treatment system. When properly operating, microorganisms within the system will break down the waste slowly before discharging the treated effluent." Due to the fact that these systems are over 30 years old, they are operationally deteriorating and no longer "provide proper treatment of wastewater." These older systems have begun to have malfunctions such as a broken motor on the aeration system or a blocked filter bed due to tree roots or collapsed pipes. In addition, these older systems were not designed in size for current use and standards.

In 1998, the CCBH performed a water quality analysis of West Creek in regards to these septic systems and their impact on the creek. Of the twenty sites tested in this study (sites not available), fifteen of the sites reported samples with counts of fecal coliform that exceeded Ohio EPA standards (1,000 geometric mean fecal coliform content per 100ml). On-site observations included strong sewage odors, organics on the water surface, and the presence of "a white filamentous bacteria," which are also indicators of failing septic systems. Condensed phosphate, produced by detergent use, is another indicator that was tested for in this study. As stated in the Board of Health Report: "The main problem of total phosphorous in West Creek is due to poor treatment of septic discharge in the form of condensed phosphates from household detergents. A high total phosphorous count (Ohio EPA effluent standard of more than 1.0mg/L) at a particular discharge point presents evidence of contamination possibly from poorly treated wastewater." Six out of the twenty sites tested in this 1998 study exceeded the Ohio EPA standard. Results of this study indicate the serious threat that failed septic systems pose to water quality within the watershed.

3.8.4.2 New Home Construction

According to the City of Parma Strategic Master Plan (2002), the City’s population has decreased approximately 14.5 percent from its peak in 1970. This trend is mirrored throughout Cleveland and its inner ring of suburbs, which are mostly losing residents to the outer suburbs. The Master Plan further projects that the City of Parma population will continue to decline over the next couple decades if general trends such as lower birth rates and smaller family sizes remain constant. The trend is not forecasted to reverse “...unless Parma annexes or acquires additional undeveloped land for new residential development, or redevelops existing nonresidential land for new residential uses.”

Despite the downward trend in the City of Parma population over the last three decades, the number of housing units has increased. However, the increase in the number of housing units is occurring at a decreasing rate according to the City of Parma Strategic Master Plan (Table 2, page 76). “The increase in the number of households within the context of a decrease in total population in Parma can be attributed to the fact that the average household size (from 3.34 persons per household in 1970 to 2.4 in 2000) has decreased during the past three decades.” These trends are consistent with those seen in Cuyahoga County, throughout the State of Ohio, and across the country.

According to the City of Seven Hills Master Plan (2002), the City’s population has declined by 11.5 percent from its 1980 peak, and that trend is expected to continue for the next two decades. However, the number of households has increased as well as the number of housing units (Table 2, page 76) “For the City of Seven Hills, the increase in the number of housing units during the past thirty years reflects the rise in the number of households, indicating that vacancy rates have remained steady and that new housing starts have been absorbed into the City without adversely impacting the sales of existing housing.”

Single-family residences comprise over 66 percent of the Seven Hills housing stock. Of that housing stock 29.3 percent of it was built prior to 1960, and an additional approximately nine percent was constructed between 1960 and 1970. Based upon 2002 data, 13.8 percent of total land within Seven Hills remained free of development. “While some parcels are entirely vacant, most of the undeveloped land is in the form of the back sections of long, narrow residential parcels. These “bowling alley” lots are characterized by a home and front yard visible from the street and a cleared, usable backyard that extends for about half of the overall depth of the lot. The remainder of these lots are usually wooded and unused. Even though each of these partial lots consist of only an acre of vacant land at most, and are oftentimes located on rolling land that is difficult to build upon, areas up to 35 acres



New residential homes on Ravine Boulevard in Parma

may be assembled for large-scale development through lot splits, multiple acquisitions, and lot consolidations.”

The Village of Brooklyn Heights experienced its highest period of population growth from 1940 to 1960, according to the Village of Brooklyn Heights Master Plan (2003). Between 1970 and today, the Village’s population has increased only slightly. As seen in Table 2 however, the number of housing units has increased somewhat significantly due to the same trends experienced by Parma and Seven Hills, and the vast majority of the housing units consist of single-family residences. Also, approximately 45 percent of the residences in Brooklyn Heights were constructed during the decades of 1940 and 1950, and an additional 20 percent were built during the 1970’s. Based upon 2002 data, approximately 15 percent of the land within Brooklyn Heights remains undeveloped.

Table 2 West Creek Watershed Housing Data

| YEAR | CITY OF PARMA | | CITY OF SEVEN HILLS | | CITY OF BROOKLYN HEIGHTS | |
|------------------------|--------------------|-----------------------------|---------------------|-----------------------------|--------------------------|-----------------------------|
| | # OF HOUSING UNITS | % CHANGE FROM PREVIOUS YEAR | # OF HOUSING UNITS | % CHANGE FROM PREVIOUS YEAR | # OF HOUSING UNITS | % CHANGE FROM PREVIOUS YEAR |
| 1970 | 30,315 | -- | 3,499 | -- | 466 | -- |
| 1980 | 34,287 | 13.1 | 4,302 | 22.95 | 568 | 21.89 |
| 1990 | 35,589 | 3.8 | 4,584 | 6.56 | 558 | -1.76 |
| 2000 | 36,414 | 2.3 | 4,883 | 6.52 | 607 | 8.78 |
| TOTAL CHANGE 1970-2000 | +6,099 | +20.1 % | +1,384 | +39.6 % | +141 | +30.3 % |

Information from the City of Parma Strategic Master Plan (2002), the City of Seven Hills Master Plan (2002), and . A Master Plan for the City of Independence was not available.

3.8.4.3 Animal Feeding Operations

Due to the high degree of urbanization within the West Creek watershed, the existence of animal feeding operations and their associated impacts are not a concern.

3.8.4.4 Highly Erodible Land

A formal study of land erodibility within the West Creek watershed has not been conducted. According to the Soil Survey of Cuyahoga County, Ohio (1980), the majority of watershed soils are encompassed by the following descriptions: Hornell-Urban land complex (rolling), Mahoning-Urban land complex (undulating), Mitiwanga-Urban land complex (undulating), Mitiwanga silt loam, Brecksville silt loam, Udorthents, and Loudonville silt loam. Areas

with significant erosion have been identified within the watershed and are included on Figure 27 on page 81. Most notable are a section of Lower West Creek near the Schaaf Road Industrial and Office Park area (will be addressed as a part of the WRRSP stream restoration project), an area within the West Creek Reservation encompassing the Crile Landfill area, a tributary to West Creek in the city of Independence just south of I-480, and a section of the West Creek mainstem immediately north of Snow Road.

The soil survey describes the Hornell-Urban land complex soil as being poorly drained with relatively rapid runoff and as having the potential for erosion. It goes on to say that, “trails in recreation areas should be protected against erosion.” The Loudonville silt loam is listed as having the possibility for erosion if used for cropland. The Brecksville silt loam is described as being capable of “very rapid” runoff and erosion as being “a serious hazard if adequate vegetative cover is not maintained.”

Udorthents are described as soils in areas of cut and fill. Therefore, the degree that they are susceptible to erosion degrees greatly on the cut and fill materials, the slope of the property, and the degree of compaction.

Dark colored, fissile shale bedrock is visible within many West Creek cutbanks. Shale erosion during normal flow conditions of West Creek is minimal. However, high stormwater inputs into the creek, due to a relatively high degree of impermeable surfaces within the watershed, result in storm surges that are capable of significantly eroding the shale banks.

3.8.4.5 Culverted Areas of West Creek

A significant portion of the West Creek headwaters south of Pleasant Valley Road have been culverted (See Figure 26, page 79). The culverted headwaters section consists of three branches of the creek that converge to form the West Creek mainstem. These sections occur in the southernmost areas of Parma and Seven Hills, and slightly extend into the northernmost section of Broadview Heights. A small section of the West Creek mainstem located near Broadview Road in an area of commercial development is also culverted. The lineal footage of the culverted sections of the West Creek mainstem has not been calculated to date and needs to be as a part of a future project.

The only other culverted sections of the West Creek mainstem that exist from the convergence of the three headwater branches to the confluence of West Creek and the Cuyahoga River, are in areas where the waterway passes beneath roadways. These culverted roadways include East Sprague Road, Pleasant Valley Road, Coventry Road by the Normandy Walkway, Lancaster Road, and Interstate 480/77 interchange. Additional roadways cross over West Creek; however, the creek is spanned by a bridge in these sections. Furthermore, the culverted span of West Creek that flows under Lancaster Road is slated to be restored to a bridge over the creek.

Several unnamed tributaries to West Creek have been culverted in large sections or in their entirety. Culverts such as these degrade West Creek water quality and can significantly increase stormwater flow. The amount of West Creek tributary lineal footage that has been

culverted is not currently available. However, a future goal for the WCPC is to quantify the lineal feet of tributaries that have been culverted and to daylight (remove the culvert and restore the stream to a more natural state) the majority of those sections.



3.8.4.6 Channelized Sections of West Creek

As previously discussed in Section 3.4.1.1, *Resource: Davey Resource Group Biocriteria Study Area of Severe Streambank Erosion.* significant portions of West Creek have been channelized in the area of the Brooklyn Heights Business Park and Schaaf Road Landfill in the Village of Brooklyn Heights (Figure 27, page 81). This is the primary area of channelization within the West Creek watershed. The total length of stream that is channelized in this section is 11,006 linear feet of stream, or just over 2 miles of stream. The remainder of West Creek, approximately 7 miles of mainstem, has not been channelized or modified.

Approximately 1,500 feet of West Creek mainstem that has been channelized in the area of the Brooklyn Heights Business Park is scheduled to be restored to a more natural state through the reintroduction of meanders, step-pools, substrate features, and streambank stabilization. This work is being conducted by a partnership between WCPC and NEORSD with funding from the WRRSP.

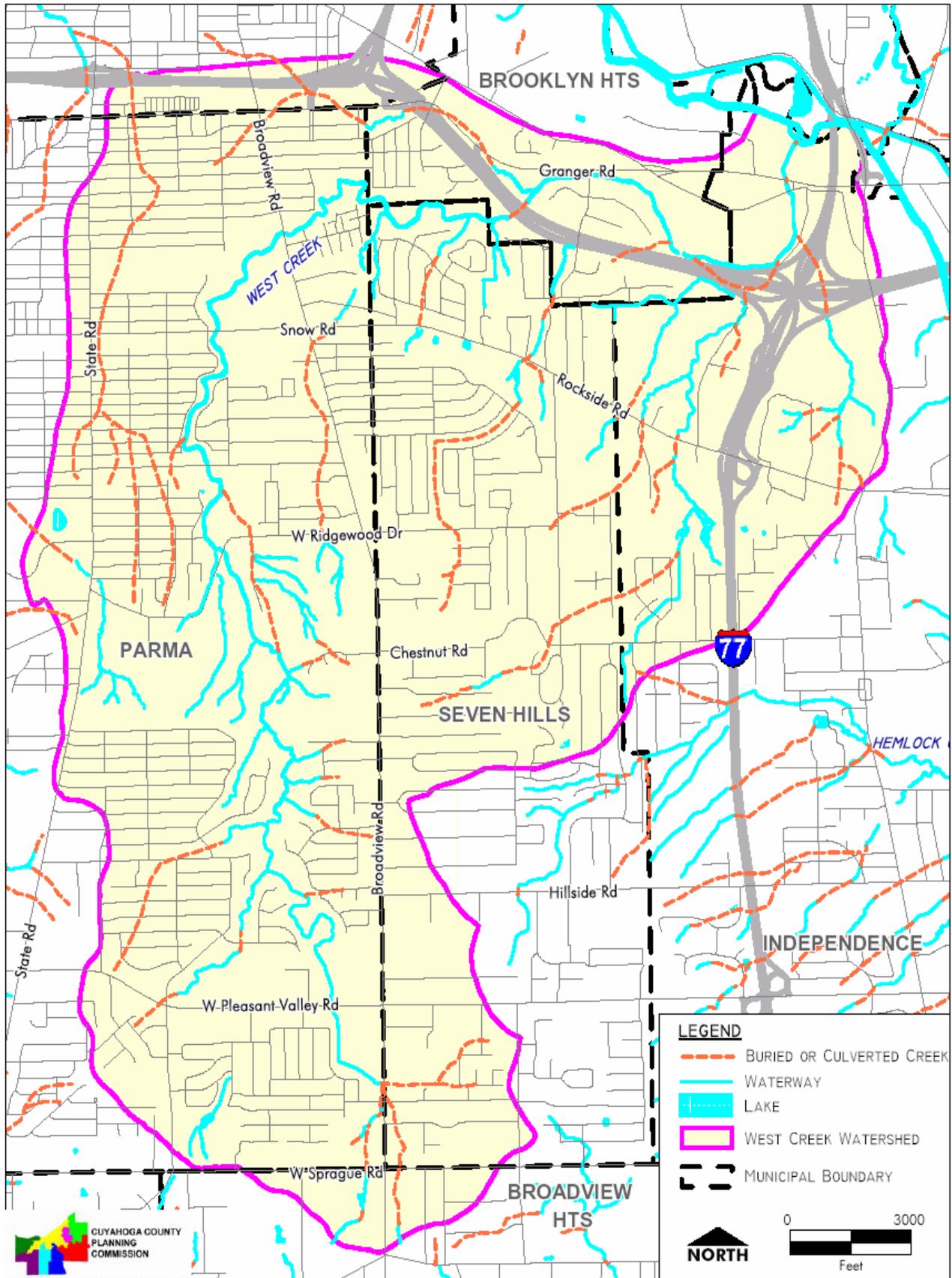
3.8.4.7 Levies Existing Along West Creek

There are no known levies in existence along West Creek.

3.8.4.8 Areas With Minimal Human Impact

Due to the high degree of urbanization within the West Creek watershed, there are no sections of the waterway completely devoid of human imprint. However, some sections do maintain only minimal aesthetic impact. Reach 2 (as discussed previously in Section 3.4.1.1 and that can be seen in Figure 14 on page 42), which flows almost entirely through the West Creek Reservation, is the most unaltered section of West Creek, and it displays a diversity of habitat that is disappearing throughout much of Cuyahoga County. Reach 3 between Ridgewood and Grantwood Roads (refer to Section 3.4.1.1 and Figure 15 on page 43) has a lesser degree of human impact as the natural character of the waterway is sheltered by steep topography. Also, much of Reach 6 between Broadview Road and Interstate 480 (refer to Section 3.4.1.1 and Figure 18 on page 48) retains its natural character as West Creek flows through the Brooklyn Heights Park.

Figure 26
Culverted Waterways in the West Creek Watershed



3.8.4.9 Impounded Segments of West Creek

No portions of West Creek are impounded; however, lowhead dam structures exist in two areas approximately 50 yards apart on West Creek's mainstem (Figure 27) altering the flow dynamic of the waterway and decreasing water quality. One of the dam structures has already been breached by West Creek and the other is slated to be removed in 2008 as a part of the WRRSP activities.



3.8.5 Stormwater Control

Stormwater can have a significant impact on the daily function and long-term sustainability of West Creek and its watershed. The urban nature of the watershed increases the impact of stormwater runoff altering normal hydrologic functions. Increased water volume entering the creek in a short amount of time can greatly increase streambank erosion and oversaturate floodplain areas. Furthermore, pollution runoff influences the water quality and ecological diversity of the creek. The varied pollution sources can include lawn fertilizer, pesticides, road salt, animal waste, yard waste, air pollution, automobile oil, and contaminants from failed sanitary sewers or septic systems.



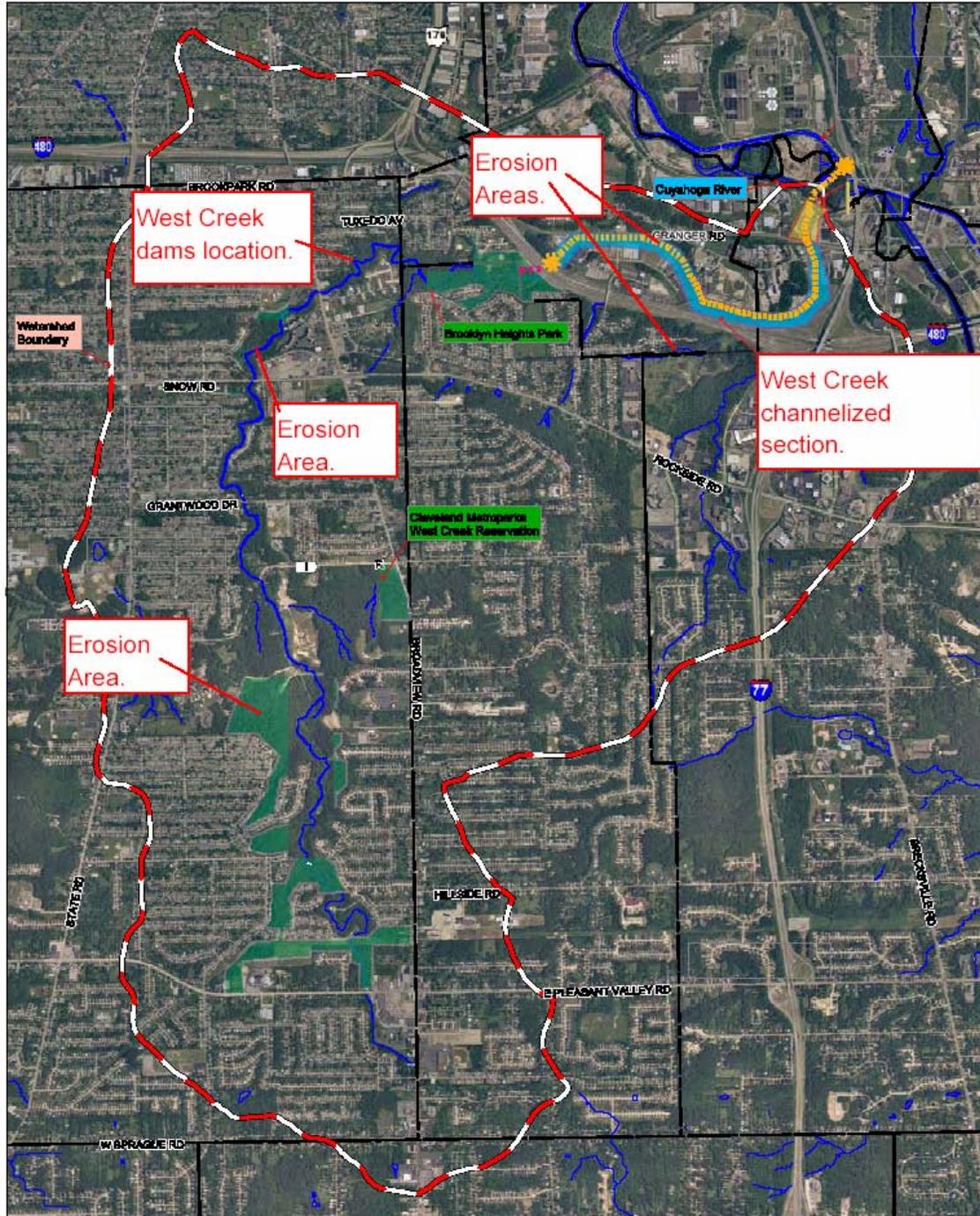
Source: Davey Resource Group Biocriteria Study
Channelized Section of West Creek

Urban structures that contribute to runoff issues include buildings, paved areas (i.e. roads, parking lots, and driveways), culverts, detention basins, and dam structures. A determination of the volume of runoff within the West Creek watershed based on land use can be a first step in the assessment of the impacts of current and future development on the watershed.

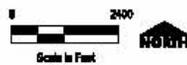
Impervious cover, which includes buildings, roads, sidewalks and parking lots, can also

Figure 27
High Erosion Areas

The West Creek Watershed



Sources:
Aerial: AirPhotoUSA, Copyright 2002
Watershed: Ohio Department of Natural Resources
Water Features: Cuyahoga County Engineer, 1993



 West Creek Greenway Trail - Completed

 West Creek Greenway Trail - Planned

greatly impact stream quality and the habitat systems that exist in them. Studies show that at about 10% impervious cover, sensitive stream elements are lost from the system. At around 25-30% impervious cover, most indicators of stream quality consistently shift to a poor condition (e.g. diminished aquatic diversity, water quality and habitat scores). Thus, urbanized and developing watersheds can influence the future function of the stream system. A model compiled by the Center for Watershed Protection was utilized for the West Creek Watershed to determine the impervious cover by general land use categories. This model calculated that 33.6% of total land cover within the West Creek watershed is impervious cover. This percentage is beyond the 30% threshold of influencing the stream quality and should be noted as future urbanization and development of the watershed affects West Creek.

Table 4 West Creek Watershed Impervious Cover By Land Use

| <i>West Creek Watershed, % Impervious Cover by Land Use</i> | | | |
|---|--------------------|--|-----------------------------------|
| Land Use | Total Acres | Impervious Cover % Value Factor | Impervious Cover Acres |
| Commercial | 823 | 85 | 700 |
| Industrial | 257 | 75 | 193 |
| Multi-Family Residential | 111 | 60 | 67 |
| Single-Family Residential (3-4 units/acre) | 4,666 | 30 | 1,400 |
| Public Facilities | 330 | 60 | 198 |
| Roads | 500 | 80 | 400 |
| Total West Creek Watershed Acres = 8,810 | | | |
| Total Acres of Estimated Impervious Cover: 2,958 | | | |
| Percent of Total land Cover as Impervious Surface: 33.6% | | | |
| <i>SOURCE: Center of Watershed Protection, Website, Table 5, Impervious Cover for Various Land Uses</i> | | | |

3.8.6 Planned Road Infrastructure Improvement Projects

ODOT was consulted to try and discern the upcoming road improvement projects that could impact water quality within the West Creek watershed. The list of upcoming projects provided by ODOT is as follows:

DISTRICT PAVEMENT PROGRAM

Fiscal Year (FY) 2008 - Reconstruct portions of the approach pavement to the IR-480 and CSX RR bridges on Pearl Road (US-42), State Road (SR-94), and Broadview Rd (SR-176J). Work includes pavement replacement, retaining wall repair, sidewalk and barrier replacement, and fence replacement. The work is budgeted for \$4 Million (M).

FY 2010 - Repair and resurface Rockside Road to I-490 in the City of Independence, Cuya-

hoga Heights, Newburgh Heights, and Cleveland. The work is budgeted for \$9.9M.

FY 2011 - Preventive maintenance is budgeted for \$2M for roadways located within the West Creek watershed; however, specific project locations are not further available.

CITY PAVEMENT PROGRAM

FY 2008 - \$2.2 M is budgeted for minor rehabilitation of State Road in the City of Parma.

FY 2010 - Resurface Granger Road from the Village of Brooklyn Heights city limit to the Cuyahoga River in Brooklyn Heights and Independence; and Brecksville Rd from the CSX railroad bridge to I-77 in Valley View, Independence, and Cuyahoga Heights. Work includes all ramps in the I-480/I-77 Cloverleaf. The project is budgeted for \$1.6M.

DISTRICT BRIDGE PROGRAM

Ongoing - New wear surface and miscellaneous repairs to the Granger Road bridge over West Creek located just east of Schaaf Road in Independence. The project is budgeted for \$0.3M.

FY 2007 - Replace the deck of the IR-77 bridge over I-480 in the City of Independence. The project is budgeted for \$6.4M.

MAJOR REHAB FUNDING

Ongoing - Major rehabilitation from Tuxedo Avenue to the Valley View bridge. Project budgeted at \$30M.

FY 2008 - I-77 major pavement rehabilitation from south of Oakes Road to IR-480. Includes add-lane and bridge decks. The project is budgeted for \$86M.

FY 2011 - Replace the bridge deck of I-77 over the Cuyahoga River, budgeted at \$34M.

CHAPTER 4 WATERSHED IMPAIRMENTS AND RESTORATION GOALS

4.1 Pollutant Loading

The TMDL report for the Lower Cuyahoga River (2003), which includes West Creek, assists in determining the impacts of pollutants on West Creek. The Ohio EPA conducted water quality testing at three locations along West Creek: at Schaaf Road (or Granger Road near the confluence with the Cuyahoga River), Broadview Road, and Ridgewood Road. Each location was tested once during the months of July, August, and September of the year 2000. Additional West Creek water quality testing by NEORSD, the Cuyahoga County Board of Health, and Davey Resource Group at the request of the WCPC helps quantify the chemical, biological, and habitat impairments faced by West Creek.

Biocriteria

As discussed in the Ohio EPA TMDL report (2003), biocriteria are the final arbiter of attainment of a use designation. The IBI is used to quantify fish abundance, richness, and health in waterways, and generally requires a score of between 38 to 40 in order to achieve attainment for this category. The Granger Road sampling location had a score of 38, classifying this section of West Creek as meeting partial attainment. The Ridgewood and Broadview Road sampling locations each scored 32 on their IBI analyses, below the required attainment value.

The Davey Resource Group studied biocriteria in six different sections of West Creek (see Figure 28, page 85) as a part of the Biocriteria Study and Riparian Corridor Assessment Report (2001). According to this analysis, Reach 1 (near the confluence with the Cuyahoga River) scored the highest with an IBI of 38. Reach 6 had an IBI of 34, and the lowest IBI was recorded in Reach 4 with a score of 28 (Figure 28).

The ICI is used to gain insight into water quality conditions by studying the health of the macroinvertebrate community, which is generally very sensitive to pollution and other environmental stresses. The ICI requires a minimum score of 34 to be considered in attainment. All three of the Ohio EPA sampling locations in West Creek returned ICI results of fair (a score between 14 and 32), below the minimum score of 34 and therefore in non-attainment.

The Davey Resource Group conducted ICI analyses in three reaches of West Creek (Reach 2, Reach 4, and Reach 6). The results were ICI scores of 30 (fair), 22 (fair), and 30 (fair), respectively, and each were below the minimum attainment score of 34. Both the Ohio EPA and Davey Resource Group ICI studies indicate a stressed environment for macroinvertebrates.

Aquatic Habitat

The QHEI was developed by the Ohio EPA to quantifiably evaluate fish habitat in waterways. It evaluates habitats based on their ability to support healthy aquatic communities. The scores are compared to reference sites in similar ecoregions, however a minimum score of 60 is typically required for warm water habitat attainment. All three of the Ohio EPA sampling locations yielded QHEI scores of below 60; however, the Granger Road sampling location

Figure 28
Davey Resource Group Special Study Areas

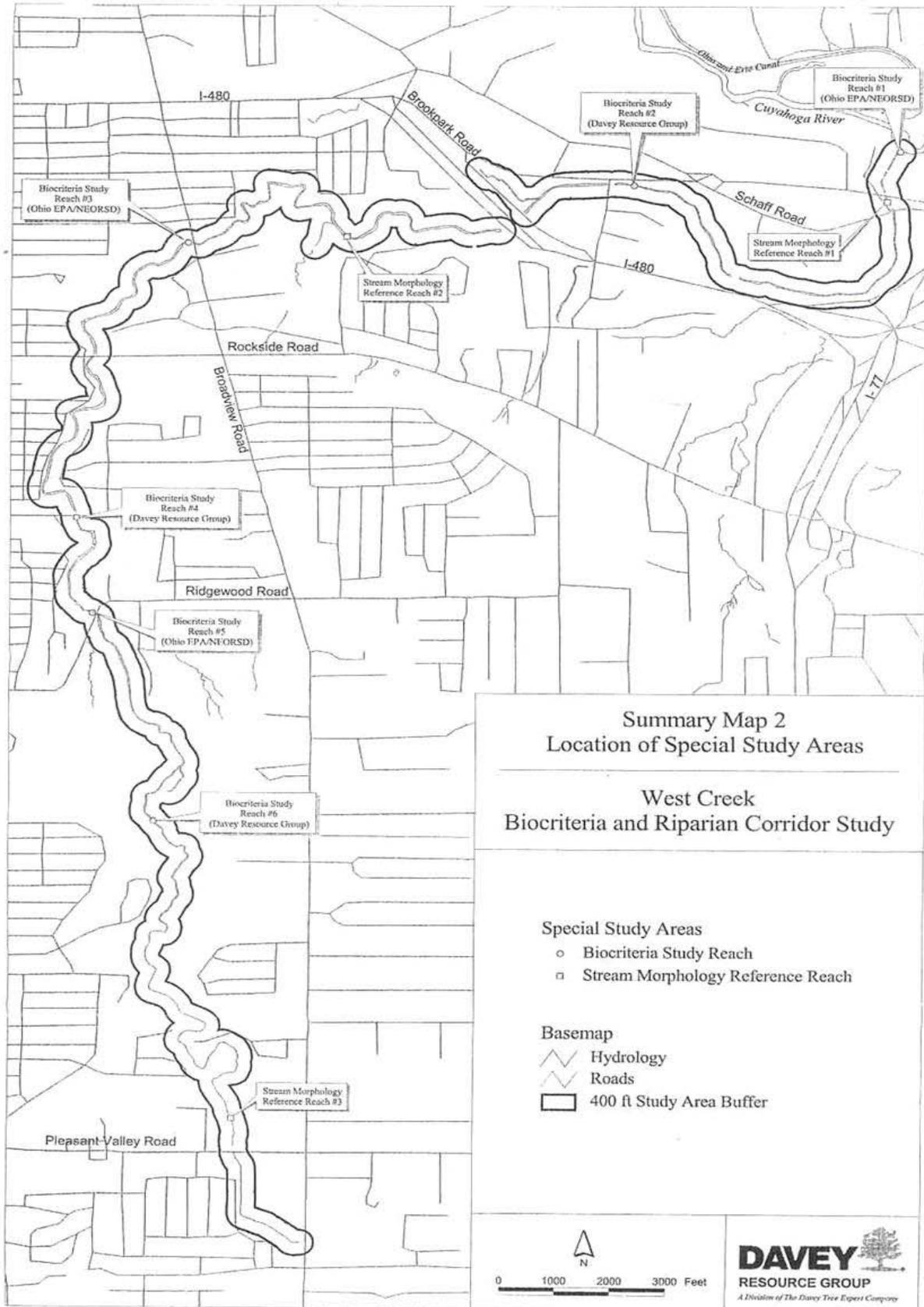
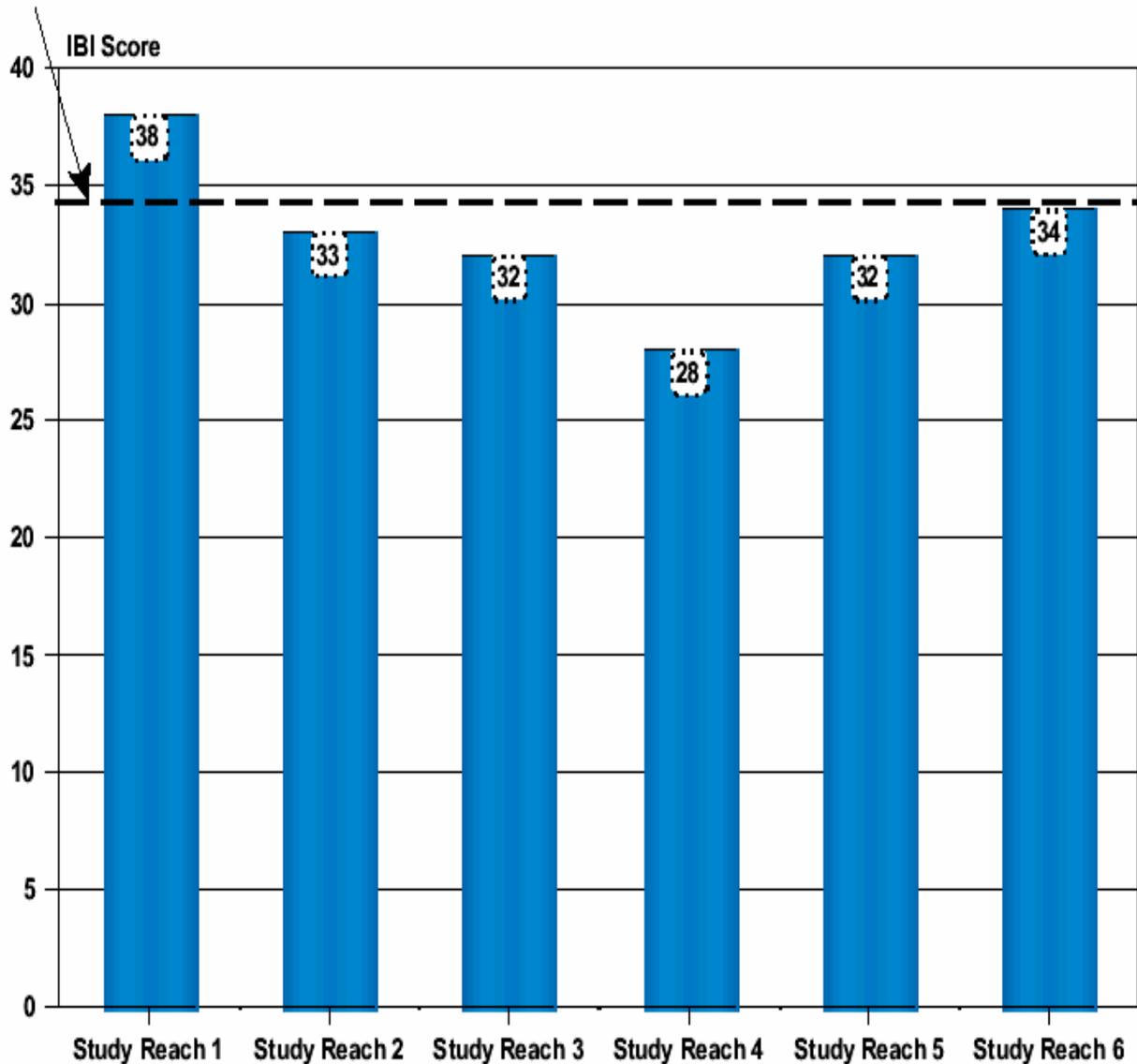


Figure 29
Index of Biotic Integrity

Fish Community Health: Index of Biotic Integrity (IBI)

Minimum Value for WWH
Conditions (QHEI Score 34)

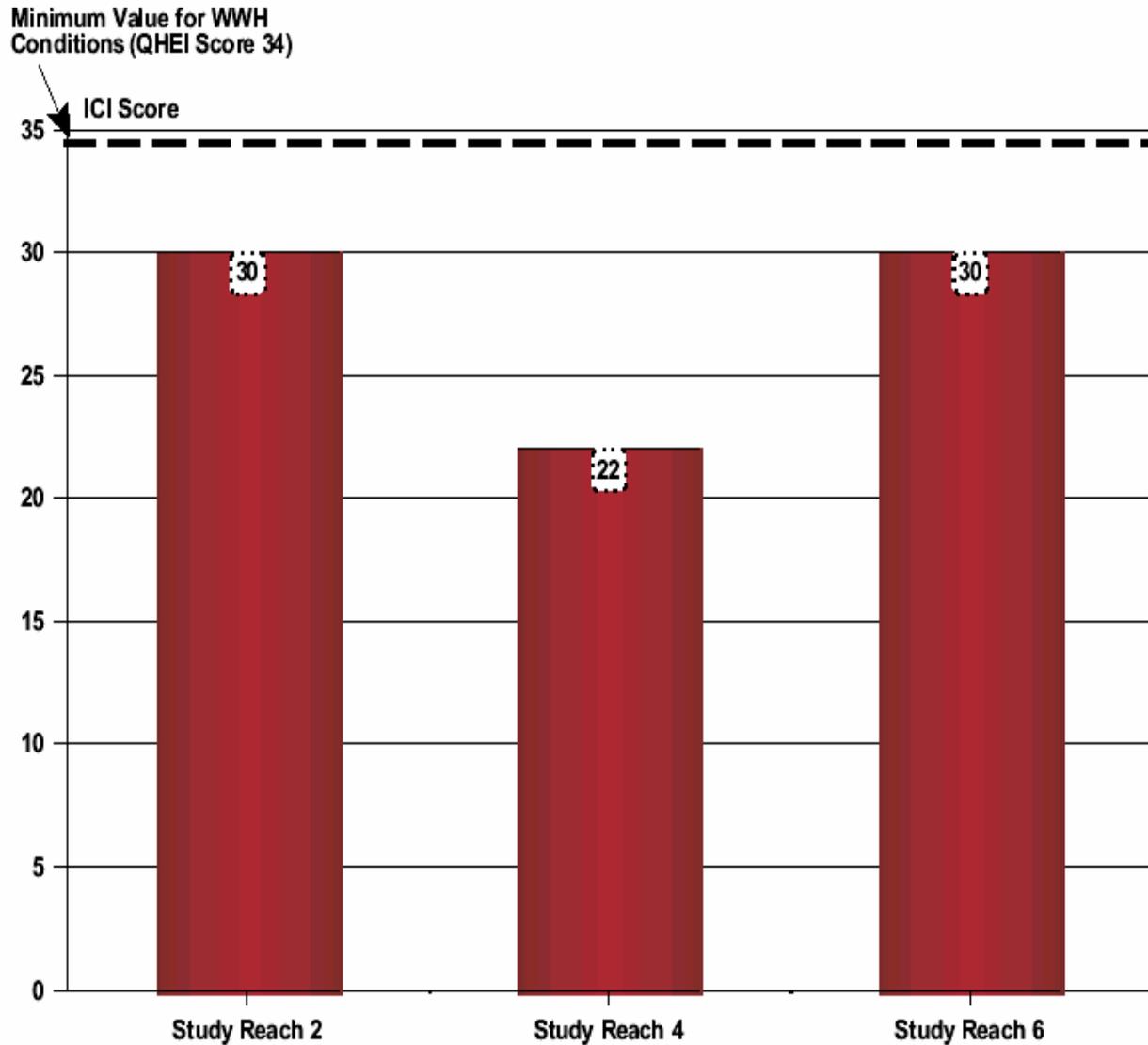


Study Reaches numbers do not reflect the same Reach Number in the Reach Assessment of this plan.

SOURCE: Biocriteria Study and Riparian Corridor August Assessment Report, Davey Resource Group, Draft, 2001

Figure 29
Macroinvertebrate Health Index

Macroinvertebrate Health: Invertebrate Community Index (ICI)



Study Reaches numbers do not reflect the same Reach Number in the Reach Assessment of this plan.

SOURCE: Biocriteria Study and Riparian Corridor August Assessment Report, Davey Resource Group, Draft, 2001

scored highest and close to the 60 minimum with a score of 58.5.

The Davey Resource Group conducted QHEI analyses in all six reaches (See Figure 31 on page 89) of West Creek. Reach 4 (score 60) and Reach 6 (score 76) each yielded the minimum attainment score of 60, and Reach 1 was just below the minimum with a score of 58.5. Reaches 2, 3, and 5 were all significantly below the minimum with scores of 49.5, 48.5, and 52, respectively. According to the Biocriteria Study and Riparian Corridor Assessment Report (2001), “the lower QHEI values at Study Reach 2 is directly attributable to massive alteration of the natural stream channel to accommodate adjacent land development.” Other low QHEI values were attributed to “a combination of impacts associated with urbanization, as well as naturally occurring characteristics such as a benthic substrate of exposed bedrock.”

Water Chemistry

The dissolved oxygen (D.O.) requirement for Warmwater Habitat waterways is a 5.0 milligram per liter (mg/l) average and a 4.0 mg/l minimum. The D.O. analyses at the Broadview and Ridgewood Road sampling locations exceeded the D.O. Warmwater Habitat requirement. The D.O. three sampling event average at Broadview Road was 10.05 mg/l and at Ridgewood Road 9.47 mg/l. There was no D.O. data taken at the Schaaf Road sampling location.

Table 5 Water Quality Analytical Laboratory and Field Results
Source: Biocriteria Study and Riparian Corridor Assessment Report (2001)

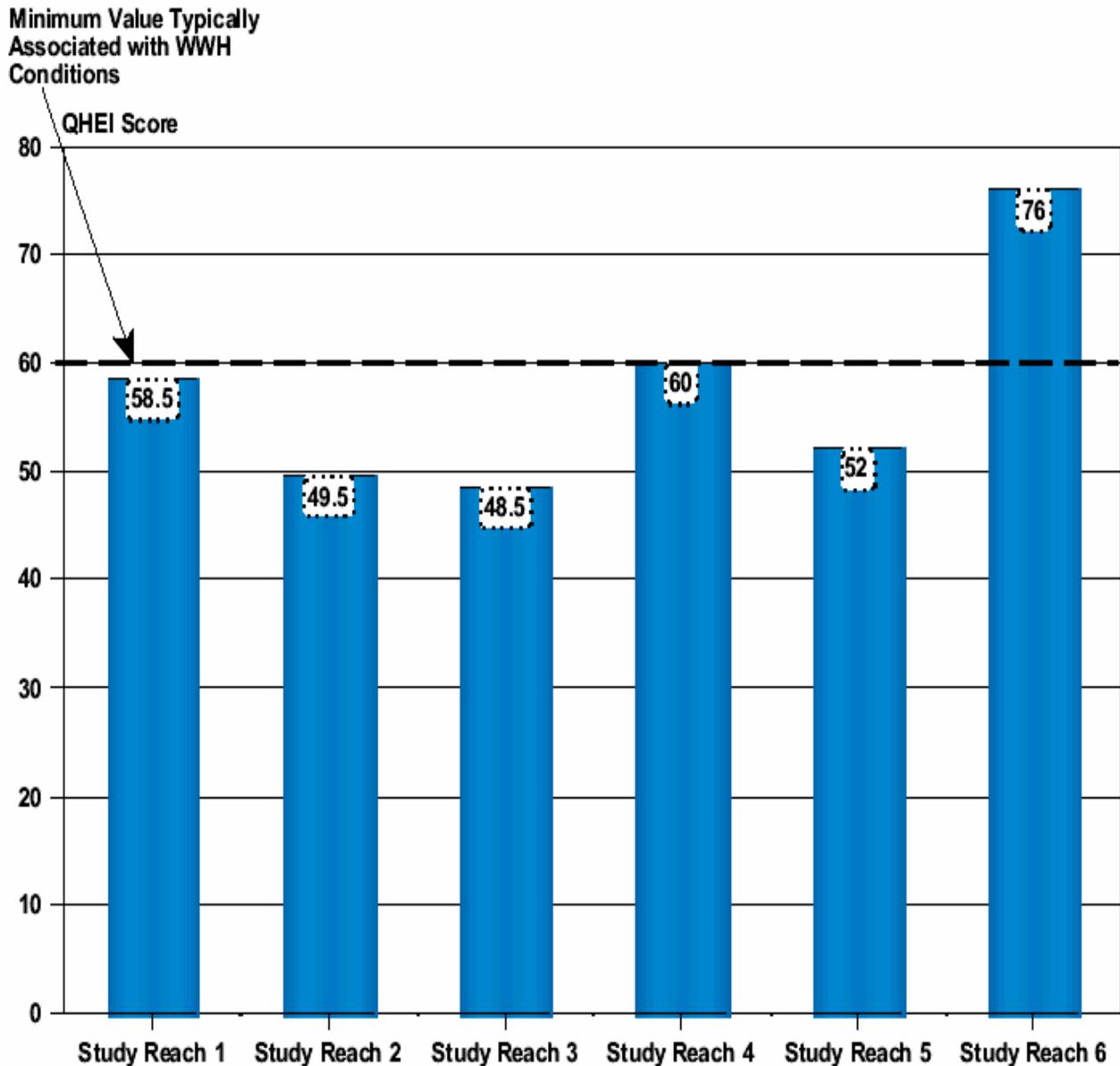
| Parameter | Unit | EPA Method | Study Reach 2 | Study Reach 4 | Study Reach 6 |
|-------------------------|-----------|------------|---------------|---------------|---------------|
| pH | s.u. | Field | 9.26 | 8.29 | 9.16 |
| Temperature | °C | Field | 18.3 | 20.2 | 25.8 |
| Total Dissolved Solids | mg/L | Field | 431 | 465 | 444 |
| Dissolved Oxygen | mg/L | Field | 8.8 | 9.0 | 7.6 |
| Conductivity | µS | Field | 887 | 936 | 906 |
| Total Alkalinity | mg/L | 310.1 | 120 | 110 | 100 |
| Chloride | mg/L | 300.0 | 120 | 130 | 150 |
| Total Phosphorus | mg/L | 365.2 | 0.13 | 0.048 | 0.089 |
| Ammonia | mg/L | 350.3 | 0.96 | 0.10 | not detected |
| Nitrite | mg/L | 354.1 | not detected | not detected | not detected |
| Nitrate | mg/L | 300.0 | 1.3 | 1.3 | 0.44 |
| Turbidity | ntu | 180.1 | 2.2 | 1.3 | 1.3 |
| Total Hardness | mg/L | 130.2 | 230 | 240 | 180 |
| Iron | µg/L | SW846 7380 | not detected | not detected | not detected |
| fecal coliform bacteria | cfu/100ml | SM 9222D | 4,400 | 38,000 | 26,000 |

Phosphorous

Target phosphorous levels for watersheds in the Erie-Ontario Lake Plain region of less than 20 square miles is 0.05 mg/l. Water quality analytical analysis conducted by the Davey Resource Group as a part of the Biocriteria Study and Riparian Corridor Assessment Report

Figure 31
QHEI Index

Habitat Quality Along West Creek



Study Reaches numbers do not reflect the same Reach Number in the Reach Assessment of this plan.

SOURCE: Biocriteria Study and Riparian Corridor August Assessment Report, Davey Resource Group, Draft, 2001

(2001) showed West Creek phosphorous levels exceeded the 0.05 mg/l target in two out of three sampling locations (See Figure 28 on page 85 for the Davey Resource Group sampling locations). As shown in Table 4, Reach 4 of the Davey study was within the target levels with a result of 0.048 mg/l. Reach 2 and Reach 6 were above the target level with results of 0.13 and 0.089 mg/l, respectively.

Total Dissolved Solids

Analyses for total dissolved solids (TDS) as a part of the Biocriteria Study and Riparian Corridor Assessment Report (2001) yielded results well below the target concentration of 1,500 mg/l (see Table 4 on page 88).

Fecal Coliform Bacteria

The Biocriteria Study and Riparian Corridor Assessment Report (2001) identified “extraordinarily high levels of fecal coliform bacteria at the three sampling sites.” Waters designated as primary contact recreational use have a maximum allowable limit of 1,000 bacteria/100 ml. The Davey study yielded concentrations of 4,400 bacteria/100 ml in Reach 2, 38,000 bacteria/100 ml in Reach 4, and 26,000 bacteria/100 ml in Reach 6 (See Table 4). Therefore, all sampling locations significantly exceeded primary contact requirements.

Water quality sampling conducted by the Ohio EPA on August 3, 2000, also identified significant fecal coliform bacteria exceedances at their three sampling locations. The Schaaf Road sampling results were 6,900 bacteria/100 ml water, Broadview Road was 4,900 bacteria/100 ml water, and Ridgewood Road was 2,900 bacteria/100 ml water. Additional exceedances at the Schaaf Road sampling site during the August 3, 2000 sampling event included copper, lead, and zinc at 22 mg/l, 43 mg/l, and 179 mg/l respectively.

As a part of the Biocriteria Study and Riparian Corridor Assessment Report (2001) ten in-stream and riparian problem areas that directly impact water quality were identified and noted. They correspond to the locations shown on Figure 33 on page 92 and are as follows:

Problem Area 1 - A culvert in this area was observed to have significant flow during dry weather conditions. A sewage odor and algal blooms were noted just downstream from the culvert.

Problem Area 2 - A drainage way with high flow levels and a considerable sediment load was noted flowing from under this housing development road.

Problem Area 3 - The appearance of leaking septic.

Problem Area 4 - West of Broadview Road. It appears as if excess road salt or something similar was concentrated here and is flowing into West Creek.

Problem Area 5 - The appearance of leaking septic.

Problem Area 6 - The appearance of leaking septic.

Problem Area 7 - The appearance of leaking septic.

Problem Area 8 - A broken sewer line with leaking sewage identified. **This impact was immediately remedied.**

Problem Area 9 - A tributary flows through the Crile Landfill and erodes landfilled materials into the creek. **This impact has had Phase II testing completed and funding is being sought for remediation.**

Problem Area 10 - The appearance of leaking septic.

4.1.1 High Priority Riparian Areas

In our opinion, any riparian area not permanently protected through a conservation easement or fee title acquisition by a conservation organization is considered threatened. That would include approximately 5 miles of West Creek mainstem and approximately 9 miles of tributary. However, we have identified 5 primary areas (See Figure 32 Below) where we believe protection of the riparian area around water resources is important. These areas include:

Figure 32
High Priority Riparian Areas

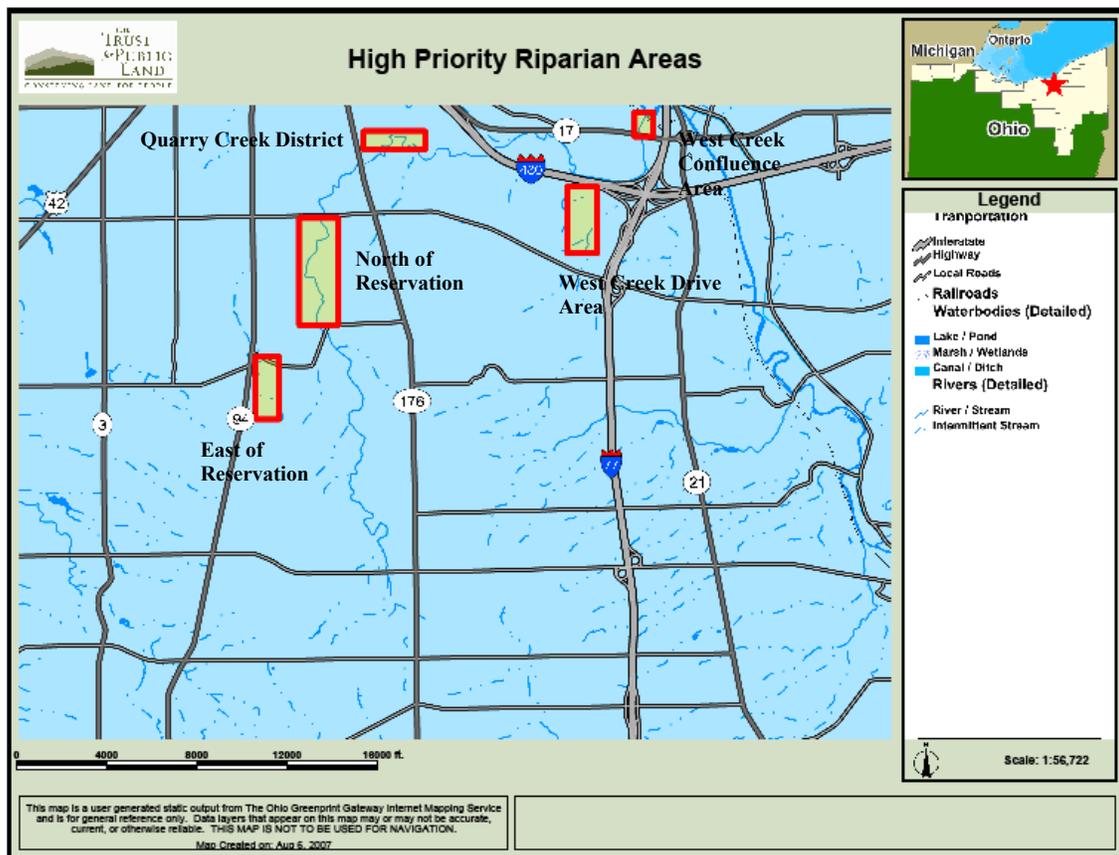


Figure 33
Instream and Riparian Problem Areas



1. East of Reservation Area: this area consists of multiple tributaries to West Creek that are under significant threat of development.
2. North of Reservation: This area is already largely developed around the stream's perimeter; however, the protection of the remaining riparian area is a priority.
3. Quarry Creek District: This area encompasses the West Creek mainstem between Broadview Road and Brooklyn Heights Park.
4. West Creek Drive Area: This area includes an important tributary to West Creek. It is in an area of expanding business development and protecting the water resources of this tributary as a part of the area's development is a priority.
5. West Creek Confluence Area: This area is further discussed in Section 5.2.8. It includes the confluence of West Creek and the Cuyahoga River and is an area prioritized for protection and restoration.

4.2 Habitat Conditions (Dams, Corridor, and Riparian Cover)

Physical impairments to West Creek stream mainstem and tributary flow dynamics, and wetland and riparian development have a profound impact on West Creek water quality as evidenced by the biocriteria studies mentioned previously. The remaining fish blocking structures act to impede fish migration, decrease dissolved oxygen levels, increase water temperature, decrease fish and macroinvertebrate habitat, and increase sediment deposition in the dam pool.



Source: Davey Resource Group Biocriteria Study (2001)
Concrete flume in the vicinity of the Brooklyn Heights Business Park

Past channelization and stream re-routing (also referred to as hydromodification) has also affected the hydraulic dynamic of the waterway. In fact, channelization is considered by many to be one of the leading causes of water pollution in the State of Ohio. Channelization decreases the amount and quality of streamside vegetation, decreasing both important riparian habitat and its pollutant filtration buffer benefits. Channelization also results in siltation due to increased streambank erosion and higher amounts of sediment deposition as the channelized waterway attempts to re-introduce meanders and a more natural flow regime.

4.3 Cuyahoga Remedial Action Plan Areas of Concern

The West Creek watershed is a part of the Cuyahoga River Remedial Action Plan Areas Of Concern, as designated by the Great Lakes Water Quality Agreement of 1978. The following is a list of beneficial use impairments identified specifically for the Cuyahoga River Area of Concern with a brief description of how they apply to the West Creek watershed.

- Degraded Fish Populations: Fish populations within West Creek and its primary tributaries are indicative of stressed fish communities according to IBI scores. According to the Biocriteria Study and Riparian Corridor Assessment Report (Davey Resource Group, 2001), "overall species diversity is low, there is a high percentage of pollution tolerant and omnivorous species, and the number and percentage of simple lithophiles (scatter their eggs in gravel and clean substrates and provide no parental care) is low." However, reports of a caught steelhead trout and other steelhead trout sighting near the confluence of West Creek and the Cuyahoga River are encouraging. The removal of fish migration barriers, increases in chemical water quality, and the restoration of the creek in areas of previous hydromodification should aid in fish population improvement.
- Degraded Benthos Populations: Macroinvertebrate populations within West Creek and its primary tributaries are also indicative of stressed communities according to the ICI scores. However, as the Biocriteria Study and Riparian Corridor Assessment Report (2001) states, "the macroinvertebrate communities of West Creek presently fare better than many urban streams and these data suggest that efforts to improve the water quality of West Creek may result in the return of warmwater communities." Also necessary will be reduction in rates of siltation that decrease bedrock and gravel substrate habitat.
- Fish Tumors and Other Deformities: Data on tumors and deformities in West Creek fish populations is not currently available; however, informal surveys conducted as part of educational programs with area schools have shown red spots and various other lesions on fish trapped as a part of those activities.
- Degraded Phytoplankton and Zooplankton Populations: Data does not currently exist regarding plankton populations.
- Loss of Fish Habitat: Fish habitat within West Creek appears to be improving overall; however, West Creek is still in non-attainment in regard to habitat according to QHEI scores. Improvements to habitat include several thousand linear feet of streambank that has been protected by the WCPC, the City of Parma, and the Village of Brooklyn Heights. Also, a stream restoration project partnership between the WCPC and NEORSD is occurring, which will significantly improve fish habitat and remove two fish migration barriers along West Creek.
- Elevated Bacteria Levels: As discussed in Section 4.1, extremely high fecal coliform bacteria levels were detected during Ohio EPA and Davey Resource Group sampling. These concentrations are most likely a result of faulty septic systems within the watershed and also from stormwater runoff. Besides taking steps to alleviate the influence from septic systems and stormwater runoff, it is recommended that bacteria sampling within West Creek and its watersheds be expanded to include various times of the year and stream flow levels.
- Public Access and Recreation Impairments: Use of West Creek for public recreation will

always be limited due to the relatively minor flow volume of the waterway; however, as water quality improves there will be increased opportunities for using the creek as an educational environment, wading, and possibly fishing in certain areas.

- Degradation of Aesthetics: Woody debris and litter are the primary contributors to impaired aesthetics of West Creek. The WCPC and partner cities within the watershed hold two to three litter removal days per year within West Creek. However, due to the urban nature of the watershed significant amounts of litter continue to get washed or deposited into the waterway. Tires, plastic, shopping carts, and Styrofoam make up a majority of litter removed from the creek. The closed Crile Landfill (located within the West Creek Preserve) is also a source of glass litter that washes down West Creek during storm events.
- Eutrophication/Undesirable Algae: Data does not currently exist regarding algae quantities within West Creek. However, based on visual assessments algae does not appear to be a significant problem.
- Restrictions on Dredging Activities: Data does not currently exist regarding dredging activities within the West Creek watershed.
- Added Costs to Agriculture or Industry: There are no known costs to treat creek water for industrial use.
- Lack of Public Awareness of Watershed Issues: Since the inception of the WCPC and the creation of the West Creek Preserve, public awareness of issues within the West Creek watershed has increased significantly (i.e. over 100 individuals participated in RiverSweep 2005); however, outreach opportunities must continue throughout the watershed.



Source: Davey Resource Group Biocriteria Study (2001)
Heavily impacted section of West Creek near the headwaters

4.4 Problem Statement

West Creek, as a waterway that flows through a highly urbanized area of Southern Cuyahoga County, faces numerous obstacles in obtaining Warmwater Habitat Primary Contact recreational use designation. Biocriteria (IBI and ICI) and habitat quality (QHEI) scores are below attainment status primarily due to mainstem channel modifications, fish blocking structures that change the waterway's flow regime, floodplain and wetland loss from overdevelopment, siltation from stormwater influxes and poor construction stormwater management practices, and a loss of riparian habitat. The continued existence of several hundred septic systems within the watershed and the high degree of surface stormwater flow into the creek contribute to water quality exceedances for parameters such as fecal coliform bacteria and phosphorous, and to a lesser and more localized degree copper, lead, and zinc. Furthermore, the existence of at least four known landfills (three of which are closed) have resulted in alterations to the creek and reductions in water quality and biological habitat.

Implementation of Coastal Non-Point Pollution Control Measures West Creek Watershed

Introduction

Ohio Coastal Nonpoint Pollution Control Program Implementation

As part of meeting the state and federal requirements as established by the Coastal Zone Management Act (1972) and its Reauthorization Amendment (1990), this section outlines how West Creek efforts will address and implement the applicable management measures to meet the conditions of the Ohio Coastal Non-point Pollution Control Program. The West Creek Watershed Plan recommendations are aimed to meet the management measures set forth in the Coastal Non point Pollution Control Program.

Applicability of Management Measures

A review of the applicability of management measures as a result of the West Creek watershed's land uses has been evaluated to determine what areas of Coastal Non-Point Pollution Control are necessary within the Watershed as follows. This section outlines programs in place to address the applicable management measures or recommendations for programs as part of the West Creek Watershed Action Plan implementation program.

CHAPTER 5 COASTAL NONPOINT POLLUTION CONTROL

The West Creek watershed exists within the Lake Erie Basin. Therefore, actions that occur that impact water quality within West Creek also ultimately affect water quality with Lake Erie. As one of Northern Ohio's most important natural resources, the health of Lake Erie is crucial to the economic health and vitality of Northern Ohio. The purpose of this section is to create a strategy for actions that will protect and improve West Creek and Lake Erie water quality and aquatic health, both currently and into the future.

Agriculture

Northeast Ohio, including the West Creek watershed, has historically supported a thriving greenhouse, nursery, and agricultural industry. Over the past 100 years such activity has decreased incrementally. The West Creek watershed contains no area greater than 10 acres that sustains irrigation for agriculture, grazing, waste facilities for livestock, or the application of fertilizer, pesticide, or herbicide for agriculture. The Rosby Greenhouse complex, located just outside the watershed in Brooklyn Heights, was once an area that sustained certain activities for crop production, such as irrigation. The complex now has working operations on less than 7 acres of its original production area, still outside the boundaries of the West Creek watershed.

As such the West Creek watershed does not contain such areas applicable to this management measure and requests exemption thereof.

Urban

Municipalities within the West Creek watershed have been deemed exempt from the following management measures due to their status as Municipal Separate Storm Sewer System (MS4) Communities under the NPDES Phase II Program.

- New Development
- Existing Development
- Road, Highway, and Bridge Operation and Maintenance
- Road, Highway, and Bridge Runoff Systems

As exempt from the above management measures, the remainder of this section will address the following:

- 5.3.2** Watershed Protection
- 5.3.3** Site Development
- 5.6.1** New Household Treatment Systems
- 5.6.2** Operating Household Treatment Systems
- 5.8.1** Planning, Siting, Developing Road, Highways, and Bridges
- 5.8.2** Bridges (Local Only)
- 7.4.1/2** Operation and Maintenance Program for Existing Modified Channels –
Protect Surface Water and Restore In-Stream and Riparian Habitat
- 7.5.3** Dam Management – Protection of Surface Water Quality and In-Stream and
Riparian Habitat – Request for Exemption
- 7.6.1** Eroding Streambanks and Shorelines

5.3.2 Watershed Protection Management Measure

WCPC will utilize various proactive and retroactive measures (i.e. stream and wetland restoration) in order to:

Protect and Preserve vital areas in the watershed that provide for enhanced water quality, which includes areas susceptible to erosion and sediment loss, riparian area, wetlands, and other areas deemed necessary to improve the aquatic and biological integrity of the watershed; please see Preservation priority list in Appendix I and

Restore and enhance areas in the watershed that provide for enhanced water quality, which includes areas susceptible to erosion and sediment loss, riparian area, wetlands, and other areas deemed necessary to improve the aquatic and biological integrity of the watershed; and

Engagement in sustainable site development/redevelopment that limits or abates possible adverse effects on streams, tributaries and drainage in the watershed, which also includes roads, highways and bridges.

Through a diversity of partnerships, the WCPC has and will continue to preserve, protect, and enhance areas in the West Creek watershed that lessen the severity of nonpoint pollution. Although much of the watershed is presently developed, additional infill developments are expected to continue in small residential and commercial areas. Impervious surfaces are abundant in this urban watershed, and appropriately addressing nonpoint runoff from these surfaces while also keeping existing greenspace and creating natural buffers between water features is an important step in protecting water quality.

Priority preservation initiatives are listed in Appendix I. WCPC has earmarked these parcels for acquisition, or some other form of protection as described below. Each parcel will be acquired as funding and/or the opportunity permits. WCPC will be the lead preservation entity, although we may partner with the watershed communities, or other organizations such of the Northeast Ohio Regional Sewer District or Cleveland Metroparks. Certain initiatives will take a collaborative effort to meet a communal goal. Priority initiatives as delineated in Appendix I total 1.12% of the total watershed area.

Conservation Easements & Deed Restricted Land

WCPC has filled an important role within the watershed by conserving and protecting important natural areas and water features. To date, approximately 500 acres have been permanently protected, including approximately 15,000 feet of stream, and dozens of acres of wetlands. WCPC prioritizes parcels for acquisition that are believed to be important to certain water quality protection measures such as greenway continuity, stormwater management, riparian buffer, restoration potential, and recreational trail alignment. Refer to www.westcreek.org/location

WCPC protects conservation lands either singularly or in partnership with other governmental or non-profit entities. WCPC protects land through a variety of measures including fee title purchases, conservation easement acquisition, and through the lobbying for the creation and enforcement of waterbody setback regulations.

The protection of natural or restorable lands along the West Creek Valley and throughout the watershed will continue to be a central goal for WCPC. Each property obtained by WCPC has a baseline survey performed to evaluate its conservation values. Each year following protection, the properties are monitored to ensure the protection of those conservation values. Furthermore, following protection, properties are evaluated to determine restoration and enhancement potential. Please Refer to Appendix I for the preservation priority list.

Stream, Riparian Area, and Wetland Restoration

Due to significant development within the watershed, West Creek in many areas has become incised, channelized, and modified other ways throughout the watershed. The future restoration of these areas is important in order to increase the aquatic health, natural flow regime, and stormwater flow reduction and pollutant filtration potential of the stream.

Two of the most successful restoration project performed by WCPC included the West Creek Urban Wetlands and the West Creek Washout Projects, both of which are located within the West Creek Reservation. The re-creation of wetlands in Northeast Ohio, especially in the Cuyahoga River and West Creek watersheds is integral to retaining stormwater, and reducing sediment and nonpoint runoff into West Creek and ultimately Lake Erie. The final reports for the West Creek Urban Wetlands and West Creek Washout Project projects can be found at www.westcreek.org for further reference.

Preserved lands are individually evaluated for restoration potential. Having property control enables WCPC and its partners to fulfill restoration initiatives where funding is available.

Additionally in 2005, NEORSD and WCPC were awarded a WRRSP award to commence one of the largest stream restoration projects in the Cuyahoga River watershed. Multiple sites, mostly in the lower reaches of West Creek, were identified for restoration, which will include channel enhancement, sediment loss and erosion control, fish migration barrier removal, and invasive species control. Each site will use natural stream channel design, natural in-channel enhancements (where applicable), and native plantings. Pre, during, and post construction monitoring will be performed on each site and management plans for invasive species control, and post-restoration maintenance will also be created specifically for each site.

Supplementing the WRRSP stream restoration project, WCPC has been able to obtain additional restoration funding for several of those sites. One included an award from the Great Lakes Commission (Great Lakes Basin Program) for sediment and erosion control on a 1700 lineal feet section of West Creek. An award was made to WCPC from the National Fish and Wildlife Foundation to supplement stream habitat restoration measures on an 800 lineal foot section of West Creek. Lastly, an Ohio EPA Section 319 Grant award was obtained by WCPC to supplement two additional WRRSP sites close to the confluence with the Cuyahoga River. Please refer to www.westcreek.org/WRRSP and www.westcreek.org/319 for more information.

Furthermore, in the Spring of 2009, an additional stream and floodplain restoration project will take place within the West Creek Reservation. This project includes the re-meandering of a channelized tributary stream, and enhancement of the riparian area and floodplain including the restoration of floodplain wetlands. Restoration measures to be implemented over the next three year period totals approximately 11% of the total stream.

WCPC and its partners will continue to preserve, protect and restore waterways within the watershed as opportunities arise and as funding becomes available.

Riparian & Wetland Setbacks & Stormwater Management Plans

The Cities of Parma, Seven Hills, Independence, and Brooklyn Heights have each implemented Riparian Setback ordinances for new construction projects. The official language can be found in Appendix G. In short, the City requirements are as follows:

Parma

All development is to be a minimum of 75 feet from the edge of those waterways draining an area greater than one half square mile and 25 feet from the edge of waterways draining less than one half square mile. Parma also requires a 120-foot setback from Category 3 wetlands and a 75-foot setback from Category 2 wetlands.

Seven Hills

Requires a 75 foot setback from each side of the West Creek main stem and 50 feet beyond the outer boundary of any wetland identified within that setback.

Independence

Requires a minimum setback of between 25 feet and 300 feet depending on the size of the waterbody's watershed. Wetlands setback of 75 feet for Category 2 wetland and 120 feet for a category 3 wetland.

Brooklyn Heights

Requires a 75-foot setback for all development occurring along the main stem of West Creek and its tributaries and a 300 foot setback from the Cuyahoga River.

The watershed communities will continue to implement and enforce riparian setback ordinances for new construction projects. In most cases the cities, upon request of a building permit or other form of development, will initialize contact with WCPC to study any potential impacts to West Creek, its tributaries, wetlands, and associated riparian areas. WCPC is indirectly viewed as a resource for mitigating impacts either on or off site in certain circumstances.

5.3.3 Site Development Management Measure

The West Creek watershed is a highly developed watershed. The most northern section of the watershed, constituting approximately one third of West Creek, in the proximity of West Creek confluence with the Cuyahoga River and also Interstates I-480 & I-77, has significant commercial

and light industrial development. Dense single-family residential neighborhoods dominate the remainder of the watershed, with commercial districts interspersed throughout. See Figure 12 on page 39 for zoning and land use patterns within the watershed.

New large-scale development of wide-open greenspaces is not expected to occur within the watershed into the future because few wide open greenspaces still exist. Rather, infill development of relatively small parcels, which can often contact water features or woodland habitat, is expected to be the norm. Also, the redevelopment of existing areas will become more frequent as existing infrastructure ages and new opportunities are created.

The watershed communities enforce riparian and wetland setback ordinances, with recommendations from CSWCD, who review each plan on a case by case basis to ensure that impacts are either minimal or avoided from development-related erosion and sedimentation. Within the watershed, any project that disturbs more than one acre of area must submit a plan to CSWCD for review and monitoring throughout the construction period.

For less than an acre, each city has an internal review. At their discretion, certain types of building or development project may have to also perform Storm Water Pollution Prevention Plans (SWP3), which are in turn reviewed by CSWCD. Less invasive projects (for instance a backyard deck/patio), may simply be internally reviewed and permitted, and any perceived impact can either be mitigated on site (most commonly with plantings or other buffer to water ways) or off-site, in the form of preservation.

WCPC is indirectly viewed as a resource for the development and implementation of Best Management Practices (BMPs). When certain circumstance arise where an impact Stormwater management plans, as discussed above, are also being implemented by all of the watershed communities.

Management Measure Goals:

(Implementation of municipal riparian ordinance and erosion control plans, which are reviewed and approved by Cuyahoga SWCD, enable the following management measures to be executed).

- Protect specific areas that provide important water benefits and/or protect those that are or may be susceptible to erosion or sediment loss;
- Except where deemed necessary, limit the increase of impervious surface area
- Avoid sediment loss and erosion by limiting cutting or clearing activities
- Avoid or limit disturbance to native vegetation and natural drainage areas

Lead agency will be Cuyahoga Soil and Water Conservation District and the Municipalities within the watershed. WCPC will facilitate efforts where and when possible; in an effort to offset potential impacts or otherwise mitigated them offsite. Official ordinance language is found in Appendix G.

5.6.1. New On-Site Disposal Systems

The installation of new Household Treatment Systems will not occur in the West Creek watershed, as each MS4 community must follow the guidelines of the NPDES Phase II Program as directed by the Ohio EPA and will be required to connect to an existing sewer system.

5.6.2 Operating On-Site Disposal Systems

City of Parma

Parma currently has 480 operating systems in the watershed. The City expects to remove approximately 80% of them by December 2009.

City of Seven Hills

The City of Seven Hills, as mandated by the Ohio EPA is developing and implementing numerous projects to eliminate the existence of Household Treatment Systems in the West Creek Watershed. The City has eliminated approximately 70% of the existing systems by January of 2007. Of the current 214 systems, 143 of them are now connected to the sewer system.

City of Independence

The City of Independence has no operating household treatment systems in the watershed, nor is there any expected development of new systems.

Village of Brooklyn Heights

The Village of Brooklyn Heights has no operating household treatment systems in the watershed, nor is there any expected development of new systems.

In 2001, the Cuyahoga County Board of Health reported that there were 837 operating home septic systems. Current municipal records indicate that there are less than 700 operating systems. Nevertheless, these systems, which include septic tanks, aeration systems, leaching fields, filter beds, and evapo-transpiration systems, were installed many years prior to the municipal infrastructure that exists today. The most common systems in the watershed are filtration beds and aeration systems. Most of these systems are well over 30 years old and have operationally malfunctioned due to deteriorating systems. Additionally, the systems installed 30 year ago do not meet today's requirements or standards of use.

No new onsite disposal systems will be constructed within the West Creek watershed. By 2009, there will be less than 170 operating Household Treatment Systems within the watershed, which correlates to approximately one system per 53 acres. Furthermore, both Parma and Seven Hills plan to completely eliminate all operating on-site systems within the watershed. Request from exemption from this management measure should be made in early 2009, due to there being less than 1 OSDS per 20 acres.

Until such time as all onsite disposal systems are eliminated from the watershed, they are will continue to be monitored by the CCBH to protect ground and surface water quality from illicit discharges due to failing or malfunctioning systems. Methods that are employed to reduce the impact of currently operating household treatment systems include scheduled pumping of septic tanks and monitoring to ensure that illegal discharged directly to waterbodies by onsite systems is

not occurring. Inspections are made on a five-year rotating basis. CCBH also enforces remediation issues when systems are reported to have failed or are in danger of failing. An inspection and permit is also required for abandonment of such systems.

The State Sewage Treatment Systems Rule implemented in 2006 further describes how cities, municipalities, and Boards of Health will administer on site systems within the watershed.

5.8.1 Planning, Siting, and Developing Roads, Highways and Bridges

Please refer to Section 3.8.6 of this plan beginning on page 82 for a comprehensive list of ODOT Projects in the West Creek watershed. ODOT and cooperating agencies follow guidelines set forth in the ODOT Stormwater Management Plan. Refer to <http://www.dot.state.oh.us/stormwater> for more information on ODOT's plan. Since the watershed is already highly developed, new road and bridge construction would likely be in conjunction with small residential or commercial developments, or as currently existing roads and bridges are repaired and replaced. Examples include the widening of Rockside Road in the City of Independence and significant repairs to the I-480/I-77 Cloverleaf, both occurring in 2006.

Stormwater Management Plans, through ODOT, CSWCD, and the watershed communities, have been implemented to cooperatively and safely guide the development of any new roads or bridges to prevent significant erosion pollution. BMPs typically implemented include the incorporation of silt fencing or other sediment blocking mechanism, the quick seeding of disturbed areas, and frequent washing of the underside of construction vehicles to limit the transport of sediment offsite. Special attention should be paid to those areas prone to erosion and susceptible to sediment loss. CSWCD reviews site plans according to http://www.epa.state.oh.us/dsw/storm/swp3_cgp_checklist2.pdf.

Management of roads, highways and bridges will be an ongoing process in the watershed, since much of the infrastructure has aged significantly and sustains high traffic loads. The watershed, in its urban location, is surrounded by numerous transportation arteries, some of which are closely located near West Creek main stem or its tributaries. As replacement and repair projects are undertaken sound management measures by ODOT and the watershed communities will be implemented. The application of salt as a de-icing agent is critical to safety, however, it should not be over-applied.

Management Measure Goals

- Protect specific areas that provide important water benefits and/or protect those that are or may be susceptible to erosion or sediment loss;
- Except where deemed necessary, limit the increase of impervious surface area
- Avoid sediment loss and erosion by limiting cutting or clearing activities
- Avoid or limit disturbance to native vegetation and natural drainage areas

The NPDES Phase II program requires protection and erosion and sediment control on all road improvement projects at the state, federal, county and municipal level. The state DOT , Cuyahoga County Engineer and each West Creek municipality have an established storm water pollution prevention plan strategy to address this management measure.

Under NPDES Phase II, all roads planned and constructed are required to follow the sponsoring agency's established storm water management plan. On sites less than one acre, local municipalities will use their existing local ordinances for storm water management to examine appropriate erosion and sediment control is in place for new roads. Refer to Appendix G.

WCPC is rarely sought as a resource or partner when building roads, bridges, highways in the watershed, except for unique circumstances where impacts need to be mitigated either on-site (riparian buffer easements, planting, swales, etc), or off-site (preservation most common off-site mitigation). WCPC will provide a capital improvements update each year to introduce areas that best practices can be integrated into the planning and development process. Phase II compliance of sites greater than an acre will also play a role in implementing non-point source pollution control measures.

5.8.2 Bridges (Local Only)

As stated in Section 3.8.6 of this plan, ODOT has not scheduled any bridge construction or replacement projects in the West Creek watershed in the next five years. Recently in 2006/2007, there have been minor repairs to the Granger Road bridge, just east of Schaaf Road that crosses West Creek in Independence, and the Lancaster bridge in Brooklyn Heights was replaced.

All bridge projects under guidance by ODOT and/or the watershed communities will implement sound stormwater management initiatives that limit runoff, sediment loss, and disruption to any watercourse. There are multiple bridges that intersect with West Creek and due diligence at these project sites will ensure that the integrity and health of the stream be protected. Bridge projects are conducted in such a way as to limit the impact on water quality and are conducted in compliance with the State DOT Stormwater Management Plan (<http://www.dot.state.oh.us/stormwater>).

Management Measure Goals

- Protect ecosystems from detrimental effects that are valuable and sensitive to water quality health and improvement, through the site design, implementation and maintenance of bridges, culverts, or other such structures.

The State DOT, the Cuyahoga County Engineer and the local municipalities within the West Creek watershed have storm water pollution prevention plans that outline procedures and practices that are to be conducted during design and maintenance activities on bridge structures to protect water quality resources.

The Cuyahoga Soil & Water Conservation District through the West Creek Watershed Coordinator will continue to work with ODOT, Cuyahoga County Engineer and their established Storm Water Management Pollution Prevention Plans for implementation of best management practices for new and existing bridges. The local municipalities also have storm water pollution prevention plans in place as well as storm water management ordinances to address erosion and sediment control for bridge projects in the West Creek watershed.

The state DOT follows the NEPA process in evaluating bridge development areas in relation to impacts on streams and contribution to water quality impacts. In the State's Bridge Design Manual, Section 209.3, ODOT's policy is to minimize or eliminate the use of bridge scuppers.

WCPC is rarely sought as a resource or partner when building roads, bridges, highways in the watershed, except for unique circumstances where impacts need to be mitigation either on-site (riparian buffer easements, planting, swales, etc), or off-site (preservation most common off-site mitigation).

Hydromodification

Hydromodification is an essential management measure for the West Creek watershed due to its highly urbanized state. The development of the watershed generally occurred over the last 50-75 years, and in that time dense residential areas have expanded exponentially over the watershed, with commercial and industrial activities being sparse. West Creek and its tributaries have been relocated, incised, trenched, and encroached upon from an array of development. Extensive mapping and surveys have delineated the most impacted sections of West Creek and its tributaries, and as described below, the most recent attention is being paid with extensive restoration projects on those areas.

7.4.1/2 Operation and Maintenance Program for Existing Modified Channels – Protect Surface Water and Restore In-Stream and Riparian Habitat

As discussed in Sections 3.8.4.5 through 3.8.4.7 beginning on page 77, West Creek has been incised, entrenched, and modified in numerous areas, especially where major transportation arteries were constructed (i.e. I-480, I-77 and SR 17). Many of the areas that were previously modified are now either being restored or are planning to be restored to a more natural stream condition. An example of this is the WRRSP Project underway to restore approximately one mile of West Creek main stem that has previously been otherwise modified. Refer to www.westcreek.org/WRRSP.

Protection of the surface water is vital to the health and integrity of the watershed. Riparian buffer zones, replanting native vegetation, efficient stormwater management plans, and restoration and maintenance of areas prone to erosion and sediment loss will all provide protection for surface water. Acquiring the site is key to getting these measures implemented. Upon acquisition and depending the funding used to do so, the property will then be put under a conservation easement or some other protective measure such as a deed restriction or environmental covenant. See preservation priority list in Appendix I.

ODOT has previously modified major lengths of the stream including the section along the I-480 & I-77 Cloverleaf interchange, which has been straightened and entrenched. As a part of this interstate construction a 750 lineal foot section of stream now runs through a concrete flume, which is planned for removal as part of the WRRSP Project. Highway-side channel maintenance, in ODOT controlled areas, has historically been performed by ODOT where they have channel easements. As part of the WRRSP stream restoration project, discussions have commenced and will continue with ODOT to manage and restore stream areas within ODOT easements in a more

natural and environmentally friendly manner where possible, while still mandating a safe and effective transportation network. Refer to www.westcreek.org/WRRSP.

Light industrial and commercial operations are present along West Creek throughout its lower one-third have resulted in channel modification. Stream and riparian zone restoration will be occurring throughout much of this section. Such activities will aim to decrease stream-bank erosion, increase riparian habitat and cover, and increase aquatic habitat. Conservation easements or some other protective measure will protect areas where stream and riparian restoration is occurring. Infrastructure that exists within the easement areas (i.e. stream-bank discharge pipes) will be repaired with oversight from the easement holder to keep damage to the restored areas to a minimum and to ensure the restoration of disturbed areas.

Relatively small sections of West Creek, within the Cleveland Metroparks Reservation, have been modified in the past due to landfill and TV tower construction activities. Cleveland Metroparks has now taken over maintenance and operation of the stream corridor within the park. A Natural Resource Management Plan for the West Creek Reservation is currently being compiled by the Cleveland Metroparks, which will establish management and operational duties for existing modified channel within this reach of stream. Also refer to the *West Creek Reservation Master Plan, 2005*. The restoration of an approximately 800 lineal foot section of tributary to West Creek that was previously modified is planned for 2009 within the Reservation. If successful, numerous other stream and wetland restoration project will occur in partnership with Cleveland Metroparks and WCPC.

Many sections of hydromodified stream will eventually need repair in one case or another. For instance, erosion might expand channelized areas and endanger nearby infrastructure, headwalls might begin to fail, or conveyance pipes might no longer be sized correctly to convey necessary stormwater. As repairs to modified sections of stream become necessary, WCPC and its partners will attempt to engage those conducting the repairs so that they can be conducted in a more environmentally friendly manner. For example, where stream-banks need to be hardened to protect against erosion, rootwads, log cribs, or boulder-toe protection can be installed rather than rip-rap. Furthermore, where possible, culverted sections of stream should try to be daylighted and re-connected to historic floodplains.

Many of the improvements to modified sections of stream that will improve aquatic and riparian habitat will also improve water quality. In fact, the two are mutually inclusive in almost all circumstances.

Management Measure Goals

- Evaluate the potential effects of proposed modifications on the physical and chemical characteristics of surface waters within coastal areas;
- Plan and design such proposed modifications to ensure adverse effects are limited and/or completely avoided.
- Operate maintenance program for such modified surface waters, and maintain implementation measures on such improvements.

NEORSD's Intercommunity Drainage Study as well as the West Creek Watershed Action Plan, and the West Creek Valley Management Plan information will be continually synthesized into the operation of a maintenance program on modified surface waters, and for those to be improved through such implementation measures. As described below in the Implementation Table, Cleveland Metroparks will fulfill the obligations within the West Creek Reservation, according to West Creek Reservation Master Plan, 2005. NEORSD will fulfill such obligations as listed in West Creek Watershed Restoration Plan, 2006. WCPC will continue to facilitate such efforts throughout the entire watershed. West Creek Reservation improvements are planned to be completed by 2012. NEORSD's stream restoration initiatives are planned to be completed by 2010. Total estimated costs for this are not available at this time, but are in the realm of 15 Million.

7.5.3 Dam Management – Protection of Surface Water Quality and In-Stream and Riparian Habitat – Request for Exemption

The West Creek watershed contains one functioning low-head dam, which is slated for removal as part of the WRRSP stream restoration project in the Spring of 2009. The removal of the low-head dam will be documented, as well as pre and post construction water quality monitoring. Progress of and updates for the WRRSP stream restoration project can be found at www.westcreek.org. NEORSD and WCPC will be coordinating the dam removal aspect. The City of Parma and WCPC have put additional protection measures on the property to ensure its sustainability as a natural area after the dam removal. Please refer to www.westcreek.org/WRRSP for dam removal at Site 11.

Figure 20 on page 51 shows the different stream segments that are planned to be restored as part of the WRRSP project. Management and maintenance plans will be implemented for each of these sites following stream restoration. Local municipality guidelines for stormwater management during dam removal construction will also be adhered to.

WCPC and the NEORSD are the lead entity on the project, as well as cooperation with the City of Parma and other project partners. Completion is planned for Spring/Summer of 2009. Estimated costs as listed on www.westcreek.org/WRRSP for site 11 range from \$340,000 to \$450,000.

No other true dam structures exist in the watershed, although there are two other fish migration barriers in the lower reach of the stream. Once as depicted as Site 9 at www.westcreek.org/WRRSP will be removed by Fall of 2009, and the other, also referred to as the ODOT flume, as depicted as site 6 has no pending date for completion. As funding becomes available for such restoration, WCPC, NEORSD, and ODOT will lead the project collaboratively.

7.6.1 Eroding Streambanks and Shorelines

Mainly due from the urbanized nature of the watershed and significant stormwater surges and water velocities during storm events, eroding streambanks, hillsides, and roadways continue to be a threat to the health of West Creek and its tributaries. Refer to Figure 27 on page 81 for a location map of highly erodible areas in the watershed, which are further discussed in Section 3.8.4.4 beginning on page 76 of this plan.

Although numerous restoration projects have specifically addressed several of these areas, there are still sections of West Creek and its tributaries that experience erosion and sediment loss. Currently, projects that will address erosion in part or in whole include, the WRRSP stream restoration project, in combination with WCPC's National Fish & Wildlife Grant, Ohio EPA 319 Grant, and Great Lakes Basin Grant. Additional grant and partnership opportunities for streamside erosion abatement will be sought as funding becomes available. Also refer to www.westcreek.org/WRRSP, www.westcreek.org/319, West Creek Reservation Master Plan 2005, and <http://planning.co.cuyahoga.oh.us/documents/westcreek.html>.

Natural stream design, floodplain access, native plantings and bio-engineering are measures to implement along stream corridors to protect surface waters from stormwater run-off, erosion, and sediment loss. Specific measures may include the incorporation of rootwads, log cribs, or boulder-toe protection at highly erodible areas. The incorporation of riparian zone vegetation, such as willow plantings and fascines can also secure streambanks and prevent erosion. Also, decreasing stormwater input into the creeks, decreasing stream-bed gradient and incorporating step-pool/riffle sequences lessen water velocity can all help to decrease the erosive force of West Creek and its tributaries.

Riparian & Wetland Setbacks & Stormwater Management Plans

The Cities of Parma, Seven Hills, Independence, and Brooklyn Heights have each implemented Riparian Setback ordinances for new construction projects. The official language can be found in Appendix G. In short, the City requirements are as follows:

Parma

All development is to be a minimum of 75 feet from the edge of those waterways draining an area greater than one half square mile and 25 feet from the edge of waterways draining less than one half square mile. Parma also requires a 120-foot setback from Category 3 wetlands and a 75-foot setback from Category 2 wetlands.

Seven Hills

Requires a 75 foot setback from each side of the West Creek main stem and 50 feet beyond the outer boundary of any wetland identified within that setback.

Independence

Requires a minimum setback of between 25 feet and 300 feet depending on the size of the waterbody's watershed. Wetlands setback of 75 feet for Category 2 wetland and 120 feet for a category 3 wetland.

Brooklyn Heights

Requires a 75-foot setback for all development occurring along the main stem of West Creek and its tributaries and a 300 foot setback from the Cuyahoga River.

The watershed communities will continue to implement the above-listed ordinances as WCPC work together on strengthening, monitoring and enforcing riparian setback ordinances for new construction projects.

Management Measure Goals

- Protect stream bank areas and buffers to reduce nonpoint source of pollution
- Stabilize/restore stream banks where erosion is a nonpoint source of pollution. Bioengineering methods utilizing natural stream design and natural materials should be implemented as much as possible/feasible.
- Maintain conservation easement/land acquisition program and maintenance schedule for areas prone or may be prone to stream bank erosion.

WCPC and its partners have identified numerous areas within the watershed that need protection, preservation, or otherwise enhancement to offset sedimentation and other nonpoint pollution into the stream. Aside from the preservation priority list in Appendix I, the West Creek Valley Management Plan (2001, <http://planning.co.cuyahoga.oh.us/documents/westcreek.html>), the West Creek Watershed Restoration Plan, and other grant initiatives (such as the 319 program, www.westcreek.org/319), WCPC and its partners will continue to be opportunistic as funding permits. A prime example of one of the biggest and successful opportunities WCPC ever attempted was the West Creek Confluence Project (www.westcreek.org/Confluence), which culminated in the preservation of a ten-acre site at the confluence of West Creek and the Cuyahoga River. See Appendix J for recent initiatives performed on the property in the Fall of 2008.

Conclusion

The West Creek Watershed Action Plan will be updated and integrated with the coastal non-point management measures stated in this section. West Creek Preservation Committee and project partners will continue to preserve and enhance priority areas outlined in the Watershed Action Plan, while accounting for restoration initiatives, implementation of best management practices, and educational outreach for such practices, all leading to enhanced water quality and environmental health.

**West Creek Watershed
Coastal Nonpoint Pollution Prevention Plan
Implementation Strategy Table**

| Management Measure | Lead Agency | Strategy | Cost | Timeline | Target Area | Practice or BMP Model/Guidance Document |
|-----------------------------|--|---|--|--|---|--|
| Watershed Protection 5.3.2. | West Creek Preservation Committee | <p>Land Conservation: Fee title and conservation easement acquisition. Deed restrictions.</p> <p>Create a preservation priority list for entire watershed – complete by 2009. Current Priority list found in Appendix I</p> <p>Stream, riparian, and wetland restoration. 1 mile of West Creek (11% of stream)</p> <p>Riparian, stream, and wetland setback ordinances, as found in Appendix G.</p> | No final cost itemized for preservation in West Creek watershed; rough estimates: 7-10 M | 2008-2011 (Prioritization preservation will be complete by 2009) | Main branch of West Creek and its tributaries; West Creek Watershed, a subwatershed of the Cuyahoga River | <p>Appendix 8 Update. West Creek Watershed Action Plan:</p> <p>www.westcreek.org/FinalWSAP.html</p> <p>West Creek Valley Management Plan: http://planning.co.cuyahoga.oh.us/documents/westcreek.html</p> <p>Current Preservation priority list as found in Appendix I</p> |
| Site Development 5.3.3. | Cuyahoga Soil and Water Conservation Districts | <p>Review Site plans and Stormwater Pollution Prevention Plan (SWP3) for Watershed Communities; per-case basis.</p> <p>Reviews, recommends, and approves/denies plan. Works with city to implement BMPs for site development.</p> <p>For less than an acre, cities review plans internally; certain development/building is at discretion of city to have SWP3 plan reviewed on case by case basis.</p> | \$0 | On-Going Completed on a per-case basis for development and redevelopment. | Entire watershed for both new development and redevelopment | <p>Riparian and Wetland Setback ordinances as seen in Appendix G.</p> <p>Guidelines as listed on: http://www.epa.state.oh.us/dsw/storm/swp3_cgp_chec_klist2.pdf</p> |

| | | | | | | |
|---|--|--|-----|---|---|--|
| Site Development 5.3.3. | Cities of Parma, Independence, Seven Hills and Brooklyn Heights | <p>Implement the Ordinances as referenced in Appendix G.</p> <p>Coordinates efforts with Cuyahoga SWCD on site plan review; takes recommendations to building and zoning review board for approval/denial.</p> <p>Facilitate efforts with WCPC on available mitigation tactics where and when necessary.</p> <p>For less than an acre, plans submitted to cities for internal review; development/building may require Stormwater Pollution Prevention Plan review by CSWCD; discretion of building/zoning committee</p> | \$0 | <p>2008-2011</p> <p>2010 to adopt additional Riparian setback ordinances and erosion control plans</p> | Entire watershed for both new development and redevelopment | <p>Riparian and Wetland Setback ordinances as seen in Appendix G.</p> <p>Guidelines as listed on: http://www.epa.state.oh.us/dsw/storm/swp3_cgp_chec_klist2.pdf</p> |
| New Onsite Disposal Systems 5.6.1 | Cuyahoga County Board of Health (within the watershed communities) | <p>Cuyahoga County Board of Health Programs for Siting Onsite Systems: Sewage Treatment System Rules (2007)</p> <p>No new systems in the West Creek Watershed.</p> | \$0 | No New Onsite disposal system will be constructed in the West Creek Watershed | Entire West Creek Watershed | <p>CCBH Sewage Treatment System Rules</p> <p>http://www.ccbh.net/ccbh/export/sites/default/CCBH/services/environmental_health/house_sewage_systems/CCBH_STS_Rules_Final_.pdf</p> |
| Operating On-Site Disposal Systems 5.6.2 | Cuyahoga County Board of Health | <p>Cuyahoga County Board of Health Illicit Discharge Program</p> <p>NPDES Permit No.: OHQ000001</p> <p>AUTHORIZATION FOR SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS TO DISCHARGE STORM WATER UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM</p> | \$0 | <p>2009-2012 (by 2009-2010, over 80% of onsite systems will have been removed from the West Creek watershed)</p> <p>No New Onsite disposal system will be constructed in the West Creek Watershed</p> | Entire West Creek Watershed | <p>CCBH Sewage Treatment System Rules</p> <p>http://www.ccbh.net/ccbh/export/sites/default/CCBH/services/environmental_health/house_sewage_systems/CCBH_STS_Rules_Final_.pdf</p> |

| | | | | | | |
|---|--------------------------|---|-----|-----------|-----------------------------|---|
| | | Remove 80% of on-site disposal systems by 2009; less than 1 per 20 acres in the entire watershed. | | | | |
| Planning, Siting, and Developing Roads, Highways and Bridges 5.8.1. | Cuyahoga County Engineer | <ul style="list-style-type: none"> - Protect specific areas that provide important water benefits and/or protect those that are or may be susceptible to erosion or sediment loss; - Except where deemed necessary, limit the increase of impervious surface area - Avoid sediment loss and erosion by limiting cutting or clearing activities - Avoid or limit disturbance to native vegetation and natural drainage areas | \$0 | 2008-2011 | Entire West Creek Watershed | <p>Riparian and Wetland Setback ordinances as seen in Appendix G.</p> <p>Guidelines as listed on: http://www.epa.state.oh.us/dsw/storm/swp3_cgp_chec_klist2.pdf</p> <p>ODOT Stormwater Management Plan. Refer to: http://www.dot.state.oh.us/stormwater</p> <p>Also see Section 5.3.3</p> |
| Local Bridges 5.8.2. | Cuyahoga County Engineer | Protect ecosystems from detrimental effects that are valuable and sensitive to water quality health and improvement, through the site design, implementation and maintenance of bridges, culverts, or other such structures. | \$0 | 2008-2011 | Entire West Creek Watershed | <p>Riparian and Wetland Setback ordinances as seen in Appendix G.</p> <p>Guidelines as listed on: http://www.epa.state.oh.us/dsw/storm/swp3_cgp_chec_klist2.pdf</p> <p>Also see Section 5.3.3</p> |

| | | | | | | |
|---|--|--|--|---|--|---|
| Operation and Maintenance for Existing and Modified Channels - Surface Water 7.4.1. | Cleveland Metroparks | Enhance stream and riparian areas with bioengineering, natural stream design with public access enhancement. Work with WCPC and NEORSD on implementing the Stewardship Master Plan for the Reservation. | Estimates not complete for entire mainstem and tributaries; N/A at this time | 2008-2012 | West Creek Reservation | West Creek Reservation Master Plan, 2005 |
| Operation and Maintenance for Existing and Modified Channels - Surface Water 7.4.1. | West Creek Preservation Committee | Enhance stream and riparian areas with bioengineering, natural stream design Work with municipalities, adjacent owners through education, Cleveland Metroparks, NEORSD, and ODOT. | Estimates not complete for entire mainstem and tributaries; N/A at this time | On going Perpetual protection and maintenance | Entire West Creek Watershed | Refer to www.westcreek.org/WRRSP http://www.westcreek.org/Final WSAP.html http://planning.co.cuyahoga.oh.us/documents/westcreek.html |
| Operation and Maintenance for Existing and Modified Channels - Surface Water 7.4.1. | Northeast Ohio Regional Sewer District | Natural Stream design, bioengineering, revegetation, bank stabilization, etc. www.westcreek.org/WRRSP "West Creek Watershed Restoration Project" 2007 | Estimates not complete for entire mainstem and tributaries; N/A at this time | 2008-2013 | Restoration Sites as identified in NEORSD's West Creek Watershed Restoration Project" Refer to www.westcreek.org/WRRSP | Refer to www.westcreek.org/WRRSP |
| Operation and Maintenance for Existing and Modified Channels - Instream and Riparian Area 7.4.2. | Cleveland Metroparks | Enhance stream and riparian areas with bioengineering, natural stream design with public access enhancement. Work with WCPC and NEORSD on implementing the Stewardship Master Plan for the Reservation. | Estimated at 7 Million | 2008-2011 | West Creek Reservation | West Creek Reservation Master Plan, 2005 |

| | | | | | | |
|---|--|--|--|---|--|---|
| Operation and Maintenance for Existing and Modified Channels - Instream and Riparian Area 7.4.2. | West Creek Preservation Committee | Enhance stream and riparian areas with bioengineering, natural stream design Work with municipalities, adjacent owners through education, Cleveland Metroparks, NEORSD, and ODOT. | Estimates not complete for entire mainstem and tributaries; N/A at this time; double the efforts of the WRRSP program put this at an approximate cost of 10 Million+ | On-going Perpetual protection and maintenance | Entire West Creek Watershed | Refer to www.westcreek.org/WRRSP http://www.westcreek.org/Final WSAP.html http://planning.co.cuyahoga.oh.us/documents/westcreek.html |
| Operation and Maintenance for Existing and Modified Channels - Instream and Riparian Area 7.4.2. | Northeast Ohio Regional Sewer District | Enhance stream and riparian areas with bioengineering, natural stream design. Implement the WRRSP West Creek Watershed Restoration Project. | Estimates not complete for entire mainstem and tributaries; N/A at this time Approx. 5.5 Million | 2008-2013 | Restoration Sites as identified in NEORSD's West Creek Watershed Restoration Project" Refer to www.westcreek.org/WRRSP | Refer to www.westcreek.org/WRRSP West Creek Watershed Restoration plan 2007 |
| Dam Management – Protection of Surface Water Quality and In-Stream and Riparian Habitat – Request for Exemption 7.5.3 | West Creek Preservation Committee | Remove the single low-head dam in the watershed Restore habitat and monitor improvement | \$125,000 | 2009-2010 | Middle reach of West Creek; 445-24-003 Between State and Broadview | Refer to: www.westcreek.org/wrrsp Site 11 |
| Dam Management – Protection of Surface Water Quality and In-Stream and Riparian Habitat – Request for Exemption 7.5.3 | Northeast Ohio Regional Sewer District | Remove the single low-head dam in the watershed Restore habitat and monitor improvement | \$375,000 | 2009-2010 | Middle reach of West Creek; 445-24-003 Between State and Broadview | Refer to: www.westcreek.org/wrrsp Site 11 |
| Eroding Streambanks and Shorelines 7.6.1. | Northeast Ohio Regional Sewer District | Natural Stream design, bioengineering, revegetation, bank stabilization, etc. www.westcreek.org/WRRSP "West Creek Watershed Restoration Project" 2007 | Estimates not complete for entire mainstem and tributaries; N/A at this time | 2008-2011 | Restoration Sites as identified in NEORSD's West Creek Watershed Restoration Project" Refer to www.westcreek.org/WRRSP | Refer to www.westcreek.org/WRRSP West Creek Watershed Restoration plan 2007 |

| | | | | | | |
|--|--|--|--|----------------------|-------------------------------|---|
| <p>Eroding Streambanks and Shorelines 7.6.1.</p> | <p>West Creek Preservation Committee</p> | <p>Acquire stream and riparian area; protect stream and tributary (fee title; deed restriction; conservation easement).</p> <p>Prioritize sites according to funding availability: Appendix I</p> <p>Upon acquisition; design engineer, and leverage funding for restoration;</p> <p>Manage in perpetuity.</p> | <p>Estimates not complete for entire mainstem and tributaries; Rough est. 7-10 Million</p> | <p>2008--Ongoing</p> | <p>Entire watershed</p> | <p>West Creek Valley Management Plan: http://planning.co.cuyahoga.oh.us/documents/westcreek.html</p> <p>West Creek Trail and Neighborhood Connector Plan; refer to: http://www.westcreek.org/greenway</p> <p>West Creek Watershed Restoration plan: www.westcreek.org/WRRSP & www.westcreek.org/319</p> |
| <p>Eroding Streambanks and Shorelines 7.6.1.</p> | <p>Cleveland Metroparks</p> | <p>Development West Creek Reservation according to Master plan;</p> <p>Restore incised and eroding channels throughout entire Reservation reach;</p> <p>Implement public access availability</p> | <p>3 Million Estimated</p> | <p>2009-2012</p> | <p>West Creek Reservation</p> | <p>West Creek Reservation Master Plan; 2005</p> <p>Cleveland Metroparks – Baseline Ecological Survey, 2007</p> |

CHAPTER 6 WATERSHED RESTORATION AND PROTECTION GOALS

6.1 Water Quality Goals

The goal for the West Creek watershed is to reach and maintain full attainment for water quality standards of Warmwater Habitat Primary Contact recreation use designation, and also to restore West Creek and its tributaries as dynamic waterways within an urban environment setting that will be protective of human health, preserve and restore part of our natural heritage, offer outdoor educational opportunities in an urban environment, and build economically stronger communities for the future. In order to have a long lasting beneficial impact upon the waterway, it will be necessary to impact the way members of the community think about the waterway; how West Creek affects them, and how their actions affect West Creek.

The future management of the West Creek watershed can greatly influence the quality of the waterway and its watershed as well as its impact on the Cuyahoga River and Lake Erie Basin.

6.1.1 Aquatic Habitat Goals

For all sections of West Creek and its tributaries to attain QHEI scores of at least 60. This will ensure that the aquatic habitat is available to supporting functional warmwater faunas if other stresses to the system are alleviated.

6.1.2 Biocriteria Goals

For all sections of West Creek and its tributaries to attain minimum IBI scores of 38 and minimum ICI scores of 34. Attainment of the IBI will show that the waterways have a diversity of healthy fish populations and good ICI scores will demonstrate that water quality is capable of supporting macroinvertebrate communities that are sensitive to environmental stresses.

6.1.3 Water Quality Goals

Attain chemical water quality results that comply with Warmwater Habitat Primary Contact recreation designation standards. This includes maintaining dissolved oxygen concentrations above 5.0 mg/l, total dissolved solids results below 1,500 mg/l, reducing phosphate concentrations below 0.05 mg/l in all sections of West Creek, and significantly reducing fecal coliform bacteria concentrations so that the mean fecal coliform content shall not exceed 1,000 bacteria per 100 ml of water.

6.1.4 Riparian Habitat Goals

Due to the hugely beneficial impact of riparian habitat on stream health, the ultimate goal

for riparian habitat protection within the West Creek watershed is to preserve an area of 200 feet from bankfull on either side the channel for the entire length of the West Creek mainstem and all of its tributaries.

Refer to Figure 9 on page 33 (URS Priority Preservation Plan) to see preservation priority of the West Creek mainstem.

6.1.5 Mainstem and Tributary Restoration

Sections of West Creek mainstem and tributaries that have been previously altered through channelization or other types of hydromodification, should be restored back to a more natural hydraulic and habitat state. The goal is to conduct restoration activities on all sections that have been modified or otherwise impaired in which landowner cooperation can be acquired. Also included should be those sections of the headwaters mainstem and tributaries that have been culverted. Culverted waterways within the West Creek watershed should be “daylighted”, or otherwise brought back to a more natural state.

6.1.6 Wetland Goals

All wetlands within the West Creek watershed need to be identified and classified (i.e. perennial, seasonal, Class I, Class II, or Class III). Every effort should be made to preserve those remaining wetlands within the watershed and to mitigate all that are unable to be preserved. Wetland construction and restoration continues within the West Creek Reservation; however, those activities must spread on available land throughout the watershed.

6.2 Objectives to Attain Water Quality Goals

The future management of the West Creek watershed will not only influence the quality of the West Creek waterway itself, but also that of the Cuyahoga River and Lake Erie Basin. The people of Northeast Ohio have longstanding economic, historical, and recreational ties to the waterways of our region. The following section details how we can achieve the protection goals outlined in Section 6.1 so that these waterways will be a source of enjoyment, pride, and prosperity for limitless generations to come.

6.2.1 Community Ordinances

One way that all of the previously described water quality protection goals can be achieved is through the passage or adoption of community ordinances. Community and even state-wide ordinances can take many forms as described below.

Riparian Setback/Stream Corridor Protection

Recommended setback widths for varying waterways include a, “minimum of 75 feet on either side of all watercourses draining an area greater than ½ square mile and up to 20

square miles. A minimum of 25 feet on either side of all watercourses draining an area less than ½ square mile with a defined bed and bank area.” (Chagrin River Watershed Partners, working with U. S. Department of Agriculture - Cuyahoga Soil and Water Conservation District, U. S. Environmental Protection Agency, Ohio Environmental Protection Agency, Ohio Department of Natural Resources, and Northeast Ohio Areawide Coordinating Agency).



West Creek Preserve in Parma

The City of Parma has a riparian setback ordinance requiring all development performed after its implementation to be a minimum of 75 feet from the edge of those waterways draining an area greater than one-half square mile and 25 feet from the edge of waterways draining less than one-half square mile. Furthermore, Parma has a wetland preservation ordinance requiring a 120 foot setback for Category 3 wetlands and a 75 foot setback for Category 2 wetlands. The Village of

Brooklyn Heights has a similar ordinance requiring a minimum 75 feet riparian setback for all development occurring along the mainstem and tributaries of West Creek and a 300 feet riparian setback from the Cuyahoga River. The City of Seven Hills requires a 75 foot setback on each side of the mainstem of West Creek and 50 feet beyond the outer boundary of any wetland identified within that setback. Copies of the relevant setback ordinances are located in Appendix G.

Such ordinances should be expanded throughout all of the communities encompassing the West Creek watershed so that the waterways and tributaries throughout will be protected.

Wetland Setback Protection

Community ordinances requiring setbacks around certain wetland types can also be a valuable water quality protection tool. Category 3 Wetlands should have a minimum 120 feet setback between development and a Category 2 Wetlands a minimum 75 feet setback.

It is also recommended that communities require Stormwater Management Plans and Stormwater Pollution Potential Plans be written for new commercially constructed development. These plans analyze pre- and post-construction stormwater, the amount of impervious cover resulting from the development, stormwater management features, erosion control features during the construction process, and seeding requirements.

Watershed Based Zoning

Watershed and subwatershed boundaries can be utilized as effective land use planning foundations. This approach can protect receiving water quality at the subwatershed scale by relocating development or mitigating the impact of development at specific subwatershed locations. This approach should include a verification of existing impervious cover and stream quality relationships, projection of future levels of impervious cover, modification of master plans/zoning to correspond to subwatershed impervious cover targets, and adoption of specific protection strategies for each subwatershed. (U.S. EPA, Phase II Best Management Practice Manual website, 2001)

Overlay Zoning

This strategy would recommend additional regulations or specific development criteria within specific mapped areas. This zoning could require development restrictions, such as hillside protection, or allow alternative site design techniques in specified areas to protect sensitive resources (U.S. EPA, Phase II Best Management Plan Manual website, 2001)

Impervious Cover Overlay Zoning

This is a specific overlay zoning that limits total impervious cover within mapped districts. This approach can protect receiving water quality at both the subwatershed and site level. The impacts of future impervious cover are estimated and a limit is set on the maximum imperviousness within a specific area. Site development proposals are then reviewed in the context of an imperviousness cap. (U.S. EPA, Phase II Best Management Plan Manual website, 2001)

6.2.2 Phase II Regulations

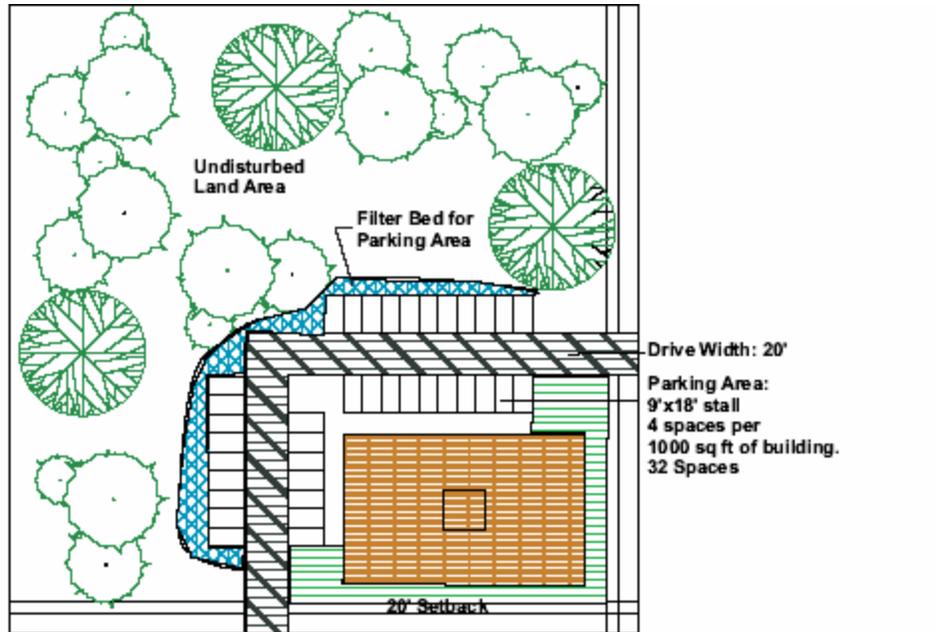
The United States Environmental Protection Agency addressed stormwater pollution under the National Pollutant Discharge Elimination System (NPDES) permit program. The Phase II Final Rule was published in the Federal Register on December 8, 1999 to address concerns regarding high concentrations of pollutants found in urban stormwater runoff. It requires NPDES permit coverage for stormwater discharges from any construction development of one acre or more to control polluted runoff through the creation and implementation of a stormwater management plan. The Phase II regulations also require operators of regulated small municipal separate storm sewer systems (MS4s) to obtain NPDES permits and to adopt stormwater management programs designed to keep urban-derived stormwater pollutants from being washed into the MS4 and into resulting waterways. All of the communities within the West Creek watershed (Parma, Brooklyn Heights, Seven Hills, Independence, and Broadview Heights) are covered by Phase II NPDES regulations.

6.2.3 Construction Best Management Practices

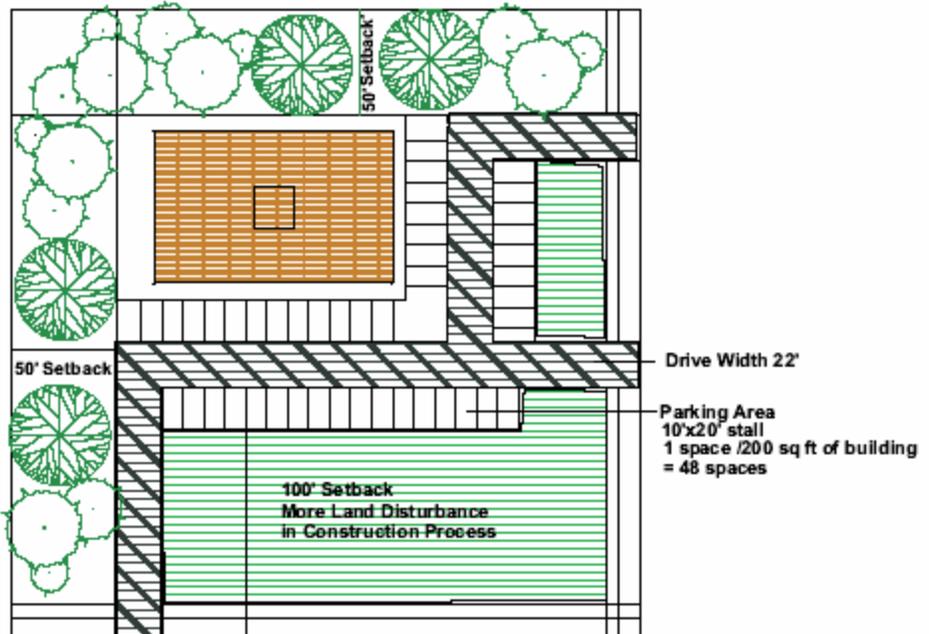
Other initiatives to be considered by the watershed communities for future development, and redevelopment design approaches to assist in stormwater management and protection of the natural habitat of West Creek are listed below.

- The modification of local zoning code requirements for parking areas and lot layout, including setbacks.
- Modifying the layout and alignments of driveways, lot layout and drainage patterns on sites to reduce impervious cover on the watershed and lessen the amount of land cover disturbed during construction. These include reassessing parking space requirements for commercial/business areas, reduce parking demand ratios for selected land uses and provide minimum and maximum space standards (professional offices = 3.0 spaces or less per 1000 sq.ft., retail areas = 4.0 spaces or less per 1000 sq.ft.). (Center for Watershed Protection, 1998)

Figure 31
Parking Lot Layout Conceptual Design



Lot Layout with Better Site Design Standards



Lot Layout with Traditional Standards

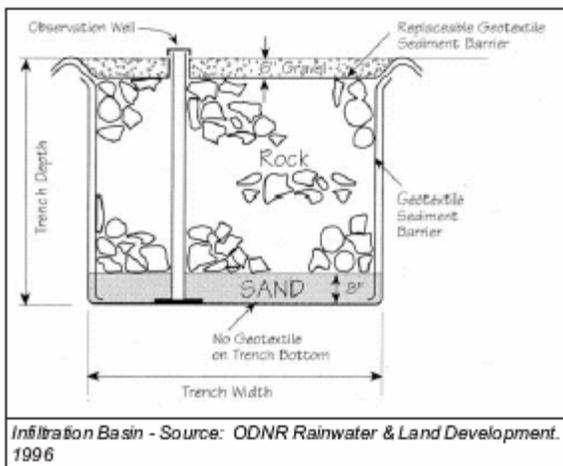
- Assess building layout on site to minimize land disturbance and maximize existing features on site.
- Direct rooftop drainage to pervious surfaces on site such as bioretention area or vegetated areas to decrease the annual runoff volume from development sites.
- Promote flexible design standards for all land uses to minimize yard setbacks. This will reduce road length in the community and overall imperviousness. This flexibility will also allow developers and designers to create neighborhoods and business centers that make each site attractive with its unique existing features.
- Parking areas, driveways and streets can account for the majority of the total impervious cover on the land area. This cover can impact the watershed and its waterway in a detrimental manner if not managed properly. As parking areas continue to be part of the urban landscape, practices to reduce the impacts are suggested.
- Use of alternative pavements such as porous pavement, gravel and paver blocks. These pavement options can be applied in overflow parking areas and less traveled loading areas to reduce the total impervious cover of a site.
- Alternative drainage solutions, such as bioretention areas in the parking lot islands, grass swales, and infiltration basins.
- Bioretention areas serve as landscape features for parking areas while providing on-site stormwater runoff treatment. They are typically 15-20 feet wide and 30-50 feet in length with a soil depth of 4 feet. They tend to drain up to a 1 acre area on shallow slope sites (5%).
- Infiltration basins provide temporary underground storage for stormwater runoff and operates as a sediment removal mechanism prior to runoff. They are for sites less than 5 acres and have a storage depth of more than 2 feet.



Bioretention Areas, University of Maryland Bioretention Study, 1997



Bioretention Areas, University of Maryland Bioretention Study, 1997



Infiltration Basin - Source: ODNR Rainwater & Land Development, 1996

Figure 35
Infiltration Basin Conceptual Design

- The West Creek watershed has at least 5 detention basins operating as a stormwater management structure for sites. These basins merely serve as infrastructure elements and have potential as landscape features for the sites. Wetland ponds can assist in stormwater management of sites through removal of pollutants and the protection of downstream areas from erosion.
- Reduction in street widths and curbs and gutters. Assessing the actual traffic volume of a street and its needs for access should be determined on a site by site basis. As narrow as 22 feet street width is recommended. Also,

Figure 36
Stormwater Basin Conceptual Design

Figure A.3 Section of Typical Stormwater Management Detention Pond

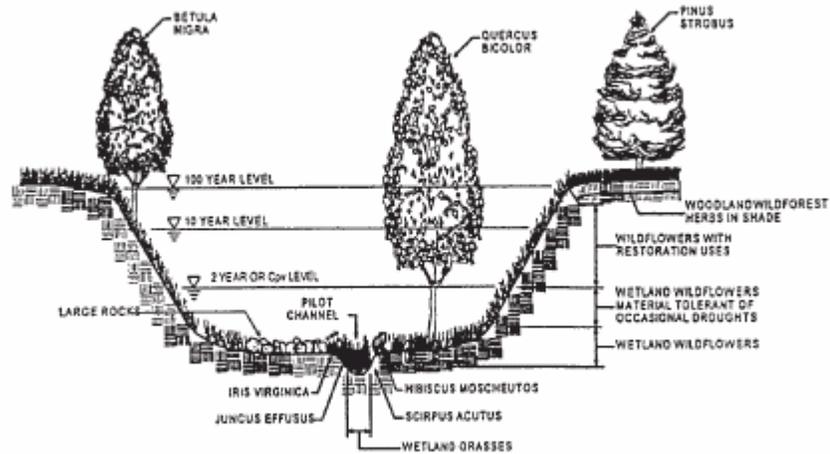
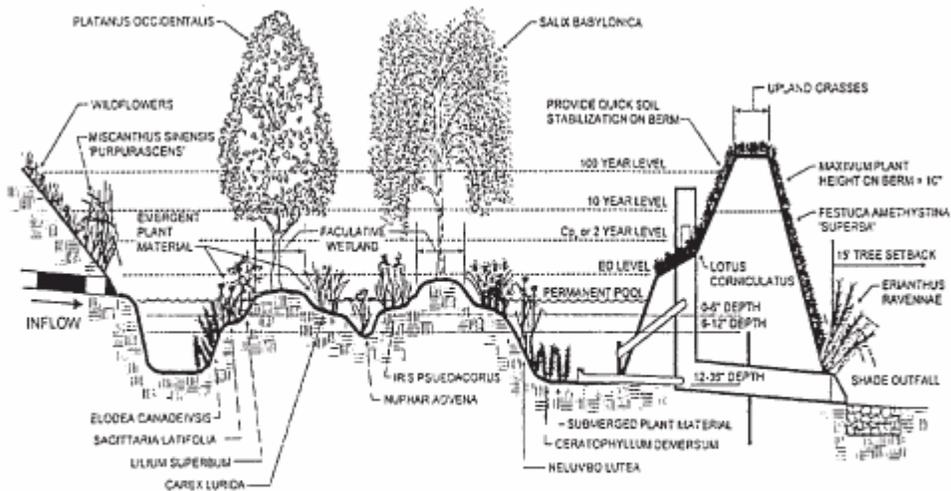


Figure A.4 Section of Typical Shallow Extended Detention Wetland System



SOURCE: Maryland Stormwater Design Manual Draft Plan, 1999



minimizing cul-de-sac radii and alternate turnaround designs should be considered.

6.2.4 Greenspace Protection

Protection and preservation of undeveloped land is a major goal of the WCPC. As open land continues to be developed and redeveloped in the watershed, active measures to protect and expand green space by the watershed communities will be essential. Measure that can aid in the protection of greenspace are listed below.

- Develop and expand ordinances to protect existing trees in the development process by requiring the *preservation of trees of a specific size or replacement of tree cover comparable to pre-development* conditions. This ordinance should also include a *landscaping plan* submission to the Planning Commission in the review process and *review by a registered landscape architect* to ensure that plant material and layout is appropriate for the design and environmentally proper.
- Establish a zoning category to “Set aside and protect from over development those areas whose primary purpose is to be open space; to provide sufficient space to meet the community’s present and prospective needs for relief from the build environment, scenic views, passive recreation and ecological education activities; and to provide protection, preservation and proper maintenance of biologically significant habitat, threatened habitat including but not limited forested areas, steep slopes, wetlands, watercourses and floodplains.” (Parma Open Space Zoning Ordinance No. 224-99)
- Develop an overlay district zoning category to protect various scenic views to and from the West Creek Valley, Cuyahoga River Valley, and downtown Cleveland from future development or redevelopment. Site development standards could include prohibition of outdoor advertising signs, tree preservation, stream protection, and/or restrictions on building height or location.

6.2.5 Additional Initiatives

- Develop relationships within the local business community to work with development and land use companies to better utilize the natural resources that exist in the watershed. This includes incorporating waterways into the design of properties in contrast to filling, culverting or channelizing. It also includes the use of native vegetation in landscape design, as well as green building technologies and materials in construction.
- Continue research and management of open space, particularly within the Reservation. The research can continue with plant species identification, as well as habitat identification and assessment. Potential partners include Cleveland Museum of Natural History, Cleveland State University, Cleveland Metroparks, Cuyahoga Valley National Park, The Nature Conservancy, ODNR, and other local experts in the plant and animal habitat fields.
- A conservation easement is a legal agreement a property owner makes to restrict the type and amount of development that may take place on the property. The property

owner works with an easement holder such as a land trust, public agency, historic preservation organization or other qualifying nonprofit organization to lay out the restrictions and rights of the use of this property in the agreement. There are currently tax benefits (this is being studied for possible legislative change) for the property owner under the Internal Revenue Code as a tax deduction by meeting the definition of conservation purposes.” The conservation of outright donations of land can also be made to qualifying entities. Similar to a conservation easement, the property owner may lay out conditions for the donation and also potentially receive federal tax considerations.

- Form partnerships with organizations such as the Trust for Public Land or Cleveland Metroparks to develop initiatives to approach property owners concerning sale of property. Any property sale should be a voluntary action by the property owner. The use of eminent domain is discouraged.

6.2.6 Waterway Restoration Design Measures

The Biocriteria Study and Riparian Corridor Assessment Report (2001) has outlined the conditions of West Creek and its streambanks. The current and ongoing step is to determine specific stream restoration project locations and the design criteria to utilize. The following are measures from the USDA Stream Corridor Restoration Manual (2001), which outline potential design tools that can be utilized during restoration projects on West Creek or its tributaries.

- It is important to assess the stream corridor width and the structural characteristics of the stream channel to increase connectivity of the different habitats and improve floodplain function.
- Stream channel restoration projects can consist of features such as step pools, rock weirs, and boulder drop structures.
- Streambank restoration projects may implement such features as anchored vegetative cutting systems, geotextile systems, integrated systems of vegetation and structures, and

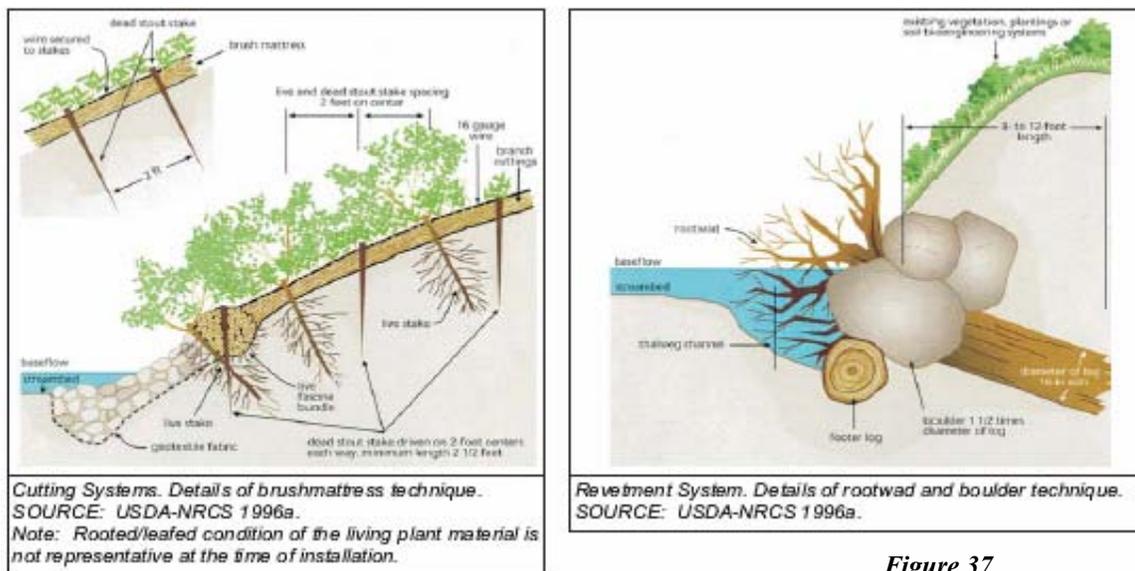


Figure 37
 Restoration Design Measures

trees and logs such as root wad systems.

- Instream habitat recovery projects frequently consist of weirs, random rock placement, and fish passage structures.

Consultation with the Soil and Water Conservation District office in Cuyahoga County and an experienced bioengineering firm is recommended to successfully determine project area priorities, as well as design and implement solutions.

6.2.7 Currently Occurring Water-Quality Improvement Implementation Efforts

WCPC and its partners have numerous implementation activities underway that will help to maintain and improve water quality conditions. Based on our ten years of on-the-ground experience, we believe that much of our effort must be expended toward stemming the continued decline of West Creek water quality. To that end, WCPC continues to protect urban and suburban greenspace. Over 500 acres of greenspace has been permanently protected to date within the West Creek watershed, including the creation of Cleveland's newest Metropark, the West Creek Reservation. Much of the greenspace that has been protected is considered capable of being developed and has existing water features that would have been negatively impacted if built upon.

Several stream and wetland restoration projects have been completed or are in the planning process. For example, approximately 4 acres of wetlands have been created to date within the West Creek Reservation that were designed to improve aquatic and terrestrial habitat, but also to receive stormwater input during storm events to mitigate flooding potential and non-point source pollution. A stream restoration project that merits description is also underway. It involves a partnership between the WCPC and the NEORSD to restore approximately 1 mile of West Creek mainstem at approximately 6 different sites along its course. The restoration objectives are numerous, but include the removal of fish migration obstructions, the restoration of channelized sections of stream to a more natural hydrology, the reduction of storm event water velocities (which also reduces streambank erosion), and the restoration of aquatic and riparian habitats.

Whereas greenspace protection and stream and wetland restoration are the most visible water quality improvement efforts, much else is happening within the watershed. WCPC members frequently attend the watershed community City Council and Zoning Commission meetings in an effort to improve community regulations and building patterns. The Cuyahoga County Soil and Water Conservation District is working with many of the watershed communities on the implementation of their Phase II stormwater requirements, including reviewing site building plans to ensure that proper sediment and erosion control is included.

Furthermore, a partnership between WCPC, Cleveland Metroparks, the City of Parma, and the NEORSD is occurring that will create a water stewardship center at the West Creek Reservation. One of the goals of the stewardship center will be to conduct water quality education and outreach that will include things that families and businesses can do individually to make a difference and improve water quality within both the watershed and through-

out Greater Cleveland. Some of these things include the creation of raingardens (one was recently created at Seven Hills City Hall), reduction in the use of lawn and garden fertilizers and herbicides, landscaping with native plants, disconnecting downspouts from the storm drain system, and being cognizant of those items being flushed into stormdrains and down the sink.

6.2.8 The West Creek/Cuyahoga River Confluence Restoration

The West Creek Confluence parcel presents a unique conservation opportunity for watershed protection within the Cuyahoga River area. The 10 acre property in Cuyahoga County contains approximately 850 feet of West Creek, a major tributary of the Cuyahoga River, and includes its confluence with the Cuyahoga River. The property is positioned at the northern end of the Cuyahoga Valley National Park and will provide a public access point to the Cuyahoga Valley Scenic Railroad and Ohio and Erie Canal Towpath Trail. Within the past year, Cleveland MetroParks has established a new 400-acre West Creek Reservation along West Creek. West Creek has previously been straightened through the property. This has led to flooding and degraded river habitat. Acquisition of this property would present a great opportunity to restore the aquatic resources at the confluence of West Creek and the Cuyahoga River.

The NEORSD is currently coordinating the complete restoration of lower West Creek to its confluence with the Cuyahoga River. Funding for the restoration portion of this project is

Figure 38
The West Creek Confluence Area



being supplied by various state and federal grants. This \$3.5 million project is aimed at bringing West Creek into full attainment as a warm-water habitat stream.

Upon successful acquisition of the West Creek Confluence property, demolition of the warehouse and parking lot will occur. The channelized section of West Creek will be restored with meanders and associated riparian wetlands. This will result in substantial habitat improvement, water quality enhancement, fish migration and flood control. The entire site will be publicly accessible with a hike/bike trail and public facilities including access to the Towpath Trail and Cuyahoga Valley Scenic Railroad.

West Creek channel restoration will reduce channel velocities during high flow events so that aquatic species and habitat will not be “scoured out” and erosion and stream entrenchment will be minimized. A more natural hydrology will be introduced to the channel through the reintroduction of meanders, aquatic and riparian habitat reintroduced, and the floodplain will be restored to provide floodplain access.

Similar to the tremendously successful “Urban Wetlands” project led by the West Creek Preservation Committee in 2002 within the West Creek Reservation, floodplain wetlands will be created to provide stormwater storage, nonpoint source pollution filtration, wetlands habitat for numerous species from birds to amphibians, and the aesthetic beauty associated with a healthy wetlands environment.

Figure 39
Regional West Creek Confluence Map



6.2.9 Implementation Objectives

The following table has been created to outline specific implementation objectives to be carried out in order to protect and improve West Creek water quality. The table includes specific BMP's to be implemented, implementation activities as a part of those tasks, the parties responsible for those tasks, timeframe for implementation of those tasks, ongoing and potential funding sources, and expected water quality results, as requested.

Table 5 Implementation Activities and Objectives

| Task | Implementation Activities | Responsible Parties | Timeframe | Funding Sources | Expected Water Quality Results | Short Range Goals |
|--------------------------|--|---|------------------------------------|--|---|--|
| Greenspace Protection | <ol style="list-style-type: none"> 1. Identify priority parcels that will protect important water resources. 2. Negotiate conservation easements or fee title acquisition of the priority parcels. | <p>West Creek Preservation Committee</p> <p>Private Property Owners</p> <p>Cuyahoga SWCD</p> <p>Watershed Communities</p> | <p>Started 1998</p> <p>Ongoing</p> | <p>Clean Ohio Conservation Fund</p> <p>Conservation Grants</p> <p>Private Donations</p> <p>Compensatory Mitigation</p> <p>State and Federal Grants</p> | <ol style="list-style-type: none"> 1. Will prevent future water quality impacts from develop of these properties. 2. Provide properties to conduct stream and wetland restoration at. | <p>50 acres of greenspace protected per year on average.</p> <p>A minimum of 10 negotiations conducted per year for conservation acquisitions.</p> |
| Conservation Stewardship | <ol style="list-style-type: none"> 1. Create baseline surveys of protected properties and thoroughly mark property boundaries denoting | <p>West Creek Preservation Committee</p> | <p>Started 2005</p> <p>Ongoing</p> | <p>Foundation Grants</p> <p>Private Donations</p> <p>Compensatory</p> | <ol style="list-style-type: none"> 1. Healthy riparian zones will increase filtration of stormwater pollutants prior to reaching water resources. | <p>Conduct baseline surveys for all current conservation acquisitions.</p> <p>Conduct</p> |

| Task | Implementation Activities | Responsible Parties | Timeframe | Funding Sources | Expected Water Quality Results | Short Range Goals |
|--------------------------------|---|---|---|---|--|--|
| | <ul style="list-style-type: none"> conservation properties. 2. At least annually, monitor protected properties for encroachment or damage. 3. Establish funding to legally defend properties from encroachment. | | | <ul style="list-style-type: none"> Mitigation Stewardship Fees | <ul style="list-style-type: none"> 2. Healthy canopy cover will increase stormwater absorption and retention. | <ul style="list-style-type: none"> baseline surveys for 3 previous conservation acquisitions per year. Raise \$20,000 per year for legal defense funding. |
| Stream and Wetland Restoration | <ul style="list-style-type: none"> 1. Work with partners to identify potential stream and wetland restoration opportunities. 2. Acquire funding to conduct restoration projects. 3. Conduct engineering and design of restoration projects. 4. Oversee construction of restoration projects. 5. Conduct post-construction monitoring to ensure success of the project. | <ul style="list-style-type: none"> West Creek Preservation Committee Northeast Ohio Regional Sewer District Cleveland Metroparks Cuyahoga SWCD Watershed Communities Private Business | <ul style="list-style-type: none"> Started 2000 Ongoing | <ul style="list-style-type: none"> State and Federal Grant Programs (i.e. 319 Program, National Oceanic and Atmospheric Administration grants) Foundation Grants (i.e. National Fish and Wildlife Foundation) Compensatory Mitigation Private Donations | <ul style="list-style-type: none"> 1. Increase riparian and aquatic habitat. 2. Improve fish and amphibian migration. 3. Reduce nonpoint source pollution input into waterways. 4. Increase stormwater absorption and retention. | <ul style="list-style-type: none"> Restore an average of 200 linear feet of stream per year. Restore or create an average of 0.5 acres of wetlands per year. |

| Task | Implementation Activities | Responsible Parties | Timeframe | Funding Sources | Expected Water Quality Results | Short Range Goals |
|----------------------|---|--|------------------------------------|------------------------|---|---|
| Community Ordinances | <ol style="list-style-type: none"> 1. Work with watershed communities to strengthen riparian and wetland setback ordinances currently in place. 2. Attend community zoning commission meetings to ensure that riparian and wetland setbacks are being enforced. | <p>West Creek Preservation Committee</p> <p>Cuyahoga SWCD</p> <p>Watershed Communities</p> <p>Private Landowners</p> | <p>Started 2000</p> <p>Ongoing</p> | Not Applicable. | <ol style="list-style-type: none"> 1. The adoption and enforcement of good riparian and wetland setback ordinances will prevent future water quality impacts from the development of water resources. | <p>Within all 4 watershed communities, see no more than 5 riparian setback variances granted per year, with a goal of none.</p> |
| Phase II Regulations | <ol style="list-style-type: none"> 1. Work with watershed communities to implement the requirements in the Phase II stormwater regulations. 2. Work with the communities to maximize the results of the implementation measures. | <p>Ohio EPA</p> <p>Cuyahoga SWCD</p> <p>Environmental Consultants</p> <p>West Creek Preservation Committee</p> | <p>Started 1999</p> <p>Ongoing</p> | Local Communities | <ol style="list-style-type: none"> 1. The implementation of activities mandated within the Phase II stormwater regulations will decrease stormwater input to waterbodies and decrease nonpoint source pollution. 2. Cuyahoga SWCD is taking the lead on overseeing proper implementation of construction site | <p>Have at least 2 Phase II-related newsletter articles per year.</p> |

| Task | Implementation Activities | Responsible Parties | Timeframe | Funding Sources | Expected Water Quality Results | Short Range Goals |
|-----------------------------------|---|---|----------------------------|---|---|---|
| | | | | | <p>BMP's, which will significantly decrease sediment input to waterways.</p> <p>3. West Creek Preservation Committee is taking a secondary role in implementation of the Phase II regulations by helping to implement those recommendations made by Cuyahoga SWCD and private consultants hired by communities.</p> | |
| Dam Removals | 1. Acquire the funding and conduct engineering and construction necessary to remove the 2 existing lowhead dams within the watershed. | <p>West Creek Preservation Committee</p> <p>Northeast Ohio Regional Sewer District</p> <p>City of Parma</p> | 2007 and 2008 | Water Resources Restoration Sponsorship Program | <p>1. Improve fish migration within West Creek.</p> <p>2. Restore natural stream hydrology.</p> | Within 3 years of implementation of this WAP, no lowhead dams to exist on West Creek. |
| Implement Raingarden Construction | 1. Work with landowners to create raingardens | <p>Cuyahoga SWCD</p> <p>West Creek</p> | <p>2007</p> <p>Ongoing</p> | State and County Grant Funding | 1. Reduce stormwater input into area | Work with partners to implement at |

| Task | Implementation Activities | Responsible Parties | Timeframe | Funding Sources | Expected Water Quality Results | Short Range Goals |
|----------------------------|---|---|---|--|---|--|
| | <ul style="list-style-type: none"> on their property. 2. Assist with funding for raingarden creation. 3. Work with experts and landowners to construct raingardens. | <ul style="list-style-type: none"> Preservation Committee Watershed Communities | | <ul style="list-style-type: none"> Private Donations | <ul style="list-style-type: none"> waterways. 2. Reduce nonpoint source pollution into the watershed. | <ul style="list-style-type: none"> least 2 raingardens per year within watershed. |
| Greenway Trail Development | <ul style="list-style-type: none"> 1. Work with property owners and communities to develop right-of-way for the trail. 2. Acquire the funding for trail engineering and construction. 3. Oversee trail design and construction. 4. Future trail oversight and management. | <ul style="list-style-type: none"> West Creek Preservation Committee Cleveland Metroparks Watershed Communities Ohio & Erie Canal Association Private Landowners | <ul style="list-style-type: none"> 2000 Ongoing | <ul style="list-style-type: none"> Federal, State and Local Grants (i.e. ODNR Recreational Trails Program and Ohio and Erie Canal Association grants) Federal and State appropriations (i.e. TEA-21/SAFTLU funding) Private Donations | <ul style="list-style-type: none"> 1. Increase citizen access to natural areas. 2. Reduce traffic congestion and need for infrastructure expansion. 3. Tool to protect water features along which trails and greenways can be developed. | <ul style="list-style-type: none"> Develop a minimum of 1 mile of recreational trail per year on average. |

| Task | Implementation Activities | Responsible Parties | Timeframe | Funding Sources | Expected Water Quality Results | Short Range Goals |
|-------------------------------|---|--|------------------|---|---|---|
| West Creek Confluence Project | <ol style="list-style-type: none"> 1. Purchase and permanently protect the West Creek Confluence site. 2. Demolition existing structures. 3. Conduct engineering and design of a restored site. 4. Oversee construction of restoration measures. 5. Conduct monitoring of restoration project. | <p>West Creek Preservation Committee</p> <p>Northeast Ohio Regional Sewer District</p> <p>City of Independence</p> | 2007 to 2010 | <p>Water Resources Restoration Sponsorship Program</p> <p>Clean Ohio</p> <p>Local Matching Funds</p> <p>319 Nonpoint Source Program</p> | <ol style="list-style-type: none"> 1. Remove approximately 9 acres of impervious surface. 2. Significantly decrease nonpoint source pollution into West Creek and Cuyahoga River. 3. Increase terrestrial and aquatic habitat. 4. Provide citizen access to West Creek and Cuyahoga River Valley. | Complete protection and restoration of the West Creek Confluence site within 5 years of the implementation of this WAP. |
| Remove Septic Systems | <ol style="list-style-type: none"> 1. Convert existing areas with septic systems to sewer infrastructure. | <p>Ohio EPA</p> <p>Cuyahoga County Board of Health</p> <p>Watershed Communities</p> | Ongoing | <p>Local Funds</p> <p>Private Funding</p> | <ol style="list-style-type: none"> 1. Converting area septic systems to sewer will reduce bacteria levels within the watershed and will reduce other pollutant sources (i.e. personal care products, cleaning products, etc...). | Removal of an average of 50 home septic systems per year. |

6.3 Economic Redevelopment Focus Areas

Economic redevelopment is an ongoing issue in older, fully developed suburbs as housing needs change, consumer demand continues to evolve, and municipal governments seek to improve their tax base. For older communities to continue to be economically viable and a desirable place to live, they must plan for the future by re-creating themselves as economic hubs that will attract businesses, consumers, and residents. The West Creek watershed is included in this trend. The watershed, with the exception of the Rockside Road area in Independence, has commercial areas that were built primarily during the 1950's through 1970's, with the infill of more recent retail and office space. As attention begins to focus on West Creek, and the proposed West Creek Greenway Trail becomes reality, new opportunities will become available to use these resources as focal points for green economic redevelopment, utilizing the natural environment to everyone's continuing benefit.

The following section outlines possibilities for the future redevelopment of two economic hubs along the creek.

6.3.1 Design Approach

For several generations, commercial development has molded itself to meet the needs of customers driving automobiles. Building placement, parking lot layout and amount, and signage have been arranged primarily for the convenience of drivers. To satisfy this goal, the natural environment typically has been destroyed or ignored. Ravines, creeks, and wetlands have been filled if small, or viewed as a physical barrier to place behind the buildings along with the loading docks, delivery vehicles, and rubbish facilities.

Today, opinions are slowly changing. Instead of ignoring the natural environment, business opportunities are being built to celebrate nature. The Cuyahoga River was entirely an industrial zone, but now it is a popular entertainment area that focuses on the river. The Ohio & Erie Canal was an inaccessible, forgotten piece of early 19th century infrastructure, but now it is a popular recreational trail that has spawned successful businesses in communities such as Peninsula and Valley View. Even passive activities such as enjoying the view of a ravine and stream while dining has resulted in the construction of restaurants in Brecksville and Chagrin Falls.

6.3.2 Focus Areas

Two sites have been initially identified to explore potential changes and redesign. One of these sites is the area around the Broadview Road and Snow Road Intersection in the cities of Parma and Seven Hills. The other area is at the confluence of West Creek and the Cuyahoga River, at the north side of Granger Road in Independence.

Both of these locations have important potential to be an integrated part of the West Creek Main Trail and to provide a focal point for development that will enhance their communities. However, the ideas presented can be applied to other areas within the watershed experiencing significant potential for re-development and integration into West Creek.

6.3.3 Focus Area 1

Focus Area 1 is in the vicinity of the Broadview Road and Snow Road Intersection. This area is a mixed use environment consisting of the Midtown Shopping Center, office space, apartments, single-family homes, library, and the historic Henninger House. The existing uses, however, do not connect with each other in a defined manner and do not take advantage of West Creek as a highlight of the area.

Alternative A: Near Term

As a result of interest from the local community, a proposal has been presented to make physical improvements and establish an image, which begin to visually unify the area. The focal points of efforts would be to restore and showcase the already preserved Henninger House and begin to re-design the streetscape into a defined corridor. Further strategies would be to establish 14 acres of West Creek Valley woodlands into a natural park, display utility pole banners highlighting the district, install historic-style street signs and additional brickscaping and street trees, install a historical marker near West Creek Bridge on Broadview Road, and create a local business association to address further complementary development, public improvements, and business retention within the district.



The development of design guidelines is recommended for the district, in order to create a consistent design approach for elements such as streetscaping, building facades, and signage. Guidelines for commercial/office districts have been used with success both locally and nationally, including the proposed Crocker Park development in Westlake and the northwest quadrant of the Madison Avenue/West 117th Street intersection in Lakewood, as well as the communities of Cleveland, Cleveland Heights, Middleburg Heights, and Shaker Heights. Exploration of these examples will assist in developing the goals for the district and context for the guidelines.

Alternative B: Intermediate Term

Improved definition of existing property spaces and expansion of connections among the variety of uses is the goal of this phase. This could be accomplished by incorporating various design elements into the existing space, such as the addition of landscaping and paving materials to define vehicular and pedestrian circulation, the utilization of parking islands as filter strips, other drainage mechanisms, greenspace expansion, trail linkage to shopping and residential areas, and the introduction of entryway plazas to create gathering areas. It is recommended to have design guidelines in place in order to create a consistent and attractive area for shoppers, businesses, and residents.

Figure 40
Economic Redevelopment Focus Area 1 - Alternative A

Economic Redevelopment Focus Area 1 - Alternative A Broadview and Snow Roads

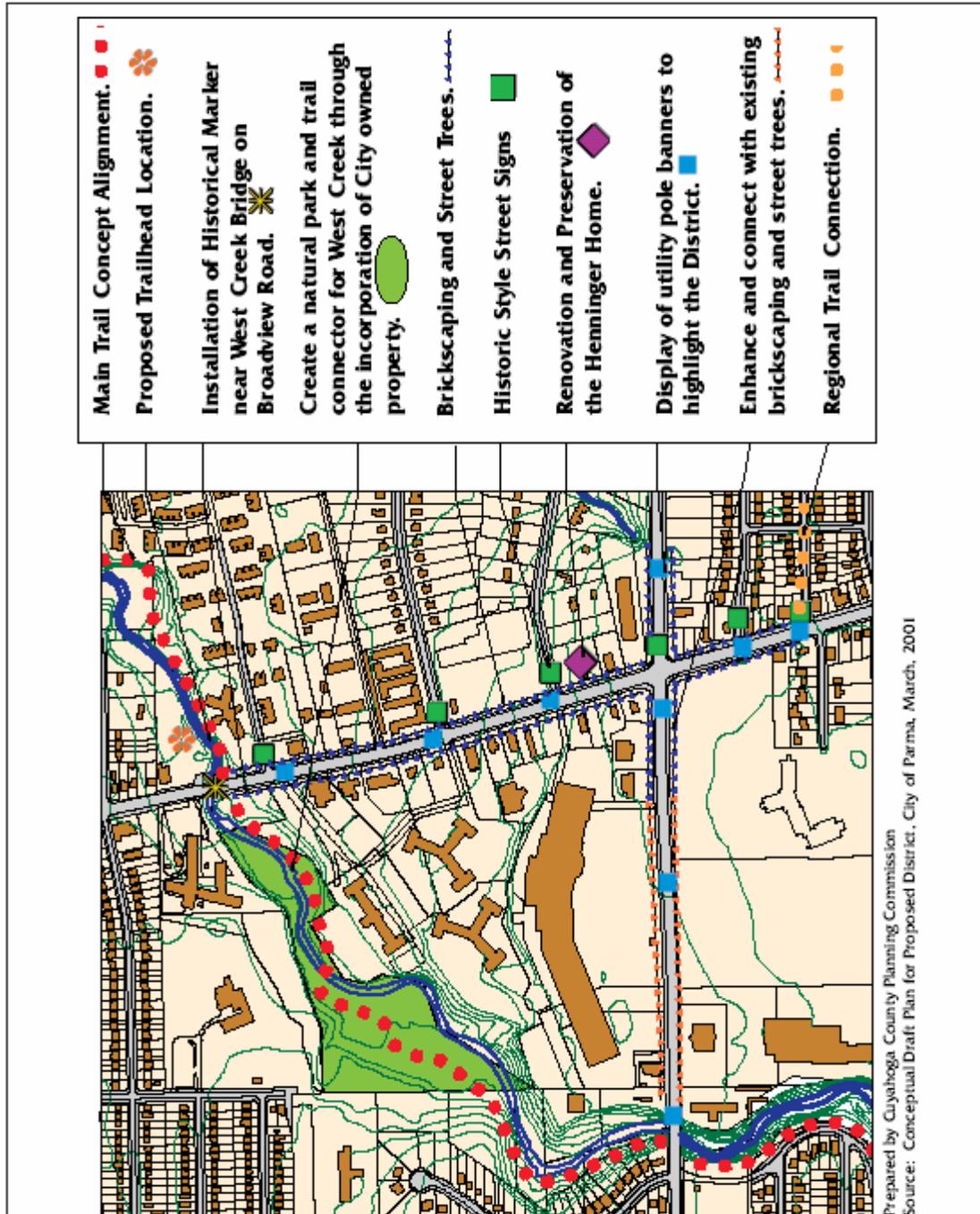
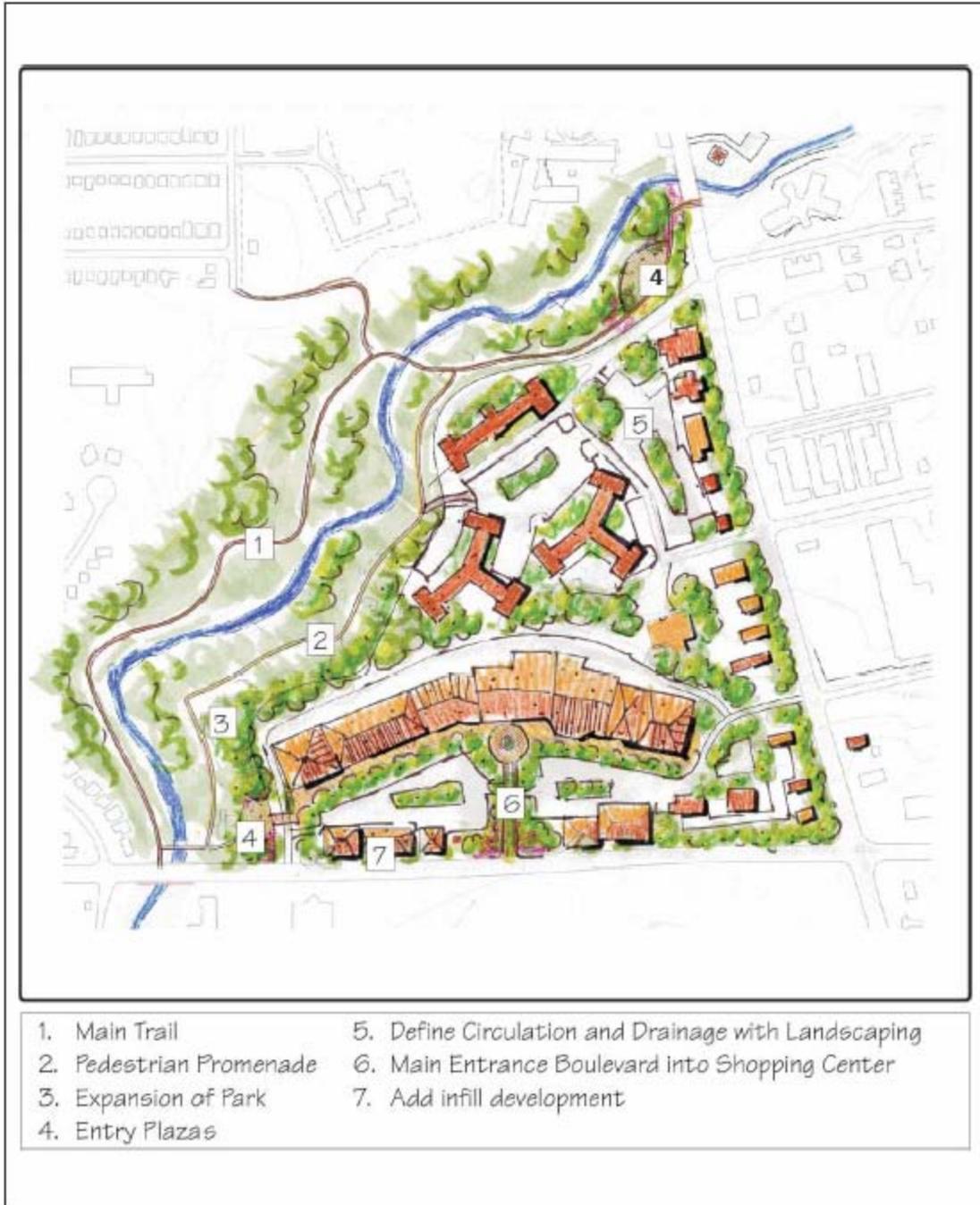


Figure 41
Economic Redevelopment Focus Area 1 - Alternative B

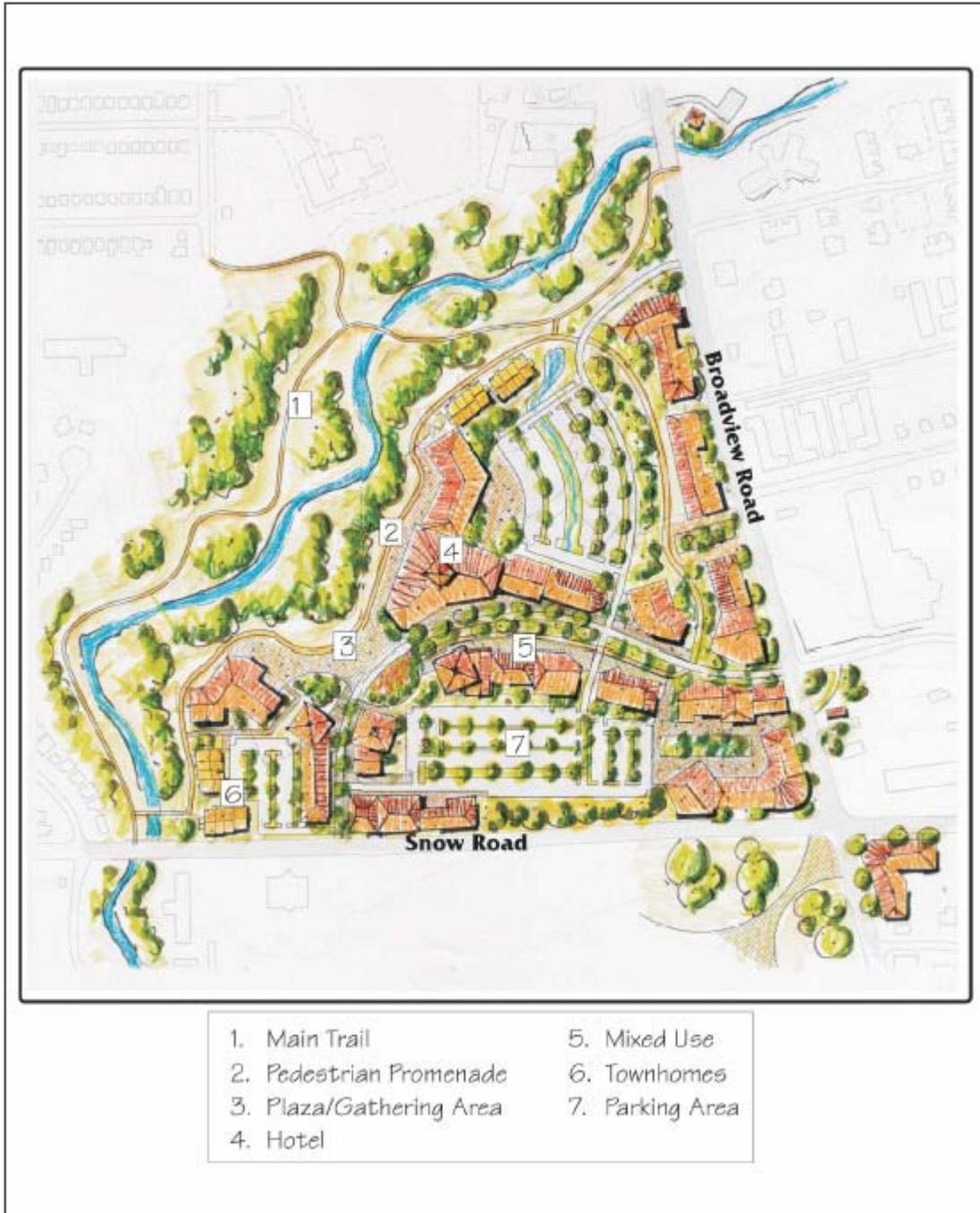
Economic Redevelopment Focus Area 1 - Alternative B



Prepared by the Cuyahoga County Planning Commission

Figure 42
Economic Redevelopment Focus Area 1 - Alternative C

**Economic Redevelopment
Focus Area 1 - Alternative C**



Prepared by the Cuyahoga County Planning Commission

Alternative C: Long Term

When it is economically feasible, the community should explore a new urban design for the area, focusing on West Creek as the unifying context for development and community life. The area would retain a diverse mix of uses, providing shopping, entertainment, recreation, housing, and public space for the community. Rather than a site that is visually dominated by parking spaces, the priority would be the relationships of buildings and the activity they generate to the natural setting of West Creek.

Appropriate combinations of uses could be selected from elements that would include offices, retail (specialty and neighborhood services), restaurants, a hotel, townhomes, apartments, walking paths, a gathering place for community events, plazas and overlooks, and connection to the West Creek Trail.

Nationwide, a number of successful economic revitalization projects can be reviewed as examples to explore when the opportunity exists for a dynamic redevelopment of this area, such as Napa, California; San Luis Obispo, California; Boulder, Colorado; Naperville, Illinois; White River Park in Indianapolis, Indiana; Hopkinsville, Kentucky; and the Riverwalk in San Antonio, Texas.

6.3.4 Focus Area 2

Focus Area 2 is located at the confluence of West Creek and the Cuyahoga River on the north side of Granger Road. The existing site is primarily an industrial area for various trades and is subject to flooding during large storm events. The amount of pavement is extensive, with no defined circulation pattern for parking or use as a truck entry and exit. There is no acknowledgment of the natural resources that surround the site as West Creek has been realigned and restricted to a narrow channel.



Alternative A: Intermediate Term

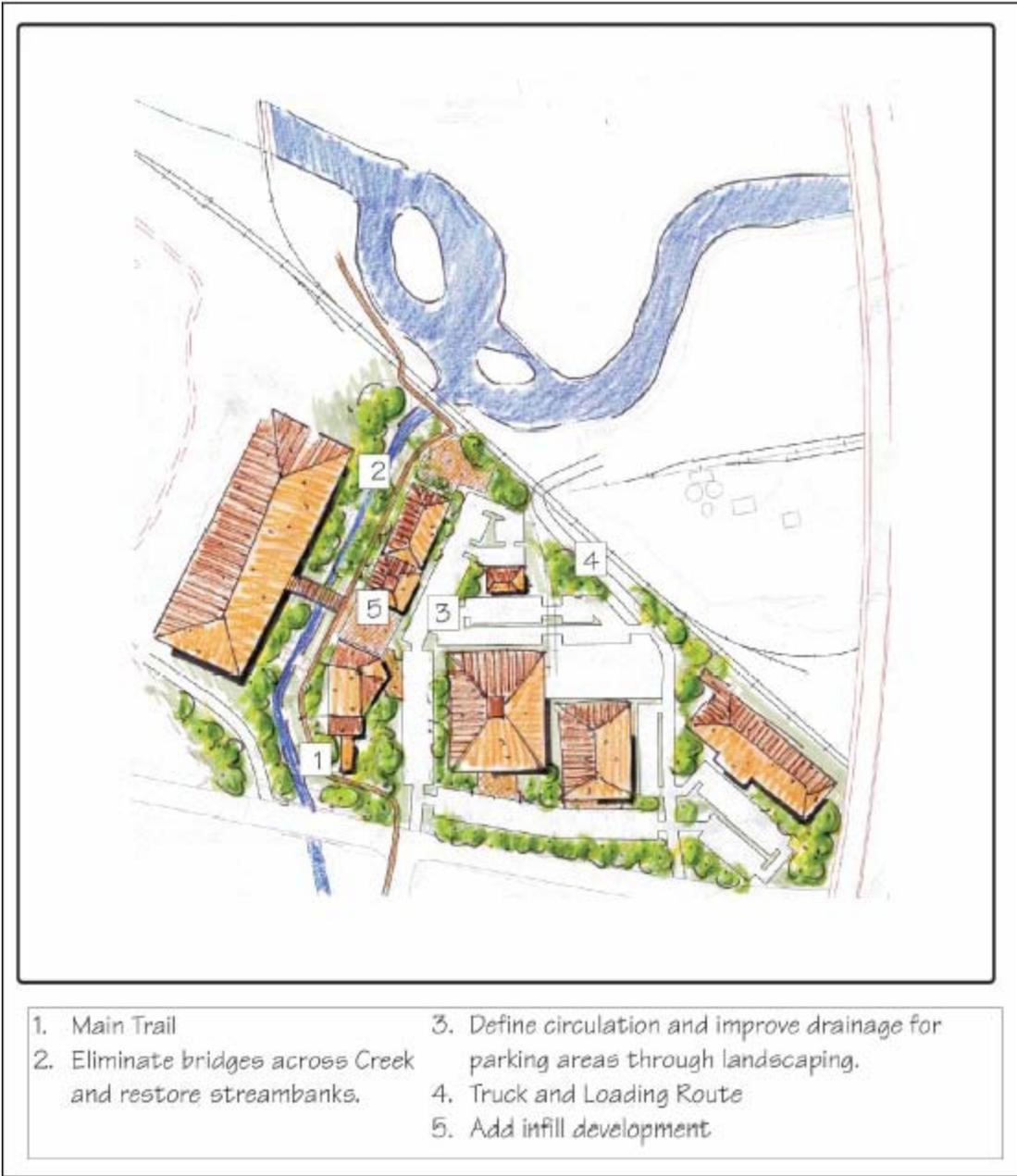
Improved definition of existing spaces and further protection and restoration of West Creek are recommended in this phase. This could be accomplished by incorporating various design elements: define a circulation pattern for vehicular traffic through use of creative landscaping, reduce or eliminate culverts as a part of bridge design, introduce the West Creek Main Trail as a part of a promenade connection along the creek, and improve natural qualities of the creek and its banks. It is recommended to have design guidelines in place in order to create a consistent and attractive area for employees and visitors.

Alternative B: Long Term

When it is economically feasible, the community should explore a new urban design for the area that sets a priority of focusing on West Creek as a context for development and community life.

Figure 43
Economic Redevelopment Area 2 - Alternative A

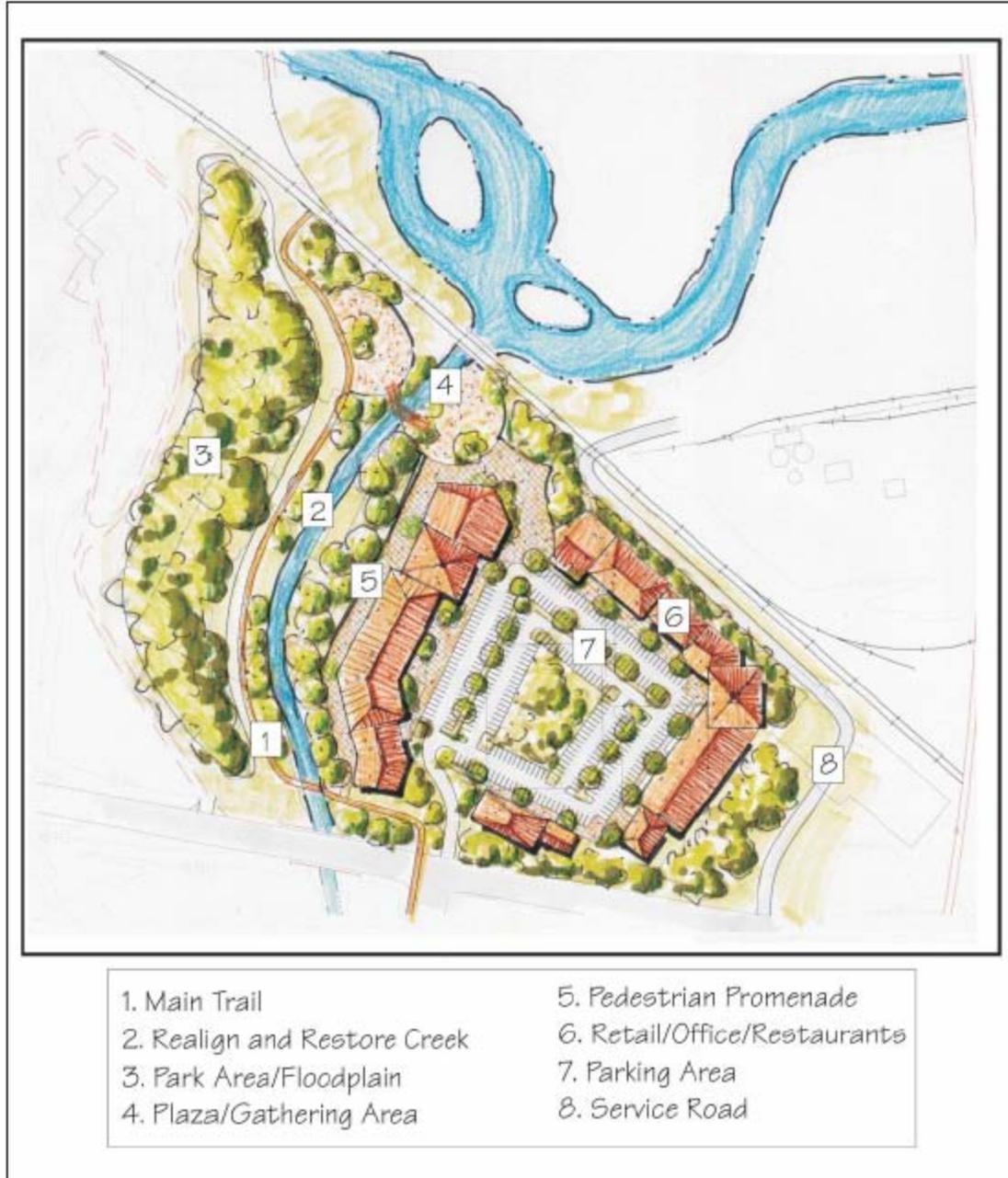
**Economic Redevelopment
Focus Area 2 - Alternative A**



Prepared by the Cuyahoga County Planning Commission

Figure 44
Economic Redevelopment Focus Area 2 - Alternative B

**Economic Redevelopment
Focus Area 2 - Alternative B**



Prepared by the Cuyahoga County Planning Commission

In the long term, the proposed revitalization could include creation of a mixed use environment incorporating light industrial, retail, restaurant, and offices. West Creek should be de-channelized, adjusted to its original alignment, and stream restoration measures undertaken. On the west side of the creek, expanded green space could be created, providing needed floodplain to help correct existing flooding problems, as well as to serve as a portion of a connection with the adjacent Cleveland Metroparks Ohio & Erie Canal Reservation across the Cuyahoga River. Finally, at the confluence of West Creek and the Cuyahoga River, the site contains a railroad line that is proposed for use by the Cuyahoga Valley Scenic Railroad when it expands service northward to downtown Cleveland. Depending upon the needs of the excursion line, a train stop with a waiting station could be located at the site.

CHAPTER 7 WEST CREEK MAIN TRAIL

7.1 West Creek Main Trail Concept Plan

The West Creek Corridor has great recreational resource potential as a trail and as an impetus for economic vitality for the communities through which it travels. Integrating the watershed with recreational opportunities provides a dual benefit for West Creek and its communities. The expansion of a trail network along a stream corridor will provide additional protection of open space and the stream as well as improve recreational resources for the communities. The development of a trail along West Creek and beyond will provide a linkage between resources such as the West Creek Reservation, the Cleveland Metroparks Canalway Reservation, and the Towpath Trail, and become part of the regional trail system that has embodied this region as a blueprint for greenway planning nationwide.

To provide a successful linkage for the communities, this plan has identified goals, developed program elements and outlined design guidelines for the future implementation of the proposed trail. The concept presented will assist in further discussion, design feasibility and implementation priorities for developing a trail along West Creek.



West Creek Trail

6.2 Greenway Trail Goals

Through research of successful trail networks and existing conditions of the West Creek Valley, the following goals have been identified for the West Creek Greenway Trail.

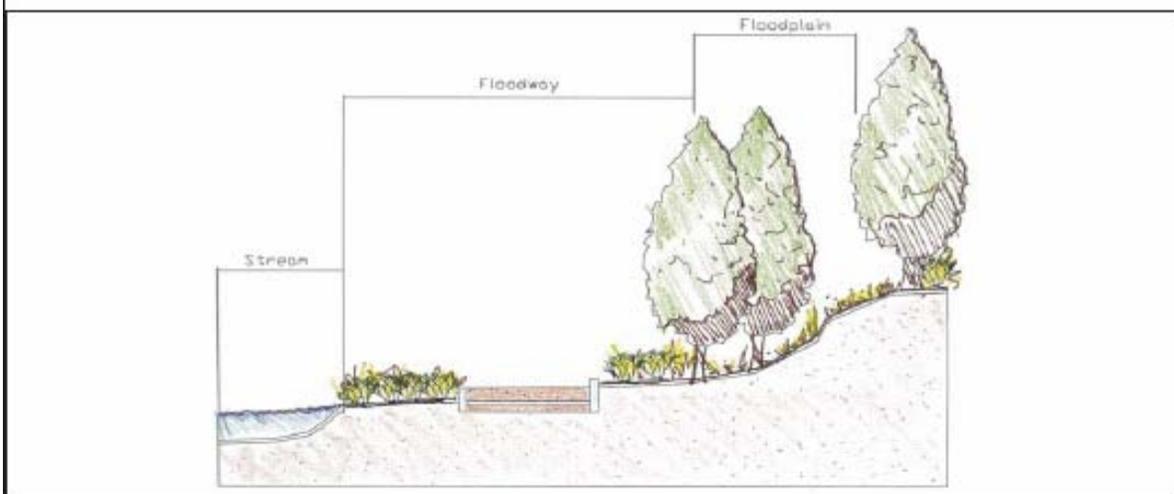
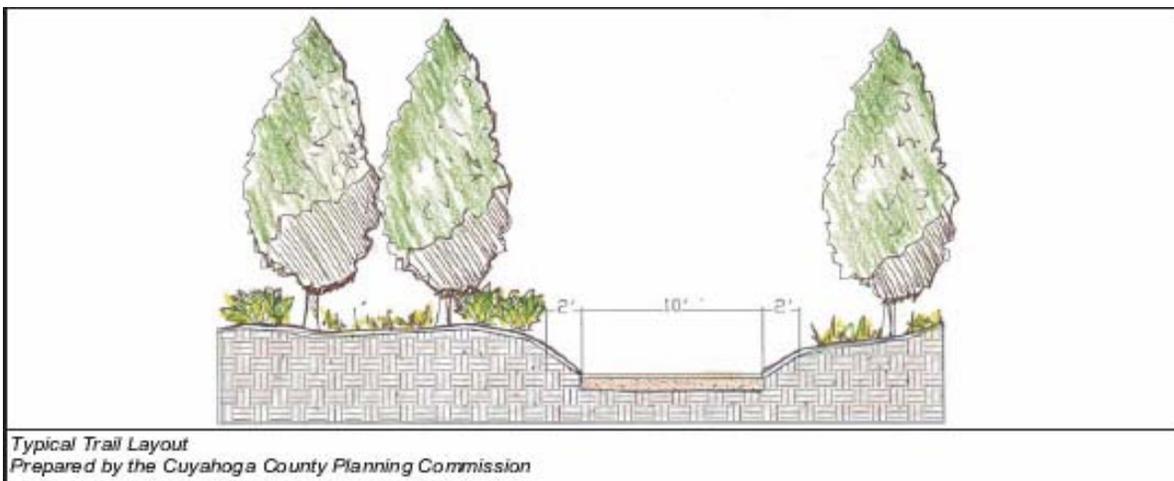
- *Develop a continuous multi-purpose trail along West Creek from the West Creek Reservation to the Ohio & Erie Canal Metroparks Reservation.*
- *Protect and restore the natural habitat and creek dynamics along the route through thoughtful design of the trail.*
- *Create interpretive facilities and trailheads at various locations to develop an educational journey, including features as specific as plant communities, forest area creek dynamics, and geologic contacts, for the users of the West Creek Valley.*
- *Manage the trail to ensure the safety of users, as well as nearby residents and businesses.*
- *Develop a trail system that considers safety, engineering feasibility, and property ownership in the design development process.*

Figure 45
West Creek Greenway Trail Concept Layout



- *Explore opportunities for economic redevelopment as part of the trail system and the rediscovery of West Creek.*
- *Develop a safe and easily traveled route for bike and pedestrian users by considering grade changes, road/bridge crossings, and access for medical emergency/safety force vehicles and maintenance purposes.*
- *Plan a trail route location to minimize impact on streambank erosion and creek hydrologic function by assessing factors such as, but not limited to:*
- *Consider results of the hydrologic/hydraulic model of estimated high water marks in annual rainstorm events, as well as the rate and volume of flow in these events, to determine proper location, elevation, and structural engineering of the trail or bridge structures.*
- *Consider stream bank erosion prone areas, especially on the bends of the creek, to minimize trail impact and develop protection/restoration measures for the streambank as*

Figure 46
Concept Trail Layout



part of the trail design.

- *Integrate through interpretive exhibits and overlooks the historical and natural features of the West Creek Valley as part of the trail system.*
- *Consider property ownership and conservation easement options for land acquisition for the trail network,*
- *Develop trailheads at prominent locations to provide parking areas, information kiosks, restroom facilities, and picnic areas.*
- *Potential locations for trailheads include:*
 - Bamboozles property on the east side of Broadview Road
 - Brooklyn Heights Park
 - North side of Granger Road and the Cuyahoga River
- *Create a consistent design theme for these trailheads that reflects the West Creek Valley's beauty and heritage.*
- *Implement stormwater/water quality improvements into the trail design. Potential improvements include, but are not limited to:*
 - Wetland restoration to assist in flood control and water quality.
 - Retention/detention basin construction to capture and slowly release stormwater volume.
 - The inclusion of bioengineering practices for streambanks to assist in controlling erosion rate.
 - The incorporation of structural solutions for some areas of concern along the creek.
- *Encourage economic development opportunities that enhance neighborhoods, make connections to the main trail, and focus attention on West Creek.*
- *Where appropriate, explore conceptual design alternatives that consider mixed-use economic development that satisfies community and trail user needs.*
- *Develop accessibility requirements for trails and proposed facilities to allow safe access for persons of all abilities.*
- *Develop a natural resources management for West Creek Trail and its immediate vicinity.*
- *Develop a unified signage system for use along the entire trail corridor.*
- *Develop an interpretive plan to determine the approach for exhibit and access for features to interpret in an overall concept.*
- *Develop design criteria that promote the use of sustainable building materials and practices for the trail network, as a model for trail design in the region.*

7.2.1 Design Guidelines

To develop a consistent and aesthetically pleasing trail and park system, design guidelines have been formulated to create a contiguous theme and view of the West Creek Trail corridor. These guidelines will assist in determining the appearance and approach for the design and engineering of the trail as a whole entity.

The West Creek Greenway Trail will be designed to exemplify its natural resources, provide an integrated experience for the user through sustainable design principles and a holistic design approach, and to provide a model for the community and region for future trail and facility design. Sustainable design principles will be forefront throughout the design process so that the trail will be an example of humanity and nature co-existing in a mutually beneficial setting. Other sustainable design principles to be incorporated will be accepting responsibility for the consequences of design decisions, the creation of objects of long-term value, eliminating the concept of waste, relying on natural energy flows, and the treatment of nature as a model and not as an inconvenience to be controlled (*Guiding Principles of Sustainable Design*, National Park Service, 1993)

7.2.2 Building Materials

The purpose of selecting materials that are considered “green” products is to maximize the long-term efficiency of a facility and minimize harmful environmental and human health impacts. There are various definitions of “green” products. For example, the National Park Service uses the following parameters (every material does not necessarily meet every classification, however the overall goal is to consider the entire life cycle of a material and make decisions that include environmental factors):

- Use of sustainable materials that are renewable and that are harvested in a sustainable manner.
- Use of materials that do not emit toxic gases, or are not made of hazardous substances.
- Uses materials that are byproducts of other production processes, or uses less material overall to perform a particular function.
- Uses recycled materials.
- Select energy efficient materials that utilize less energy/water than other products performing the same function.
- Use of biodegradable materials that are either compostable, or that break down under natural conditions into innocuous particles.
- Whenever possible select recyclable materials that can be reprocessed for their original uses again, or re-utilized for another use.
- Utilize materials that have an exceptionally long life-expectancy compared to other products performing the same function. (*Environmentally Responsible Building Products*, National Park Service, 1992)

7.2.3 Trail Surface Selection

Asphalt is a reliable, sturdy, paving material, and it is a cost-effective approach for a low maintenance trail surface. The drawbacks of this material however, are that it is a non-porous surface, that it contains chemicals that may impact the surrounding wetlands and water quality, and that it is not aesthetically pleasing in an otherwise natural environment. Asphalt is locally used by the Cleveland Metroparks in trail construction.

Crushed limestone provides a porous surface without the issues of chemical implications. There may be maintenance concerns with the use of this material in areas subject to flooding. Additionally, crushed limestone should be used only in situations where slopes have a five percent grade or less. In areas with greater slopes, the limestone screenings migrate downslope. Crushed limestone is used locally by the Cuyahoga Valley National Park in trail construction.

Crushed limestone with stone chip-and-seal surfaces are an alternative for areas prone to flooding and that have steep slopes. This surface utilizes an asphalt base that is covered with a stone chip-and-seal surface. It performs well when flooded, and the stone surface has an appearance similar to that of a crushed limestone trail. This surface application is used locally by the Cuyahoga Valley National Park in trail construction.

Road Oyl/Resin Pavement is a non-porous surface similar to asphalt, but one that uses pine resin as the binder material, providing a solid surface without the environmental implications of asphalt. It has been used across the country on various trail projects, including cold climates. The proper mixing and application of this surface is paramount to its success. Road oyl/resin pavement has been used in trail construction by the Chequamegan-Nicolet National Forest, Wisconsin.

Other porous paving options, such as a demonstration project at Walden Pond, Massachusetts, are potential alternatives in the future. The technology of these surfaces is still evolving; however, and one problem identified in past projects is the clogging of the porous surface with sediment, thus raising maintenance costs.

The use of mulch (wood chips) is only recommended for neighborhood connections. Mulch requires regular maintenance due to its continual biodegrading and use on slopes.



The user groups that are desired on the trail may also influence the choice of surface

material. For example, walkers and bicyclists can use a variety of surfaces, however in-line skaters can not efficiently use crushed limestone or mulch surfaces.

7.2.4 Trail Width Considerations

The width of the trail should safely accommodate two-way use. The typical width used locally is eight or ten feet. Generally, there is also at least a two-foot wide shoulder on both sides of the trail that is free of obstacles and hazards. For example, depending on conditions such as sun or dense shade, the shoulder could be mown grass or the typical forest ground covering.

Other issues also need to be taken into account when determining the appropriate width of the trail. For example, some funding sources may require a specific standard width, but other considerations include the location and width of the trail in relation to its impact on West Creek's hydrologic function, erosion and slope stability, and fragile plant and animal habitats.

7.2.5 Maintenance/Emergency Vehicle Access

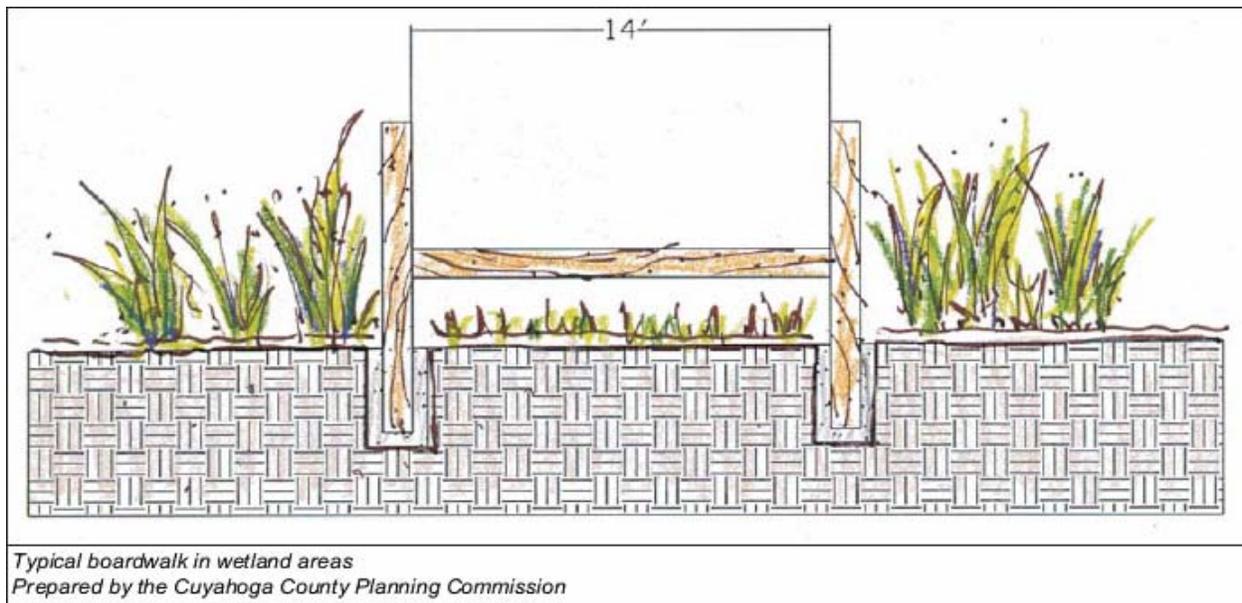
Ample access for maintenance and emergency vehicles can be provided with an eight- or ten-foot wide trail with shoulders. If a bridge will be needed for vehicle access, it will need to have a width equal to the trail plus shoulders. If a bridge will not be needed for vehicle access, its width can be more flexible to fit the situation. If a portion of the trail can not be accessed directly, an access plan is needed in order to locate access points in proximity to the trail, such as television tower access drives, neighborhood connection points, or other easements.

7.2.6 Boardwalks/Bridge Structures

Boardwalks are recommended in areas that have fragile plant communities, wetland areas, and areas prone to major flooding events. Boardwalk materials include wood or plastic. Non-pressure treated wood can provide a sturdy boardwalk surface, but may not provide the longevity of other materials and may require more maintenance over time. Recycled plastic products can provide an environmentally friendly alternative for a boardwalk and may create less maintenance demands, however following the recommendations of the manufacturer concerning design and installation is important in order to prevent the plastic decking from warping over time.

Bridge structures can vary in type due to terrain and purpose. Once the uses and location of the bridge are established, the design considerations can be determined. Trail bridges need to be assessed on an individual basis on structure selection to determine use and access requirements. For example, pre-fabricated bridges can be built of wood, steel, concrete, or plastic, and bridge manufacturers can provide assistance with engineering and design issues.

*Figure 42
Example Boardwalk Design*



Where terrain is very limited due to steep slopes, a cantilever bridge may be an option. These structures incorporate a bridge anchored to a retaining wall system, along with slope stability measures. This is a costly design feature, and all trail route alternatives should be analyzed before proceeding with this option.

7.2.7 Signage and Interpretive Exhibits

Signage serves as a tool to provide directional and safety information. The design and material used for these signs should be consistent, easy to read, and attractive. These signs could include small directional signs for facilities, as well as provide directions to local establishments. Signage could also be included as part of information kiosks that display park maps and amenity locations.

A graphic artist and sign fabricator should be part of the team that develops signage. The West Creek Valley has opportunities to tell users the stories of the valley through wayside interpretive exhibits or other media. The development of a comprehensive interpretive plan will assist in outlining an interpretive approach for the entire valley and its resources. Once this approach is determined, the design, materials, and layout can be considered.

A wayside interpretive exhibit should display a graphic or description of an area in a simple and cost effective manner. Porcelain enamel is the preferred material for outdoor exhibits. It withstands weather and vandalism and is low maintenance. The design of the panel should be determined by an experienced exhibit specialist using the findings of this document and the recommendation of the interpretive plan. Typically, a wayside panel is 36 inches by 24 inches. To increase interest, the panel should include visuals in addition to text.

There are varying types of bases that can reinforce the design theme of the park. The National Park Service has a number of bases they use as project standards, and it is recommended that these examples be used as a starting point.

7.2.8 Picnic Pavilions and Other Trail Elements

Picnic pavilions, as well as other site elements such as trash receptacles, benches, and signage, should be made of environmentally responsible materials and be low maintenance. The design of these features should reflect the overall design theme of the Greenway Trail and West Creek Reservation in a consistent and attractive manner. Consultation with a landscape architect is recommended to determine the location, style, and construction of these elements and ensure that they meet the needs of visitors and address maintenance/safety issues.

Bollards are designed and utilized to assist in separating vehicle and trail users, as well as to restrict motorized access onto the trail. A variety of bollard types are currently being used. For example, collapsible bollards prevent trail access by vehicles, but provide access in emergency situations for security or medical vehicles or repair trucks. The installation of

Figure 48
Example Educational Panel Design

| | |
|--|--|
| <p>CANTILEVERED LOW PROFILE BASE This new version of the low profile base has become the preferred style for NPS interpretive exhibits. The base's simple, unadorned form helps to diminish its visual intrusion and makes it appropriate for any park landscape. Made entirely of welded aluminum extrusions, the base assembly will not rust or otherwise corrode, even in harsh marine environments. A textured finish, polyurethane enamel paint adds to the base's durability. When necessary, exhibit panels can be easily replaced by removing rivets that secure the top of the frame assembly.</p> <p>Examples of the Cantilevered Low Profile base can be seen at Arches National Park.</p> | |
| <p>Panel Sizes (WxH): 24"x18", 24"x24", 36"x24", 42"x24", Custom Front Edge Height (Z): 32" Angle: 30 or 45 Degrees Colors: Medium Gray, Dark Brown, Custom</p> | |
| <p>National Park Service, Division of Wayside Exhibits</p> | |

these bollards should be considered at access points of the trail or roadway intersections, and should be determined in the final design phase of the trail layout. The materials and appearance of the bollards should reflect the design theme for the entire valley and its trail elements.

7.2.9 Landscaping

Additional landscaping to the Trail area should be minimal and designed to reflect the surrounding natural resources in plant selection and layout. The amount of landscaping will need to be determined on a project basis, and will vary along the corridor. Determination of landscaping needs should be assessed by a landscape architect, natural resource specialist and/or stream specialist to ensure proper plants and techniques will be used for stream protection, habitat restoration and aesthetic quality. The plants should be native and non-invasive, low maintenance, water efficient, and provide an appealing appearance for the visitor. Plants should be selected by a certified nurseryman and the use of B&B plants (balled and burlapped) or bareroot plants is recommended.

CHAPTER 8 IMPLEMENTATION

8.1 Priority Areas of the Watershed

Due to the high degree of urbanization and impairment within the West Creek watershed, it is difficult to discern areas with a higher priority than others. The goals listed in Section 6.1 (beginning on page 105) need to be applied to the entire watershed in order to have a significant and long-lasting beneficial impact on West Creek water quality. The WCPC has been working to fulfill those goals over the last several years; however, to date, the organization's efforts have been directed in the City of Parma and to a lesser extent the Village of Brooklyn Heights along the West Creek mainstem. The WCPC is seeking to expand its mission throughout the communities of Independence, Seven Hills, and Broadview Heights and will continue to do so as this Watershed Action Plan is enacted.

Moreover, restoration, preservation, and outreach programs conducted within the West Creek watershed are frequently performed as opportunities arise, as specific funding is available, or as offers and partnerships are extended. However, it is necessary to have projects and plans already available when such opportunities surface and, therefore, a listing of priority areas is provided to help guide future watershed activities.

Riparian Protection Along West Creek and Its Tributaries

One of the greatest threats to West Creek and its watershed is irresponsible development of undeveloped greenways and riparian and wetland areas. As discussed throughout this document, these areas have numerous functions within the watershed and are vital to the health of West Creek. These areas are under the continuous threat of irresponsible development as long as they are not protected through conservation easements.

The riparian protection goal is to have 90 percent of the riparian land along the West Creek mainstem and 70 percent of riparian land along tributaries to West Creek protected under conservation easement by 2020. This will be an ongoing effort building upon the past successes of the WCPC. Organizations that may be able to assist with land protection include the WCPC, the City of Parma, the Village of Brooklyn Heights, the City of Seven Hills, the City of Independence, the City of Broadview Heights, CSWCD, the Natural Resources Conservation Service, the Western Reserve Land Conservancy, and the Trust for Public Land.

Stormwater Management and Nonpoint Pollution

Due to the urbanized nature of the West Creek watershed, the large volume of stormwater and the pollutants it can transport with it are of great concern. Reducing the amount of stormwater that reaches West Creek unabated is a paramount priority. Providing riparian habitat or bioretention basins to filter the stormwater pollutants are equally important, as is reducing pollutants in the urban environment that stormwater can pick up and transport into West Creek.

Of primary importance is to quantify the approximate amount of stormwater produced by impervious surfaces throughout the West Creek watershed. This process will begin in July 2005 and be completed by December 2007 with the aid of NEORSD. Once the approximate amount

of stormwater generated throughout the watershed has been determined, a reduction goal can be stated. Another project to be implemented alongside stormwater reduction, is stormwater quality monitoring for common urban pollutants to be conducted in the seven “Reach” areas of West Creek previously identified on Figures 13 through 19. Monitoring in three of the seven reaches should begin in June 2006 and in all of the seven reaches in June 2008.

West Creek Headwaters

Much of the headwaters area of West Creek have already been culverted or significantly impaired by irresponsible development. Since the headwaters have a significant impact on West Creek water quality, these areas should be restored to the extent feasible and preserved through conservation easements where still intact. Outreach programs also need to be instituted in the communities that comprise the headwaters to make them aware of the tremendous resource that flows through their backyards.

By June 2006 all culverted and impaired areas of the West Creek headwaters and their tributaries should be field identified. Based upon these findings, a specific lineal footage of culverted and impaired waterway will be proposed for restoration. Resources in the headwaters project will include the City of Broadview Heights, the City of Parma, the City of Seven Hills, the Cuyahoga Planning Commission, CSWCD, and the WCPC.

West Creek Confluence With the Cuyahoga River

Much of West Creek and its tributaries have been altered (i.e. Hydromodification) or seriously impaired due to industrial or commercial activities in this area of the watershed. Looking at alternative economic development models for this area of the watershed would greatly benefit both West Creek and the Cuyahoga River, as well as the communities and neighborhoods within and near this area.

A partnership between the WCPC and NEORSD, with funding from the WRRSP, is working to restore several segments of impaired West Creek mainstem in this area. Project designs and the acquisition of conservation easements is underway with construction projected for 2006 and to be completed by 2007. Those areas of the mainstem and its tributaries that are unable to be addressed during the WRRSP restoration work, should be targeted through other restoration opportunities. The long-term goal is to have all segments of the West Creek mainstem restored to as natural a state as feasible by the year 2018.

An additional goal for this area is to enact the economic redevelopment scenarios described in Sections 6.3.3 and 6.3.4. Efforts toward that goal should begin promptly with potential project partners including the City of Brooklyn Heights, the City of Independence, the Cuyahoga Planning Commission, WCPC, the local Chambers of Commerce, and local development agencies.

West Creek Mainstem and Tributaries

There are significant segments of the West Creek mainstem and its tributaries that need to be protected through conservation easements. Several restoration activities have occurred and are ongoing, but they need to be expanded to address all impaired waterway sections throughout these areas.

The long-term goal is to have all segments of the West Creek mainstem restored to as natural a state as feasible and to have all segments meet Warmwater Habitat, Primary Contact Recreation Full Attainment status by the year 2020.

Of equal importance is the identification of all tributaries to West Creek, areas where they have been impaired or otherwise modified, and areas where restoration projects are conceivable. The identification of impaired tributaries will begin in June 2006 with a projected completion date of June 2007, at which time recommendations for restoration can be made. Resources to be utilized include the WCPC, NEORS, the Cuyahoga Planning Commission, the Ohio EPA, and CSWCD.

Wetlands

Wetlands are a rather scarce, albeit very valuable, commodity within the West Creek watershed. It is important to attempt to preserve those remaining wetland areas within the watershed and to restore those that have become degraded or impaired. The WCPC has previously conducted wetland restoration projects within the West Creek Reservation. Those efforts need to be expanded throughout the watershed.

The immediate and ongoing wetlands goal is to create or restore one wetland area within the watershed each year. One wetland restoration (the West Creek Reservation Washout Project) project has already been completed in 2005. Beginning immediately, all potential wetland areas of 0.25 acre or more need to be identified within the watershed, with a projected completion date of October 2006. Once the wetland areas are known, recommendations for preservation and restoration can be made. Potential resources include the CSWCD, the Cuyahoga Planning Commission, and the Ohio EPA.

Riparian and Wetlands Setback Ordinances

As previously discussed in Section 5.2.1, community ordinances can provide an extremely important vehicle for improving and protecting water quality and health. The cities of Parma, Brooklyn Heights, and Seven Hills currently have riparian setback ordinances in one form or another. The City of Parma also has a wetland setback ordinance. The long term goal is to have riparian and wetland setback ordinances in all communities within the West Creek watershed. However, the value of such ordinances is dependent upon local authorities consistently resisting pressure to grant variances or other ordinance modifications.

Efforts to enact riparian and wetland setback ordinances in each of the communities within the watershed are on-going with a completion goal of 2009. Resources to attain riparian and wetland ordinances include the WCPC, the CSWCD, the Natural Resources Conservation Service, the local governments and their Law Directors. The ultimate goal is for the enactment of a statewide riparian and wetland setback as a part of the Ohio Administrative Code. A statewide mandate would require the cooperation and diligent work of all watershed and grassroots groups throughout the State.

The West Creek Greenway Trail

The creation of the West Creek Main Trail, with linkages to many neighborhoods in the water-

shed, and a connection to the Ohio & Erie Canal Towpath Trail and Cleveland Metroparks system will provide numerous benefits to the communities, citizens, businesses, and employees within the West Creek watershed. It will encourage and promote not only a healthy lifestyle, but also a healthy environment. Funding and land acquisition will take many years and the work of multiple project partners for such a trail system to be accomplished.

It is important to note that strategies implemented to attain one goal (i.e. riparian and wetland protection) may very well help to reach a different goal (i.e. reduced stormwater flows into West Creek). Watersheds are dynamic, interactive entities that are affected by a myriad of daily actions and activities. Vital to the future of West Creek and its watershed are decisions made by its citizens, businesses, and governmental entities. When the people of the West Creek watershed begin thinking about the impact they have on it, positive results will spring forth and West Creek, Cuyahoga River, and Lake Erie Basin water quality will all be better off due to it.

8.2 Education

Education and awareness of the people living, working, and doing business within the West Creek watershed and its connection to the communities' landscape is requisite to increasing the value and importance of its role in the daily lives of those individuals. Forming programs and initiatives to expand this awareness are vital to the success of this plan. Furthermore, such programming should reflect the unique capabilities of the watershed, and the needs and interests of its residents.

Outdoor education, passive recreational activities, and interpretive initiatives provide experiences for environmental learning, and present opportunities to emphasize the concepts of watershed connectivity and protection, the influence of grassroots efforts, the importance of proper stewardship, and restoration of natural systems in urban environments.

The formation of partnerships with entities such as Cleveland Metroparks, local schools, universities, and stakeholder organizations is critical to successfully developing and implementing programming and educational initiatives. Cleveland Metroparks has developed a management plan for the West Creek Reservation that outlines a framework for programmatic objectives and operation. The focus of the reservation will be on environmental education; a stewardship center will be developed to support field activities as well as provide indoor activity space for training, discovery, resources, and other gatherings. The programming and interpretive development objectives laid out



A hike specifically conducted for teachers within the West Creek Preserve

in the West Creek Reservation Management Plan are appropriate for application throughout the watershed and include the following:

- Promote stewardship and sustainability issues within the watershed communities, encourage a sense of relationship to nature;
- Preserve discovery-driven, experience-based opportunities within nature, serve as a model for conservation development (green building) and restoration activity;
- Develop and implement school programming that assists students in achieving benchmarks and indicators as they pertain to the Ohio Academic Content Standards; and
- Offer environmentally focused professional development seminars and workshops for educators.

The natural landscape of the West Creek watershed lends itself well to outdoor learning. Easily accessed sites in the watershed provide a diverse array of natural resources and can serve as “land labs”. Sites at major habitat zones provide opportunities for sampling and learning areas. The West Creek Urban Wetlands, a collaborative project with Tri-C, offers one such opportunity for wildlife study, water quality examination and restoration practices.

The Watershed communities encompass three municipal school districts. Partnerships with these districts in the development of programming that incorporates watershed issues into curricula will ensure successful implementation and promote collaboration between schools. There are eight schools, elementary and secondary, within close proximity to the creek, some of which are located directly adjacent to West Creek. There is great opportunity for these schools to work together to develop and implement cooperative programming such as a water quality monitoring, riparian assessment programs, and stewardship and restoration initiatives at different sites along the creek. Dissemination of information from these programs can be made to schools inside and outside the watershed. Such programming can serve as a model of environmental education initiatives for other urban watersheds.

Example School Curricula

- Develop partnerships with local school districts and private/parochial schools to include local watershed issues as part of the science and math curricula, as well as encourage participation from local scout troops and other youth and civic organizations.
- Proposed Land Lab facility could be used as an outdoor classroom for local public school districts, private/ parochial schools, and Tri-C - Western Campus.
- Form a program with high schools to encourage students to complete an environmentally-based senior thesis that includes field research, data analysis, and report preparation. A program of this type would be especially beneficial to students interested in a collegiate science major.
- Form a partnership with local universities encouraging students to do environmental or scientific graduate work locally within the watershed to reduce travel costs to the student and provide additional scientific data on the area.
- Additional examples of potential programs include, but are not limited to:
 - The establishment of water quality monitoring programs;
 - The purchase of stream monitoring kits for both aquatic insect exploration or water quality assessment;

- Link with existing education programs to assist in establishing curricula;
- Center for Great Lakes Environmental Education - Provides educational material for educators on the Great Lakes Basin.

Adult educational programming that addresses stream biology and examines watershed issues such as stormwater management and nonpoint source pollution should be offered. Many residents in the watershed live adjacent to West Creek or its tributaries and the offering of structured programming relative to best management practices for the “stream dwellers” will assist in watershed restoration and preservation efforts. Examples of best management practice education include seminars on the impact of landscaping and lawn care with pesticides and herbicides on the watershed, the over-fertilization of lawns, ways to reduce impacts from car washing, and the disposal of typical household cleaners.



Volunteers at the 2005 RiverSweep event held at the West Creek Preserve

Existing educational strategies and programming of other entities such as NEORS, CSWCD, and Cuyahoga River RAP can be incorporated into adult and student programming, and mutual collaboration may provide new educational initiatives particular to the West Creek watershed.

The continued development of recreational opportunities in the watershed, establishing a trail system, and providing venues for learning activities are vital to encouraging and facilitating environmental education. Partnerships that support such recreational initiatives will continue to be developed and expanded, providing resources for identifying property ownership, determining trail alignments and trailhead locations, identifying potential interpretive areas and examining regional trail connections.

Active volunteer programs within the watershed can also be an educational venue, in addition to accomplishing needed work and giving individuals a sense of proprietorship.

Education is a critical component in achieving the future viability of the watershed as it relates to stormwater/water quality and greenspace protection. Communication with local governmental officials, and the offering of education and instruction that supports watershed protection strategies, will provide a sound basis for model ordinances and zoning options.

Family and special event programming for watershed visitors, residents, groups such as scout troops and the general public will be offered. Events can include guided hikes, special interest programs such as birding, art, plant species identification, and projects that engage the commu-

nity in hands-on activities such as stream restorations and clean-ups. Public presence, through display and presentation of watershed information and issues at community sponsored events and outings, provides a forum to inform the public and solicit input regarding watershed management, ensuring the communities continued role as a stakeholder within the watershed.

8.3 Funding

The initiatives outlined in this plan will take a number of years to implement and management will be an ongoing necessity. Assembling funding for projects is paramount to the progress and success of the plan. With the varied demands placed on local government budgets, municipalities should be viewed as a limited source of project funding to be combined with other financial resources.

There are a number of funding partnerships and grants available as potential resources to implement the recommendations outlined in this plan.

- Trail Planning/Implementation-Open Space Protection
 - *Rivers, Trails and Conservation Assistance, USDOJ*
 - *Urban Parks & Recreation Recovery Program, USDOJ*
 - *Land and Water Conservation Fund, USDOJ, ODNR*
 - *Lands Legacy Initiative (Proposed, USDOJ)*
 - *NatureWorks, ODNR*
 - *Recreational Trails Program, ODNR*
 - *Ohio Wildlife Diversity Projects, ODNR*
 - *Ohio Coastal Management Assistance Grants, ODNR*
 - *Ohio & Erie Canal National Heritage Corridor Grant Program, USDOJ*
 - *Clean Ohio Conservation Fund, Ohio Public Works Commission (pending reauthorization)*

- Watershed/Water Quality/Stream and Wetland Restoration
 - *Wetlands Protection: Development Grants, USEPA*
 - *North American Wetlands Conservation Fund, USDOJ*
 - *Stream and Wetland Mitigation Funding, Private*
 - *Watershed Protection and Flood Prevention, USDA*
 - *Wetlands Reserve Program, USDA*
 - *Habitat Conservation, NOAA, Dept of Commerce*
 - *Section 319 - Nonpoint Source Pollution, OEPA*
 - *Water Pollution Control Loan Fund, OEPA*
 - *Lake Erie Protection Fund, Ohio Lake Erie Commission*
 - *Urban Stream Resources Improvement Grants, Ohio Division of Soil & Water*
 - *Water Resource Protection and Restoration Grants, Ohio Division of Soil & Water (Only local Soil & Water District office can apply for the above two grant programs)*
 - *Wetland Restoration, ODNR, Division of Wildlife*
 - *Five-Star Restoration Challenge Grant, USEPA, National Fish&Wildlife Foundation*
 - *North American Fund for Environmental Cooperation*
 - *Great Lakes Restoration Grants, NOAA/ODNR*

- *Great Lakes Program Funding, USEPA*
- *Great Lakes Commission Grants, Basin Program, Great Lakes Commission*
- *Monitoring Equipment Grant, ODNR, Division of Soil & Water*
- *Water Resource Restoration Sponsor Program&Water Pollution Control Loan Funds, OEPA*

- **Education**
 - *Environmental Education Grant , USEPA*
 - *Ohio Environmental Education Fund, OEPA*
 - *Sustainable Development Challenge Grant, USEPA*
 - *Technology for Sustainable Environment Grant, USEPA*
 - *Brownfields Redevelopment Loan Fund, Cuyahoga County Department of Development*
 - *Private Foundations/Non-Profit Sources*
 - *Turner Foundation, Inc.*
 - *The Cleveland Foundation*
 - *Gund Foundation*
 - *Bikes Belong*
 - *Chevron - Conservation Awards Program*
 - *Conservation Fund - Kodak American Greenways Award*
 - *Environmental Support Center - Environmental Loan Fund*
 - *Ford Foundation - Community & Resource Development*
 - *Ittleson Foundation*
 - *Land Trust Alliance - Great Lakes Matching Grant Program*
 - *Great Lakes Protection Fund*
 - *Lila Wallace - Reader's Digest Fund, Urban Parks*
 - *National Endowment for the Arts*
 - *Richard King Mellon Foundation—American Land Conservation Program*
 - *River Network -Watershed Assistance Grant*
 - *Trust for Public Land - Green Cities Initiative, Conservation Finance Program*
 - *Surdna Foundation, Inc*
 - *Proctor & Gamble Fund*
 - *Pew Charitable Trusts*

- **Other Funding Sources**
 - *Trail Sponsorship*
 - *Fundraisers*
 - *Volunteer Programs*
 - *Local Businesses/Corporations*

CHAPTER 9 EVALUATION OF PROGRESS

9.1 Biannual Evaluation

At least once every two years short-range measurable targets within the West Creek watershed should be evaluated to determine if the goals laid out within this Watershed Action Plan are being achieved. The Watershed Action Plan should be revised at least once every five years, at a minimum, in order to incorporate achievements and lessons learned through the watershed management experience.

Short-range goals for the implementation of the Action Plan are included in the table in Section 6.2.9 beginning on page 117. These goals are to be compared to implementation results periodically, but not less than every two years. It will be up to the discretion of the Watershed Coordinator, or other implementation manager, and WCPC Trustees to determine if the stated objectives and goals are being adequately met. If the short-range goals are not being met to a satisfactory degree, the Watershed Coordinator will work with the Trustees to develop and implement a plan for their improvement.

Every five years, the pollutant loading data listed in Section 4.1 beginning on page 84 will be compared with the newest water quality data that it is available. Such water quality data will be assembled from partner agencies, such as the NEORSD or Cleveland Metroparks or the CCBH, as it is collected by them for specific projects or studies. There is not currently a routine monitoring program for the West Creek watershed and the WCPC will not create one at this time, as it will significantly detract from the organization's current implementation activities. However, by comparing newer data to that listed in Section 4.1, we will be able to determine if TMDL water quality standards and goals are being achieved. As stated in Section 5.1, the ultimate goal is to achieve full attainment of the Warmwater Habitat Primary Contact recreation use designation as listed by the State of Ohio.

WCPC has been implementing many of the activities discussed within this plan since the organization's inception in 1997. To date, approximately 500 acres of greenspace have been protected within the West Creek watershed communities, public education regarding watershed and urban environmental stewardship have significantly increased, four acres of wetlands have been created and/or restored, and approximately 2.5 miles of recreational trail have been created, not to mention the creation of Cleveland's newest Metropark, the West Creek Reservation. The Watershed Coordinator and the organization's Trustees constantly communicate implementation successes to a wide audience, including media outlets, public officials and at public meetings and gatherings. The preparation of a media plan that will better define the organization's marketing and communications goals and procedures is in progress and will be completed by the time of the first short-range goals review.

Biannual reviews would also provide a good time to analyze the wellbeing of the West Creek Preservation Committee in general (i.e. membership status, level of operating funds, grant status, Board of Directors involvement, and community participation and input).

9.2 Plan Distribution

The West Creek Watershed Action Plan will be distributed to all members of the Area Assistance Team and to the communities that make up the West Creek watershed (City of Parma, Village of Brooklyn Heights, City of Independence, City of Seven Hills, and the City of Broadview Heights). A copy of the finalized plan will be distributed to each public library in the watershed, and an electronic copy will be available on the WCPC's website for download.

9.3 Conclusion

This is an exciting time for the West Creek watershed. A tremendous amount of work has already been done within the watershed, from wetland creation and restoration activities to public environmental education and volunteer work days. West Creek restoration and greenspace preservation are ongoing and riparian setback ordinances have been enacted in several communities. The West Creek Reservation has evolved into the newest Cleveland Metropark and partnership projects continue between the WCPC and many local organizations such as NEORS and Tri-C.

The work accomplished within the watershed by WCPC and its partners has had a tremendously positive impact on West Creek water quality and quality of life within the watershed. These accomplishments are not always easily discerned by the analysis of water samples or by studying bacteria counts. For example, had the area encompassed by the West Creek Reservation (which contains approximately 2-miles of West Creek mainstem near its headwaters) been developed as a mixed use area with commercial and residential development centered around a championship golf course, it can confidently be said that West Creek water quality would be beyond repair. To those people that live and work within the watershed the benefits and potential are known. A few of the watershed success stories have been highlighted and are located in Appendix H.

With all of the great work and effort previously committed, there is still much more to accomplish. West Creek and its tributaries continue to face numerous threats from commercial development of the little remaining greenspace to ever-increasing amounts of stormwater runoff. Finding the funds to promote our educational objectives and obtaining grants for large-scale restoration projects is always a challenging objective in times of restricted budgets and spending. Furthermore, convincing citizens to donate their scarce free time to get their hands dirty picking up litter or planting wetland vegetation becomes increasingly difficult.

This plan gives the watershed a direction to follow throughout the upcoming challenges. It is our intention for this Plan to be a living document, to be revised as needed, ignored on rare occasions, and relied upon frequently. This Plan will help to build upon previous achievements and allow those involved in the watershed process to learn from past mistakes. Hopefully this Plan will provide a map for collaboration, support, and understanding to further enhance the quality and health of West Creek and those communities through which it flows.

REFERENCES

Publication Sources

- West Creek Stream Mitigation Prospectus*, URS Corporation, 2004
- West Creek Stream & Wetland Conceptual Restoration Master Plan*, URS Corporation, 2004
- Village of Brooklyn Heights Master Plan*, 2003
- City of Seven Hills Master Plan*, 2002
- City of Parma 2002 Master Plan*, 2002
- Biocriteria Study and Riparian Corridor Assessment*, Davey Resource Group, 2001
- Cities and Natural Process*, Michael Hough, 1995
- The Once and Future Forest*, Leslie Jones Sauer, 1998
- Landscape Architecture Magazine*
- The Mill Creek Watershed Greenway Master Plan and Design Guidelines*, Mill Creek Watershed Council, 1999
- The Rockaway River - Visions and Strategies for their Recovery*, Friends of Rockaway River, 2000
- The Lititz Run Watershed Plan*, Lititz Run Watershed Alliance, 1999
- Re-Evaluating Stormwater - Nine Mile Run Model for Restorative Redevelopment*, Rocky Mountain Institute, 1999
- Rockaway River Sustainable Watershed Management Plan*, The Rockaway River Watershed Cabinet, 2000
- Maiden Creek Keystone Project Report*, Penn State, Center for Watershed Stewardship, 2000
- Restoring Streams in Cities*, Ann Riley, 1998
- Ohio's Streamside Forests*, ODNR, Division of Natural Areas and Preserves, 1998
- Restoring Natural Habitats*, Waterfront Regeneration Trust, 1995
- Regeneration*, Royal Commission on the Future of the Toronto Waterfront, 1992
- National Park Service, McDade Trail Environmental Assessment*, Delaware Water Gap National Recreation Area, 1999
- Guiding Principles of Sustainable Design*, National Park Service, 1993
- Environmentally Responsible Building Products*, National Park Service, 1992
- Stream Corridor Restoration, Principles, Processes and Practices*, USDA, 1998
- A Vision for Southeast Michigan Greenways*, Rails to Trails Conservancy, 1998
- Voices of the Watershed*, Friends of the Chicago River, 1999
- Tunnels on Trails*, Rails to Trails Conservancy, 2001
- Greenways - A Guide to Planning, Design and Development*, The Conservation Fund, 1993
- The History of Parma*, Ernest Kubasek, 1976
- The Best Kept Secrets of Parma*, Robert Horley, 1998

Sandstone Quarries in Independence Township, Ken Cline, 1975
West Creek Valley Informational Study, Cleveland Metroparks, 1995
Rockside Quarry Trail, Seven Hills Parks Committee, 1999
West Creek Preserve Concept Plan, Parma Parks Advisory Committee
West Creek Greenway Preliminary Concept Plan, West Creek Preservation Committee, 1998
West Creek Preserve & Greenway Preliminary Concept Plan, West Creek Preservation Committee, 1999
An Introduction to Better Site Design, Watershed Protection Techniques, Center for Watershed Protection, January, 2000
Rainwater and Land Development, Ohio Department of Natural Resources, Division of Soil & Water Conservation, 1996
Biocriteria Study and Riparian Corridor Assessment Report, Davey Resource Group, 2001
Assessment of Contaminated Groundwater at the Closed Parma Ridgewood Landfill, Janet Popielski, 2001
Cuyahoga Watershed Demonstration Project, Ohio EPA, 1998
Analysis of West Creek Watershed Water Quality Report and Cuyahoga County Board of Health, 1999

APPENDIX A

Davey Resource Group Biocriteria Study Results



River Code: _____ RM: _____ Stream West Creek
 Date 10-4-00 Location Site #2 - Inside Industrial Park
 Scorers Initials: MT Comments _____

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present);

| TYPE | POOL RIFFLE | POOL RIFFLE | SUBSTRATE ORIGIN | SUBSTRATE QUALITY |
|--|---|---------------------|---|---|
| <input type="checkbox"/> BDR/SLBS [10] | <input type="checkbox"/> GRAVEL [7] | <u>30</u> <u>20</u> | Check ONE (OR 2 & AVERAGE) | Check ONE (OR 2 & AVERAGE) |
| <input type="checkbox"/> BOULDER [9] | <input type="checkbox"/> SAND [6] | <u>10</u> | <input type="checkbox"/> LIMESTONE [-1] | <input type="checkbox"/> SILT: <input type="checkbox"/> SILT HEAVY [-2] |
| <input checked="" type="checkbox"/> COBBLE [8] | <input checked="" type="checkbox"/> BEDROCK [5] | <u>40</u> | <input checked="" type="checkbox"/> TILLS [1] | <input checked="" type="checkbox"/> SILT MODERATE [-1] |
| <input type="checkbox"/> HARDPAN [4] | <input type="checkbox"/> DETRITUS [3] | <u>5</u> <u>10</u> | <input type="checkbox"/> WETLANDS [0] | <input type="checkbox"/> SILT NORMAL [0] |
| <input type="checkbox"/> MUCK [2] | <input type="checkbox"/> ARTIFICIAL [0] | <u>10</u> | <input type="checkbox"/> HARDPAN [0] | <input type="checkbox"/> SILT FREE [1] |
| <input checked="" type="checkbox"/> SILT [2] | | | <input type="checkbox"/> SANDSTONE [0] | <input type="checkbox"/> EXTENSIVE [-2] |
| | | | <input checked="" type="checkbox"/> RIP/RAP [0] | <input checked="" type="checkbox"/> MODERATE [-1] |
| | | | <input type="checkbox"/> LAGUSTRINE [0] | <input type="checkbox"/> NORMAL [0] |
| | | | <input type="checkbox"/> SHALE [-1] | <input type="checkbox"/> NONE [1] |
| | | | <input type="checkbox"/> COAL FINES [-2] | |

NOTE: (Ignore silt/gear origin in riprap point sources; score on natural substrates) 5 or More [2]
 NUMBER OF SUBSTRATE TYPES: 4 or Less [0]

Substrate
14
 Max 20

2) INSTREAM COVER (see back for instructions for additional cover scoring method) AMOUNT: (Check ONLY One or check 2 and AVERAGE)

| TYPE: (Check All That Apply) | AMOUNT: (Check ONLY One or check 2 and AVERAGE) |
|--|--|
| <input type="checkbox"/> UNDERCUT BANKS [1] | <input type="checkbox"/> EXTENSIVE > 75% [11] |
| <input checked="" type="checkbox"/> OVERHANGING VEGETATION [1] | <input type="checkbox"/> MODERATE 25-75% [7] |
| <input checked="" type="checkbox"/> 2 SHALLOWS (IN SLOW WATER) [1] | <input checked="" type="checkbox"/> SPARSE 5-25% [3] |
| <input type="checkbox"/> ROOTMATS [1] | <input type="checkbox"/> NEARLY ABSENT < 5% [1] |
| <input checked="" type="checkbox"/> 1 POOLS > 70 cm [2] | |
| <input type="checkbox"/> ROOTWADS [1] | |
| <input checked="" type="checkbox"/> 3 BOULDERS [1] | |
| <input type="checkbox"/> OXBOWS, BACKWATERS [1] | |
| <input type="checkbox"/> AQUATIC MACROPHYTES [1] | |
| <input checked="" type="checkbox"/> 1 LOGS OR WOODY DEBRIS [1] | |

Cover
9
 Max 20

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE)

| SINUOSITY | DEVELOPMENT | CHANNELIZATION | STABILITY | MODIFICATIONS/OTHER |
|---|---|---|--|--|
| <input type="checkbox"/> HIGH [4] | <input checked="" type="checkbox"/> EXCELLENT [7] | <input type="checkbox"/> NONE [6] | <input type="checkbox"/> HIGH [3] | <input type="checkbox"/> SNAGGING |
| <input type="checkbox"/> MODERATE [3] | <input type="checkbox"/> GOOD [5] | <input type="checkbox"/> RECOVERED [4] | <input checked="" type="checkbox"/> MODERATE [2] | <input type="checkbox"/> RELOCATION |
| <input checked="" type="checkbox"/> LOW [2] | <input type="checkbox"/> FAIR [3] | <input type="checkbox"/> RECOVERING [3] | <input checked="" type="checkbox"/> LOW [1] 1.5 | <input checked="" type="checkbox"/> CANOPY REMOVAL |
| <input type="checkbox"/> NONE [1] | <input checked="" type="checkbox"/> POOR [1] | <input checked="" type="checkbox"/> RECENT OR NO RECOVERY [1] | | <input type="checkbox"/> LEVEED |
| | | | | <input type="checkbox"/> DREDGING |
| | | | | <input checked="" type="checkbox"/> ONE SIDE CHANNEL MODIFICATIONS |
| | | | | <input type="checkbox"/> IMPOUND. |
| | | | | <input type="checkbox"/> ISLANDS |
| | | | | <input type="checkbox"/> BANK SHAPING |

Channel
5.5
 Max 20

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) ★ River Right Looking Downstream ★

| RIPARIAN WIDTH | FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) | BANK EROSION |
|--|---|--|
| L R (Per Bank) | L R (Most Predominant Per Bank) | L R (Per Bank) |
| <input type="checkbox"/> WIDE > 50m [4] | <input type="checkbox"/> FOREST, SWAMP [3] | <input type="checkbox"/> NONE/LITTLE [3] |
| <input type="checkbox"/> MODERATE 10-50m [3] | <input type="checkbox"/> SHRUB OR OLD FIELD [2] | <input type="checkbox"/> MODERATE [2] |
| <input type="checkbox"/> NARROW 5-10m [2] | <input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1] | <input checked="" type="checkbox"/> HEAVY/SEVERE [1] |
| <input checked="" type="checkbox"/> VERY NARROW < 5m [1] | <input type="checkbox"/> FENCED PASTURE [1] | |
| <input type="checkbox"/> NONE [0] | | |
| | <input type="checkbox"/> CONSERVATION TILLAGE [1] | |
| | <input checked="" type="checkbox"/> URBAN OR INDUSTRIAL [0] | |
| | <input type="checkbox"/> OPEN PASTURE, ROWCROP [0] | |
| | <input type="checkbox"/> MINING/CONSTRUCTION [0] | |

Riparian
2
 Max 10

COMMENTS: _____

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

| MAX. DEPTH (Check 1 ONLY!) | MORPHOLOGY (Check 1 or 2 & AVERAGE) | CURRENT VELOCITY (POOLS & RIFFLES!) (Check All That Apply) |
|--|--|--|
| <input checked="" type="checkbox"/> > 1m [6] | <input checked="" type="checkbox"/> POOL WIDT H > RIFFLE WIDTH [2] | <input type="checkbox"/> EDDIES [1] |
| <input type="checkbox"/> 0.7-1m [4] | <input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1] | <input type="checkbox"/> TORRENTIAL [-1] |
| <input type="checkbox"/> 0.4-0.7m [2] | <input type="checkbox"/> POOL WIDT H < RIFFLE W. [0] | <input type="checkbox"/> FAST [1] |
| <input type="checkbox"/> 0.2-0.4m [1] | | <input checked="" type="checkbox"/> MODERATE [1] |
| <input type="checkbox"/> < 0.2m [POOL=0] | | <input checked="" type="checkbox"/> SLOW [1] |
| | | <input type="checkbox"/> INTERSTITIAL [-1] |
| | | <input type="checkbox"/> INTERMITTENT [-2] |

Pool/Current
10
 Max 12

CHECK ONE OR CHECK 2 AND AVERAGE

| RIFFLE DEPTH | RUN DEPTH | RIFFLE/RUN SUBSTRATE | RIFFLE/RUN EMBEDDEDNESS |
|--|--|--|--|
| <input checked="" type="checkbox"/> Best Areas > 10 cm [2] | <input type="checkbox"/> MAX > 50 [2] | <input checked="" type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2] | <input type="checkbox"/> NONE [2] |
| <input type="checkbox"/> Best Areas 5-10 cm [1] | <input checked="" type="checkbox"/> MAX < 50 [1] | <input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1] | <input type="checkbox"/> LOW [1] |
| <input type="checkbox"/> Best Areas < 5 cm [RIFFLE=0] | | <input type="checkbox"/> UNSTABLE (Fine Gravel, Sand) [0] | <input checked="" type="checkbox"/> MODERATE [0] |
| | | | <input type="checkbox"/> EXTENSIVE [-1] |
| | | | <input type="checkbox"/> NO RIFFLE [Metric=0] |

Riffle/Run
5
 Max 8
 Gradient
4
 Max 10

6) GRADIENT (ft/mi): 52 DRAINAGE AREA (sq.mi.): 14
 %POOL: 20 %GLIDE: _____
 %RIFFLE: 30 %RUN: 50



River Code: _____ RM: _____ Stream West Creek
 Date 10-4-00 Location Site #4 - At Grantwood Avenue
 Scorers Initials: MT Comments _____

1) SUBSTRATE (Check **ONLY** Two Substrate **TYPE BOXES**; Estimate % present);

| | | | | |
|---|---------------------|---|-------------------------|--|
| TYPE | POOL RIFFLE | POOL RIFFLE | SUBSTRATE ORIGIN | SUBSTRATE QUALITY |
| <input type="checkbox"/> BLDR/SLBS [10] | <u>5</u> <u>20</u> | <input checked="" type="checkbox"/> GRAVEL [7] | <u>20</u> <u>20</u> | Check ONE (OR 2 & AVERAGE) |
| <input type="checkbox"/> BOULDER [9] | <u>5</u> <u>10</u> | <input type="checkbox"/> SAND [6] | <u>10</u> _____ | <input type="checkbox"/> SILT HEAVY [-2] |
| <input type="checkbox"/> COBBLE [8] | <u>10</u> <u>40</u> | <input checked="" type="checkbox"/> BEDROCK [5] | <u>40</u> _____ | <input checked="" type="checkbox"/> SILT MODERATE [-1] |
| <input type="checkbox"/> HARDPAN [4] | _____ | <input type="checkbox"/> DETRITUS [3] | <u>5</u> _____ | <input type="checkbox"/> SILT NORMAL [0] |
| <input type="checkbox"/> MUCK [2] | _____ | <input type="checkbox"/> ARTIFICIAL [0] | _____ <u>10</u> | <input type="checkbox"/> SILT FREE [1] |
| <input type="checkbox"/> SILT [2] | <u>5</u> _____ | | | <input type="checkbox"/> EXTENSIVE [-2] |

NOTE: (Ignores silt originating from point sources; score on natural substrates) 5 or More [2]
 NUMBER OF SUBSTRATE TYPES: 4 or Less [0]

Substrate
13
 Max 20

2) INSTREAM COVER (see back for instructions for additional cover scoring method)

| | |
|--|---|
| TYPE: (Check All That Apply) | AMOUNT: (Check ONLY One or check 2 and AVERAGE) |
| <input type="checkbox"/> UNDERCUT BANKS [1] | <input type="checkbox"/> EXTENSIVE > 75% [11] |
| <input checked="" type="checkbox"/> 1 OVERHANGING VEGETATION [1] | <input checked="" type="checkbox"/> MODERATE 25-75% [7] |
| <input checked="" type="checkbox"/> 2 SHALLOWS (IN SLOW WATER) [1] | <input type="checkbox"/> SPARSE 5-25% [3] |
| <input type="checkbox"/> ROOTMATS [1] | <input type="checkbox"/> NEARLY ABSENT < 5% [1] |

Cover
11
 Max 20

3) CHANNEL MORPHOLOGY: (Check **ONLY** One PER Category OR check 2 and AVERAGE)

| | | | | |
|---|--|--|--|---|
| SINUOSITY | DEVELOPMENT | CHANNELIZATION | STABILITY | MODIFICATIONS/OTHER |
| <input type="checkbox"/> HIGH [4] | <input type="checkbox"/> EXCELLENT [7] | <input checked="" type="checkbox"/> NONE [6] | <input checked="" type="checkbox"/> HIGH [3] | <input type="checkbox"/> SNAGGING |
| <input type="checkbox"/> MODERATE [3] | <input type="checkbox"/> GOOD [5] | <input type="checkbox"/> RECOVERED [4] | <input type="checkbox"/> MODERATE [2] | <input type="checkbox"/> RELOCATION |
| <input checked="" type="checkbox"/> LOW [2] | <input checked="" type="checkbox"/> FAIR [3] | <input type="checkbox"/> RECOVERING [3] | <input type="checkbox"/> LOW [1] | <input type="checkbox"/> CANOPY REMOVAL |
| <input type="checkbox"/> NONE [1] | <input type="checkbox"/> POOR [1] | <input type="checkbox"/> RECENT OR NO RECOVERY [1] | | <input type="checkbox"/> DREDGING |

Channel
14
 Max 20

4) RIPARIAN ZONE AND BANK EROSION (check ONE bpx per bank or check 2 and AVERAGE per bank) ★ River Right Looking Downstream ★

| | | |
|---|--|---|
| RIPARIAN WIDTH | FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) | BANK EROSION |
| L R (Per Bank) | L R (Most Predominant Per Bank) | L R (Per Bank) |
| <input type="checkbox"/> WIDE > 50m [4] | <input checked="" type="checkbox"/> FOREST, SWAMP [3] | <input checked="" type="checkbox"/> NONE/LITTLE [3] |
| <input checked="" type="checkbox"/> MODERATE 10-50m [3] | <input type="checkbox"/> SHRUB OR OLD FIELD [2] | <input checked="" type="checkbox"/> MODERATE [2] |
| <input checked="" type="checkbox"/> NARROW 5-10m [2] | <input checked="" type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1] | <input type="checkbox"/> HEAVY/SEVERE [1] |
| <input type="checkbox"/> VERY NARROW < 5m [1] | <input type="checkbox"/> FENCED PASTURE [1] | |

Riparian
7
 Max 10

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

| | | |
|--|---|---|
| MAX. DEPTH (Check 1 ONLY!) | MORPHOLOGY (Check 1 or 2 & AVERAGE) | CURRENT VELOCITY (POOLS & RIFFLES!) (Check All That Apply) |
| <input type="checkbox"/> > 1m [6] | <input checked="" type="checkbox"/> POOL WIDTH H > RIFFLE WIDTH [2] | <input type="checkbox"/> EDDIES [1] |
| <input type="checkbox"/> 0.7-1m [4] | <input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1] | <input type="checkbox"/> FAST [1] |
| <input checked="" type="checkbox"/> 0.4-0.7m [2] | <input type="checkbox"/> POOL WIDTH H < RIFFLE W. [0] | <input type="checkbox"/> MODERATE [1] |
| <input type="checkbox"/> 0.2-0.4m [1] | | <input type="checkbox"/> SLOW [1] |
| <input type="checkbox"/> < 0.2m [POOL=0] | | <input type="checkbox"/> TORRENTIAL [-1] |

Pool/Current
6
 Max 12

CHECK ONE OR CHECK 2 AND AVERAGE

| | | | |
|--|--|--|--|
| RIFFLE DEPTH | RUN DEPTH | RIFFLE/RUN SUBSTRATE | RIFFLE/RUN EMBEDDEDNESS |
| <input checked="" type="checkbox"/> Best Areas > 10 cm [2] | <input type="checkbox"/> MAX > 50 [2] | <input checked="" type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2] | <input type="checkbox"/> NONE [2] |
| <input type="checkbox"/> Best Areas 5-10 cm [1] | <input checked="" type="checkbox"/> MAX < 50 [1] | <input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1] | <input type="checkbox"/> LOW [1] |
| <input type="checkbox"/> Best Areas < 5 cm [RIFFLE=0] | | <input type="checkbox"/> UNSTABLE (Fine Gravel, Sand) [0] | <input checked="" type="checkbox"/> MODERATE [0] |
| | | <input type="checkbox"/> NO RIFFLE [Metric=0] | <input type="checkbox"/> EXTENSIVE [-1] |

Riffle/Run
5
 Max 8

Gradient
4
 Max 10

6) GRADIENT (ft/mi): 71 DRAINAGE AREA (sq.mi.): 14
 %POOL: 50 %GLIDE: _____
 %RIFFLE: 20 %RUN: 30

*See a recent channel report for a more applicable riffle design for fish species.

Species List

| | | |
|--|--|---|
| River Code: 19-066 River Mile: 5.80 | Stream: West Creek Basin: Cuyahoga River Time Fished: 1367 sec Drain Area: 4.0 sq mi Dist Fished: 0.15 km No of Passes: 1 | Sample Date: 2000 Date Range: 08/16/2000 Sampler Type: E |
|--|--|---|

| Species Name / ODNR status | IBI Grp | Feed Guild | Breed Guild | Tol | # of Fish | Relative Number | % by Number | Relative Weight | % by Weight | Ave(gm) Weight |
|----------------------------|---------|------------|-------------|-----|--------------|-----------------|-------------|-----------------|-------------|----------------|
| White Sucker | W | O | S | T | 33 | ***** | 1.40 | 0.64 | 3.26 | 9.76 |
| Blacknose Dace | N | G | S | T | 576 | ***** | 24.38 | 2.50 | 12.69 | 2.17 |
| Creek Chub | N | G | N | T | 358 | ***** | 15.15 | 3.99 | 20.20 | 5.57 |
| Central Stoneroller | N | H | N | | 1,396 | ***** | 59.08 | 12.60 | 63.85 | 4.51 |
| Mile Total | | | | | 2,363 | ***** | | 19.74 | | |
| Number of Species | | | | | 4 | | | | | |
| Number of Hybrids | | | | | 0 | | | | | |

Species List

| | | |
|--|--|--|
| River Code: 19-066 River Mile: 3.70 | Stream: West Creek Basin: Cuyahoga River Time Fished: 1850 sec Drain Area: 6.5 sq mi Dist Fished: 0.15 km No of Passes: 1 | Sample Date: 2000 Date Range: 08/16/2000 Sampler Type: E |
|--|--|--|

| Species Name / ODNR status | IBI Grp | Feed Guild | Breed Guild | Tol | # of Fish | Relative Number | % by Number | Relative Weight | % by Weight | Ave(gm) Weight |
|----------------------------|---------|------------|-------------|-----|-----------|-----------------|-------------|-----------------|-------------|----------------|
| White Sucker | W | O | S | T | 9 | ***** | 1.07 | 0.24 | 2.66 | 13.56 |
| Blacknose Dace | N | G | S | T | 286 | ***** | 34.09 | 1.94 | 21.14 | 3.39 |
| Creek Chub | N | G | N | T | 85 | ***** | 10.13 | 1.11 | 12.14 | 6.55 |
| Central Stoneroller | N | H | N | | 459 | ***** | 54.71 | 5.88 | 64.07 | 6.41 |
| <i>Mile Total</i> | | | | | 839 | ***** | | 9.18 | | |
| <i>Number of Species</i> | | | | | 4 | | | | | |
| <i>Number of Hybrids</i> | | | | | 0 | | | | | |

Species List

| | |
|---|--|
| West Creek (Cuyahoga Basin) Ohio EPA Fish Collections | Grand Total of All Streams Date Range: 08/16/2000 |
| No of Streams: 1 Dist Fished: 0.45 km No of Passes: 3 | |

| Species Name / ODNR status | IBI Grp | Feed Guild | Breed Guild Tol | # of Fish | Relative Number | % by Number | Relative Weight | % by Weight | Ave(gm) Weight |
|-------------------------------|------------|---------------|--------------------|--------------|--------------------|----------------|--------------------|----------------|-------------------|
| Northern Hog Sucker | R | I | S M | 1 | ***** | 0.02 | 0.17 | 1.30 | 250.00 |
| White Sucker | W | O | S T | 70 | ***** | 1.60 | 0.49 | 3.85 | 10.56 |
| Blacknose Dace | N | G | S T | 1,059 | ***** | 24.23 | 1.76 | 13.74 | 2.49 |
| Creek Chub | N | G | N T | 489 | ***** | 11.19 | 2.12 | 16.58 | 6.50 |
| Common Shiner | N | I | S | 3 | ***** | 0.07 | 0.01 | 0.08 | 5.33 |
| Sand Shiner | N | I | M M | 11 | ***** | 0.25 | 0.01 | 0.10 | 1.82 |
| Bluntnose Minnow | N | O | C T | 3 | ***** | 0.07 | 0.01 | 0.10 | 6.67 |
| Central Stoneroller | N | H | N | 2,731 | ***** | 62.49 | 8.21 | 64.19 | 4.51 |
| Yellow Bullhead | | I | C T | 2 | ***** | 0.05 | 0.00 | 0.03 | 3.00 |
| Johnny Darter | D | I | C | 1 | ***** | 0.02 | 0.00 | 0.01 | 1.00 |
| <i>Grand Total</i> | | | | 4,370 | ***** | | 12.79 | | |
| <i>Number of Species</i> | | | | 10 | | | | | |
| <i>Number of Hybrids</i> | | | | 0 | | | | | |

River: West Creek

Code: 19-066 Rm: 5.80 Year: 2000 Initials: XCEB

| | | | |
|--|---|---|--------------------|
| Bldr_slab: Gravel: X Boulder: Sand: Cobble: Bedrock: X Hardpan: Detritus: Silt: Artificial: Muck: | Limestone: Tills: Lacustrine: Sandstone: Y Shale: Riprap: Y Hardpan_o: Coal_fines: | Silt_heavy: Silt_mod: Silt_norml: X Silt_free: Embed_xten: Embed_mod: Embed_low: X Embed_none: | Substrate: 14.0 |
| Num_types: X | | | |

| | | | | |
|---------------------------------------|--|-------------------------------|--|---------------|
| Undercut: Overhang: Shallows: X | Deep_pools: Rootwads: Bould_cov: X | Oxbow: Aq_plants: Logs: | Ext_cov: Mod_cov: Sparse_cov: X No_cov: | Cover: 6.0 |
|---------------------------------------|--|-------------------------------|--|---------------|

| | | | | |
|--|--|--|---|------------------|
| H_sinus: M_sinus: L_sinus: X N_sinus: | E_develop: G_develop: F_develop: X P_develop: | Ch_none: X Recovered: Recovering: Recent: | H_stable: M_stable: Y L_stable: Y | Channel: 12.5 |
|--|--|--|---|------------------|

| | | | | |
|--|--|---|--|------------------|
| Rip_wide: Rip_mod: Rip_nar: Rip_v_nar: X Rip_none: X | Forest: Old_fid_sh: Park: Y Fence_past: | Cons_till: Urban_inde: Op_past_rw: Mining_con: | Erosion_nl: X Erosion_m: X Erosion_hs: | Riparian: 4.0 |
|--|--|---|--|------------------|

| | | | | |
|---|---------------------------------|---|-------------------------------------|--------------|
| Cm_100: Cm_70_100: Cm_40_70: Cm_20_40: X Cm_20: | Wider: X Narrower: Equal: | Torrent: Fast: Moderate: X Slow: X | Eddies: Interstit: Intermitt: | Pool: 5.0 |
|---|---------------------------------|---|-------------------------------------|--------------|

| | | | |
|--|--|--|----------------|
| Rif_z_high: Rif_z_mod: Rif_z_low: Y Rif_z_vlow: Y | Rif_stable: Rif_mod: Rif_unstbl: X | Rifembed_n: Rifembed_l: Rifembed_m: X Rifembed_e: | Riffle: 0.5 |
|--|--|--|----------------|

| | | | | |
|----------------------------|---------------|-----------------|-------------------|----------------|
| Mwh_attr: 4 Wwh_attr: 3 | Mwh_h_attr: 3 | Drain Area: 4.0 | Gradient_s: 24.39 | Gradient_v: 10 |
|----------------------------|---------------|-----------------|-------------------|----------------|

West Creek

19-066

Rm: 3.70

Year: 2000

Initials: XCEB

| | | | | |
|---|---|---|---|---|
| Bldr_slab: Boulder: Cobble: Hardpan: Silt: Muck: | Gravel: Sand: Bedrock: Y Detritus: Artificial: | Limestone: Tills: Lacustrine: Sandstone: Y Shale: Y Riprap: Hardpan_o: Coal_fines: | Silt_heavy: Silt_mod: Silt_norml: X Silt_free: Embed_xten: Embed_mod: Embed_low: X Embed_none: | Substrate: <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: 40px; text-align: center;">11.5</div> |
| Num_types: X | | | | |

| | | | | |
|--|---|--|--|--|
| Undercut: Overhang: Shallows: X | Deep_pools: X Rootwads: Bould_cov: X | Oxbow: Aq_plants: Logs: | Ext_cov: Mod_cov: Sparse_cov: Y No_cov: Y | Cover: <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: 40px; text-align: center;">6.0</div> |
|--|---|--|--|--|

| | | | | |
|--|--|--|--|---|
| H_sinus: M_sinus: L_sinus: X N_sinus: | E_develop: G_develop: F_develop: Y P_develop: Y | Ch_none: X Recovered: Recovering: Recent: | H_stable: X M_stable: L_stable: | Channel: <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: 40px; text-align: center;">13.0</div> |
|--|--|--|--|---|

| | | | | |
|---|--|---|---|---|
| Rip_wide: Rip_mod: Rip_nar: Rip_v_nar: Y Rip_none: | Forest: Old fld_sh: Park: Fence_past: | Cons_till: Urban_inde: Y Op_past_rw: Mining_con: | Erosion_ni: Y Erosion_m: Erosion_hs: | <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: 40px; text-align: center;">4.0</div> |
|---|--|---|---|---|

| | | | | |
|--|--|---|--|---|
| Cm_100: Cm_70_100: Cm_40_70: X Cm_20_40: Cm_20: | Wider: X Narrower: Equal: | Torrent: Fast: Moderate: X Slow: X | Eddies: Interstit: Intermitt: | Pool: <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: 40px; text-align: center;">6.0</div> |
|--|--|---|--|---|

| | | | |
|--|---|--|---|
| Rif_z_high: Rif_z_mod: Rif_z_low: X Rif_z_vlow: | Rif_stable: X Rif_mod: Rif_unstbl: | Rifembed_n: Rifembed_l: X Rifembed_m: Rifembed_e: | Riffle: <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: 40px; text-align: center;">4.0</div> |
|--|---|--|---|

| | | | | |
|--|----------------------|------------------------|--|---|
| Mwh_attrib: 3 Wwh_attrib: 4 | Mwh_h_attr: 2 | Drain Area: 6.5 | Gradient_s: 55.56 Gradient_v: | <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: 40px; text-align: center;">4</div> |
|--|----------------------|------------------------|--|---|

River: West Creek

Code: 19-066

Rm: 0.30

Year: 2000

Initials: XCEB

| | | | | |
|---|---|---|---|---|
| Bldr_slab: Boulder: Cobble: X Hardpan: Silt: Muck: | Gravel: X Sand: Bedrock: Detritus: Artificial: | Limestone: Tills: Lacustrine: Sandstone: Y Shale: Riprap: Y Hardpan_o: Coal_fines: | Silt_heavy: Silt_mod: Silt_norml: X Silt_free: Embed_xten: Embed_mod: Embed_low: X Embed_none: | Substrate: <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: 40px; text-align: center;">17.0</div> |
| Num_types: X | | | | |

| | | | | |
|--|---|--|--|---|
| Undercut: X Overhang: Shallows: | Deep_pools: X Rootwads: X Bould_cov: X | Oxbow: Aq_planis: Logs: X | Ext_cov: Mod_cov: Sparse_cov: X No_cov: | Cover: <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: 40px; text-align: center;">10.0</div> |
|--|---|--|--|---|

| | | | | |
|--|--|--|--|--|
| H_sinus: M_sinus: L_sinus: X N_sinus: | E_develop: G_develop: F_develop: X P_develop: | Ch_none: Recovered: Recovering: Y Recent: Y | H_stable: M_stable: L_stable: X | Channel: <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: 40px; text-align: center;">8.0</div> |
|--|--|--|--|--|

| | | | | |
|---|--|---|---|---|
| Rip_wide: Rip_mod: Rip_nar: Rip_v_nar: X Rip_none: X | Forest: Old fld_sh: Park: Fence_past: | Cons_till: Urban_inde: Y Op_past_rw: Mining_con: | Erosion_ni: Y Erosion_m: Erosion_hs: | Riparian: <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: 40px; text-align: center;">3.5</div> |
|---|--|---|---|---|

| | | | | |
|--|--|---|--|--|
| Cm_100: X Cm_70_100: Cm_40_70: Cm_20_40: Cm_20: | Wider: Y Narrower: Equal: Y | Torrent: Fast: X Moderate: X Slow: X | Eddies: Interstit: Intermitt: | Pool: <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: 40px; text-align: center;">10.5</div> |
|--|--|---|--|--|

| | | | |
|--|---|--|---|
| Rif_z_high: Rif_z_mod: Rif_z_low: Y Rif_z_vlow: Y | Rif_stable: Rif_mod: Rif_unstbl: X | Rifembed_n: Rifembed_l: X Rifembed_m: Rifembed_e: | Riffle: <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: 40px; text-align: center;">1.5</div> |
|--|---|--|---|

| | | | |
|--|----------------------|-------------------------|--|
| Mwh_attrib: 3 Wwh_attrib: 5 | Mwh_h_attr: 3 | Drain Area: 13.2 | Gradient_s: 20.00 Gradient_v: 8 |
|--|----------------------|-------------------------|--|

River: West Creek

Code: 19-066

Rm: 5.70

Year: 1992

Initials: XBD

| | | | | |
|---|--|---|---|--------------------|
| Bldr_slab: Boulder: Cobble: X Hardpan: Silt: Muck: | Gravel: X Sand: Bedrock: Detritus: Artificial: | Limestone: Tills: X Lacustrine: Sandstone: Shale: Riprap: Hardpan_o: Coal_fines: | Silt_heavy: Silt_mod: X Silt_norml: Silt_free: Embed_xten: Embed_mod: X Embed_low: Embed_none: | Substrate: 14.0 |
| Num_types: | | | | |

| | | | | |
|---|--|---------------------------------|--|----------------|
| Undercut: X Overhang: X Shallows: X | Deep_pools: Rootwads: X Bould_cov: | Oxbow: Aq_plants: Logs: X | Ext_cov: Mod_cov: Y Sparse_cov: Y No_cov: | Cover: 10.0 |
|---|--|---------------------------------|--|----------------|

| | | | | |
|--|--|--|---------------------------------------|------------------|
| H_sinus: M_sinus: X L_sinus: N_sinus: | E_develop: G_develop: X F_develop: P_develop: | Ch_none: Recovered: Recovering: X Recent: | H_stable: M_stable: X L_stable: | Channel: 13.0 |
|--|--|--|---------------------------------------|------------------|

| | | | | |
|--|--|---|--|------------------|
| Rip_wide: Rip_mod: Y Rip_nar: Rip_v_nar: Rip_none: | Forest: Old fld_sh: Park: Y Fence_past: | Cons_till: Urban_inds: Op_past_rw: Mining_con: | Erosion_nl: X Erosion_m: X Erosion_hs: | Riparian: 6.5 |
|--|--|---|--|------------------|

| | | | | |
|---|---------------------------------|---|-------------------------------------|--------------|
| Cm_100: Cm_70_100: Cm_40_70: X Cm_20_40: Cm_20: | Wider: X Narrower: Equal: | Torrent: Fast: X Moderate: X Slow: X | Eddies: Interstit: Intermitt: | Pool: 7.0 |
|---|---------------------------------|---|-------------------------------------|--------------|

| | | | |
|--|--|--|----------------|
| Rif_z_high: Rif_z_mod: Rif_z_low: X Rif_z_vlow: | Rif_stable: Rif_mod: X Rif_unstbl: | Rifembed_n: Rifembed_l: Rifembed_m: X Rifembed_e: | Riffle: 2.0 |
|--|--|--|----------------|

| | | |
|---|-----------------|-------------------------------------|
| Mwh_attrib: 4 Mwh_h_attr: 1 Wwh_attrib: 6 | Drain Area: 4.0 | Gradient_s: 24.39 Gradient_v: 10 |
|---|-----------------|-------------------------------------|

River: West Creek

Code: 19-066 Rm: 4.40 Year: 1992 Initials: XBD

| | | | | |
|-------------------|----------------|-------------------|--------------------|---------------------------|
| Bldr_slab: | Gravel: | Limestone: | Silt_heavy: | Substrate: 13.0 |
| Boulder: X | Sand: | Tills: | Silt_mod: Y | |
| Cobble: | Bedrock: X | Lacustrine: | Silt_norml: Y | |
| Hardpan: | Detritus: | Sandstone: X | Silt_free: | |
| Silt: | Artificial: | Shale: | Embed_xten: | |
| Muck: | | Riprap: | Embed_mod: Y | |
| | | Hardpan_o: | Embed_low: Y | |
| | | Coal_fines: | Embed_norie: | |
| Num_types: | | | | |

| | | | | |
|-------------|---------------|------------|-------------|-----------------------|
| Undercut: X | Deep_pools: X | Oxbow: X | Ext_cov: Y | Cover: 17.0 |
| Overhang: X | Rootwads: X | Aq_plants: | Mod_cov: Y | |
| Shallows: X | Bould_cov: X | Logs: | Sparse_cov: | |
| | | | No_cov: | |

| | | | | |
|------------|--------------|-------------|-------------|-------------------------|
| H_sinus: | E_develop: | Ch_none: X | H_stable: X | Channel: 15.0 |
| M_sinus: X | G_develop: | Recovered: | M_stable: | |
| L_sinus: | F_develop: X | Recovering: | L_stable: | |
| N_sinus: | P_develop: | Recent: | | |

| | | | | |
|------------|-------------|-------------|--------------|-------------------------|
| Rip_wide: | Forest: | Cons_till: | Erosion_nl: | Riparian: 5.5 |
| Rip_mod: X | Old fld_sh: | Urban_inds: | Erosion_m: Y | |
| Rip_nar: X | Park: Y | Op_past_rw: | Erosion_hs: | |
| Rip_v_nar: | Fence_past: | Mining_con: | | |
| Rip_none: | | | | |

| | | | | |
|--------------|-----------|-------------|------------|---------------------|
| Cm_100: | Wider: X | Torrent: X | Eddies: | Pool: 8.0 |
| Cm_70_100: X | Narrower: | Fast: X | Interstit: | |
| Cm_40_70: | Equal: | Moderate: X | Intermitt: | |
| Cm_20_40: | | Slow: X | | |
| Cm_20: | | | | |

| | | | | |
|--------------|---------------|---------------|--|----------------------|
| Rif_z_high: | Rif_stable: X | Rifembed_n: | | Rifle: 5.5 |
| Rif_z_mod: X | Rif_mod: | Rifembed_l: Y | | |
| Rif_z_low: | Rif_unstbl: | Rifembed_m: Y | | |
| Rif_z_vlow: | | Rifembed_e: | | |

| | | | |
|-------------|---------------|-----------------|--------------------|
| Mwh_attr: 4 | Mwh_h_attr: 0 | Drain Area: 4.7 | Gradient_s: 142.86 |
| Wwh_attr: 8 | | | Gradient_v: 4 |

River: West Creek

Code: 19-066

Rm: 3.70

Year: 1992

Initials: XBD

| | | | | |
|---|---|---|---|---|
| Bldr_slab: Boulder: Cobble: X Hardpan: Silt: Muck: | Gravel: Sand: Bedrock: X Detritus: Artificial: | Limestone: Tills: Lacustrine: Sandstone: X Shale: Riprap: Hardpan_o: Coal_fines: | Silt_heavy: Silt_mod: Y Silt_norml: Y Silt_free: Embed_xten: Embed_mod: Y Embed_low: Y Embed_none: | Substrate: <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: 40px; text-align: center;">12.0</div> |
| Num_types: | | | | |

| | | | | |
|--|---|--|--|--|
| Undercut: X Overhang: X Shallows: X | Deep_pools: Rootwads: Bould_cov: | Oxbow: Aq_plants: Logs: | Ext_cov: Mod_cov: Y Sparse_cov: Y No_cov: | Cover: <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: 40px; text-align: center;">8.0</div> |
|--|---|--|--|--|

| | | | | |
|--|--|--|--|---|
| H_sinuos: M_sinuos: X L_sinuos: N_sinuos: | E_develop: G_develop: Y F_develop: Y P_develop: | Ch_none: X Recovered: Recovering: Recent: | H_stable: M_stable: L_stable: X | Channel: <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: 40px; text-align: center;">14.0</div> |
|--|--|--|--|---|

| | | | | |
|---|--|---|---|---|
| Rip_wide: Rip_mod: Rip_nar: Y Rip_v_nar: Rip_none: | Forest: Old fld_sh: Park: X Fence_past: | Cons_till: Urban_inde: X Op_past_rw: Mining_con: | Erosion_nl: Erosion_m: Y Erosion_hs: | Riparian: <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: 40px; text-align: center;">4.5</div> |
|---|--|---|---|---|

| | | | | |
|--|--|---|--|---|
| Cm_100: Cm_70_100: X Cm_40_70: Cm_20_40: Cm_20: | Wider: X Narrower: Equal: | Torrent: X Fast: X Moderate: X Slow: X | Eddies: Interstit: Intermitt: | Pool: <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: 40px; text-align: center;">8.0</div> |
|--|--|---|--|---|

| | | | |
|--|---|--|---|
| Rif_z_high: Rif_z_mod: Rif_z_low: X Rif_z_vlow: | Rif_stable: Rif_mod: Rif_unstbl: X | Rifembed_n: Rifembed_l: X Rifembed_m: Rifembed_e: | Riffle: <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: 40px; text-align: center;">2.0</div> |
|--|---|--|---|

| | | | | |
|--|----------------------|------------------------|--------------------------|----------------------|
| Mwh_attrib: 3 Wwh_attrib: 9 | Mwh_h_attr: 1 | Drain Area: 6.5 | Gradient_s: 55.56 | Gradient_v: 4 |
|--|----------------------|------------------------|--------------------------|----------------------|

River: West Creek

Code: 19-066

Rm: 0.20

Year: 1992

Initials: XBD

| | | | | |
|---|--|---|---|--------------------|
| Bldr_slab: Boulder: Cobble: X Hardpan: Silt: Muck: | Gravel: X Sand: Bedrock: Detritus: Artificial: | Limestone: Tills: X Lacustrine: Sandstone: Shale: Riprap: Hardpan_o: Coal_fines: | Silt_heavy: Silt_mod: X Silt_norml: Silt_free: Embed_xten: Embed_mod: X Embed_low: Embed_none: | Substrate: 14.0 |
| Num_types: | | | | |

| | | | | |
|---|--|---------------------------------|--|----------------|
| Undercut: X Overhang: Shallows: X | Deep_pools: X Rootwads: X Bould_cov: | Oxbow: Aq_plants: Logs: X | Ext_cov: Mod_cov: Y Sparse_cov: Y No_cov: | Cover: 11.0 |
|---|--|---------------------------------|--|----------------|

| | | | | |
|--|--|--|---------------------------------------|------------------|
| H_sinus: M_sinus: X L_sinus: N_sinus: | E_develop: G_develop: F_develop: X P_develop: | Ch_none: Recovered: Recovering: X Recent: | H_stable: M_stable: X L_stable: | Channel: 11.0 |
|--|--|--|---------------------------------------|------------------|

| | | | | |
|--|--|---|--|------------------|
| Rip_wide: Rip_mod: Rip_nar: Y Rip_v_nar: Rip_none: | Forest: Old fld_sh: Park: Fence_past: | Cons_till: Urban_inde: Y Op_past_rw: Mining_con: | Erosion_nl: X Erosion_m: X Erosion_hs: | Riparian: 4.5 |
|--|--|---|--|------------------|

| | | | | |
|---|---------------------------------|---|-------------------------------------|---------------|
| Cm_100: X Cm_70_100: Cm_40_70: Cm_20_40: Cm_20: | Wider: X Narrower: Equal: | Torrent: Fast: X Moderate: X Slow: X | Eddies: Interstit: Intermitt: | Pool: 11.0 |
|---|---------------------------------|---|-------------------------------------|---------------|

| | | | |
|--|--|--|----------------|
| Rif_z_high: Rif_z_mod: X Rif_z_low: Rif_z_vlow: | Rif_stable: Rif_mod: X Rif_unstbl: | Rifembed_n: Rifembed_l: Rifembed_m: X Rifembed_e: | Riffle: 4.0 |
|--|--|--|----------------|

| | | | |
|----------------------------|---------------|------------------|------------------------------------|
| Mwh_attr: 5 Wwh_attr: 5 | Mwh_h_attr: 1 | Drain Area: 13.2 | Gradient_s: 20.00 Gradient_v: 8 |
|----------------------------|---------------|------------------|------------------------------------|

Ohio Department of Biological Assessment Section
Macroinvertebrate Collection

RM: 5.90

Collection Date: 08/02/2000 19-066 West Creek

| Taxa Code | Taxa | Quant/Qual | Taxa Code | Taxa | Quant/Qual |
|-----------|---|------------|-----------|------|------------|
| 0336 | <i>Plumatella</i> sp | | | | |
| 0580 | <i>Caecidotea</i> sp | | | | |
| 0670 | <i>Crangonyx</i> sp | | | | |
| 1112 | <i>Baetis flavistriga</i> | | | | |
| 1113 | <i>Baetis intercalaris</i> | | | | |
| 1352 | <i>Stenonema femoratum</i> | | | | |
| 2750 | <i>Somatochlora</i> sp | | | | |
| 5220 | <i>Cheumatopsyche</i> sp | | | | |
| 5253 | <i>Hydropsyche depravata</i> group | | | | |
| 5350 | <i>Hydroptilidae</i> | | | | |
| 6090 | <i>Pelodytes</i> sp | | | | |
| 6780 | <i>Tropisternus</i> sp | | | | |
| 6940 | <i>Stenelmis</i> sp | | | | |
| 7410 | <i>Simulium</i> sp | | | | |
| 7750 | <i>Conchapelopia</i> sp | | | | |
| 7835 | <i>Meropelopia</i> sp | | | | |
| 8037 | <i>Corynoneura lobata</i> | | | | |
| 8074 | <i>Eukiefferiella claripennis</i> group | | | | |
| 8282 | <i>Cryptochironomus</i> sp | | | | |
| 8300 | <i>Dicrotendipes fumidus</i> | | | | |
| 8445 | <i>Polypetillum (P.) flavum</i> | | | | |
| 8550 | <i>Paratanytarsus</i> sp | | | | |
| 8970 | <i>Limnophora aequifrons</i> | | | | |
| 9510 | <i>Physella</i> sp | | | | |

No. Quantitative Taxa: 0 Total Taxa: 24
 No. Qualitative Taxa: 24 ICI:
 Number of Organisms: 0 Qual EPT: 6

Ohio Department of Ecology Assessment Section
 Macroinvertebrate Collection

Collection Date: 08/02/2000 19-066 West Creek RM: 3.70

| Taxa Code | Taxa | Quant/Qual | Taxa Code | Taxa | Quant/Qual |
|-----------|---|------------|-----------|------|------------|
| 0180 | <i>Turbellaria</i> | | | | |
| 0360 | <i>Oligochaeta</i> | | | | |
| 0580 | <i>Caecidotea sp</i> | | | | |
| 0670 | <i>Crangonyx sp</i> | + | | | |
| 1112 | <i>Baetis flavistriga</i> | | | | |
| 1113 | <i>Baetis intercalaris</i> | | | | |
| 5220 | <i>Cheumatopsyche sp</i> | | | | |
| 5243 | <i>Ceratopsyche morosa group</i> | | | | |
| 5253 | <i>Hydropsyche depravata group</i> | | | | |
| 5380 | <i>Hydroptila sp</i> | | | | |
| 6940 | <i>Stenelmis sp</i> | | | | |
| 7060 | <i>Antocha sp</i> | | | | |
| 7130 | <i>Limonia sp</i> | | | | |
| 7410 | <i>Simulium sp</i> | | | | |
| 7450 | <i>Ceratopogonidae</i> | | | | |
| 7750 | <i>Conchapelopia sp</i> | | | | |
| 8030 | <i>Cardiocladius albiplumis</i> | | | | |
| 8042 | <i>Cricotopus (C.) bicinctus</i> | | | | |
| 8074 | <i>Eukiefferiella claripennis group</i> | | | | |
| 8165 | <i>Parametriochnemus sp</i> | | | | |
| 8445 | <i>Polypedilum (P.) flavum</i> | | | | |
| 8740 | <i>Stratiomys sp</i> | | | | |
| 9510 | <i>Physella sp</i> | | | | |

No. Quantitative Taxa: 0 Total Taxa: 23
 No. Qualitative Taxa: 23 ICI:
 Number of Organisms: 0 Qual EPT: 6

Ohio EPA/Division of Ecological Assessment Section
Macroinvertebrate Collection

Collection Date: 08/22/2000 19-066 West Creek RM: 0.10

| Taxa Code | Taxa | Quant/Qual | Taxa Code | Taxa | Quant/Qual |
|-----------|---|------------|-----------|------|------------|
| 0180 | <i>Turbellaria</i> | | | | |
| 0360 | <i>Oligochaeta</i> | | | | |
| 0496 | <i>Mooreobdella microstoma</i> | | | | |
| 0580 | <i>Caecidotea sp</i> | + | | | |
| 0670 | <i>Crangonyx sp</i> | | | | |
| 1112 | <i>Baetis flavistriga</i> | | | | |
| 1113 | <i>Baetis intercalaris</i> | | | | |
| 1120 | <i>Callibaetis sp</i> | | | | |
| 2120 | <i>Calopteryx sp</i> | | | | |
| 2130 | <i>Heterina sp</i> | | | | |
| 5220 | <i>Cheumatopsyche sp</i> | | | | |
| 6580 | <i>Berosus sp</i> | | | | |
| 6940 | <i>Stenelmis sp</i> | | | | |
| 7410 | <i>Simulium sp</i> | | | | |
| 7750 | <i>Conchapelopia sp</i> | | | | |
| 7775 | <i>Hayesomyia senata</i> or <i>Thienemannimyia norena</i> | | | | |
| 7780 | <i>Helopelopia sp</i> | | | | |
| 8042 | <i>Cricotopus (C.) bicinctus</i> | | | | |
| 8043 | <i>Cricotopus (C.) tremulus group</i> | | | | |
| 8273 | <i>Chironomus (C.) decorus group</i> | | | | |
| 8300 | <i>Dicrotendipes fumidus</i> | | | | |
| 8421 | <i>Paratendipes albinanus</i> or <i>P. duplicatus</i> | | | | |
| 8430 | <i>Phaenopsectra obediens group</i> | | | | |
| 8445 | <i>Polypedium (P.) flavum</i> | | | | |
| 8447 | <i>Polypedium (P.) illinoense</i> | | | | |
| 8580 | <i>Tanytarsus sp</i> | | | | |

No. Quantitative Taxa: 0 Total Taxa: 26
 No. Qualitative Taxa: 26 ICI:
 Number of Organisms: 0 Qual EPT: 4

APPENDIX B

Benthic Macroinvertebrate Taxa

**Benthic Macroinvertebrate Census For West Creek Nature Preserve
Hester-Dendy and Semi-Quantitative Kick Samples 2000**

| Taxon | Biocriteria Site #2 HD Count | Biocriteria Site #2 KS Count | Biocriteria Site #4 HD Count | Biocriteria Site #4 KS Count | Biocriteria Site #6 HD Count | Biocriteria Site #6 KS Count | Functional Feeding Group |
|--|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|--------------------------|
| Tricladida, <i>Dugesia tigrina</i> | | | | 1 | 3 | 6 | GC |
| Oligochaeta | 3 | 7 | 9 | 4 | 29 | 4 | GC |
| Crustacea | | | | | | | - |
| Isopoda, <i>Caecidotea communis</i> | | 20 | 3 | 1 | 8 | 1 | SH |
| Amphipoda <i>Crangonyx gracilis</i> | 1 | 9 | | 1 | | 1 | GC |
| Ephemeroptera | | | | | | | - |
| Baetidae | | | | | | | - |
| <i>Baetis flavistriga</i> | | 51 | | 11 | | 14 | GC |
| <i>Baetis intercalaris</i> | | | | | | 2 | GC |
| Heptageniidae | | | | | | | - |
| <i>Stenonema femoratum</i> | 1 | | | 1 | 3 | | GR |
| Odonata | | | | | | | PR |
| Calopterygidae, <i>Calopteryx</i> sp. | 1 | 7 | | | | | PR |
| Coenagrionidae <i>Argia</i> sp. | | 2 | | | | | PR |
| Trichoptera | | | | | | | |
| Hydropsychidae | | | | | | | |
| <i>Cheumatopsyche</i> sp. | 8 | 44 | 6 | 1 | 9 | | FC |
| <i>Ceratopsyche morosa</i> gr. | | | | 1 | | | FC |
| <i>Ceratopsyche slossonae</i> | | 4 | | | | | FC |
| <i>Ceratopsyche sparna</i> | | 1 | | | | 1 | FC |
| <i>Diplectrona</i> sp. | | | | 2 | | | FC |
| <i>Hydropsyche depravata</i> gr. | | 22 | | 4 | | 1 | FC |
| Hydroptilidae | | | | | | | |
| <i>Hydroptila</i> sp. | | 2 | 1 | 2 | 3 | 2 | SH |
| Coleoptera | | | | | | | |
| Elmidae | | | | | | | |
| <i>Dubiraphia</i> sp. | | 2 | | | | | GC |
| <i>Stenelmis crenata</i> . | 5 | 5 | 2 | 1 | 1 | 36 | GR |
| Staphylinidae | | | | | | | |
| <i>Stenus</i> sp. | | 1 | | | | | PR |

| Taxon | Biocriteria Site 2 HD Count | Biocriteria Site 2 KS Count | Biocriteria Site 4 HD Count | Biocriteria Site 4 KS Count | Biocriteria Site 6 HD Count | Site 6 KS Count | Functional Feeding Group |
|---|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------|--------------------------|
| Diptera | | | | | | | |
| Simuliidae | | | | | | | FC |
| <i>Simulium corbis</i> | | 1 | | | | | FC |
| <i>Simulium vittatum</i> | | 5 | | | | | |
| Empididae. | | | | | | | PR |
| <i>Hemerodromia</i> sp. | 11 | 8 | 2 | 1 | 16 | 3 | |
| Tipulidae | | | | | | | SH |
| <i>Tipula</i> sp. | | 1 | | | | | PR |
| Muscidae, <i>Limnophora</i> sp. | | 1 | | 1 | | | |
| Chironomidae | | | | | | | PR |
| <i>Ablabesmyia mallochi</i> | | | 3 | 2 | 14 | | PR |
| <i>Conchapelopia</i> sp. | 36 | 6 | 11 | 3 | 6 | 3 | PR |
| <i>Helopelopia</i> sp. | | 2 | 4 | | | | PR |
| <i>Meropelopia</i> sp. | | 1 | | | 3 | | PR |
| <i>Natarsia</i> sp. A | | | 4 | | | | PR |
| <i>Pentaneura</i> sp. | 1 | 1 | 4 | | 1 | | PR |
| <i>Thienemanniemyia</i> sp. | 7 | | 12 | | 53 | | PR |
| <i>Zavrelimyia</i> sp. | 12 | | 3 | | | | PR |
| <i>Cardiocladius</i> sp. | | | | | | 1 | - |
| <i>Corynoneura lobata</i> | 94 | 2 | 9 | 1 | 6 | | GC |
| <i>Corynoneura "taris" sp.1</i> | | 2 | | | | | GC |
| <i>Cricotopus annulator</i> | 40 | 18 | 1 | 1 | 51 | 3 | SH |
| <i>Cricotopus curtus</i> | 15 | | | | 42 | 3 | SH |
| <i>Cricotopus triannulatus</i> | 10 | | 1 | 1 | 73 | | SH |
| <i>Cricotopus bicinctus</i> | 11 | 6 | | | 7 | | SH |
| <i>Cricotopus (Isocladius) sylvestris</i> | | | | | 1 | | SH |
| <i>Eukiefferiella claripennis</i> | | 2 | | 2 | | | GC |
| <i>Nanocladius</i> | | | | | | | GC |
| <i>rectinervis/crassicornus</i> | 9 | | 3 | | 5 | | GC |
| <i>Parametriocnemus</i> sp. | | 1 | 1 | 2 | | | GC |
| <i>Thienemanniella xena</i> | | 5 | 1 | 1 | | | GC |
| <i>Tvetenia bavarica</i> gr. | | 9 | | | | | GC |
| <i>Tvetenia discoloripes</i> gr. | | | | | | | GC |
| <i>Chironomus</i> sp. | 3 | | | | | | GC |
| <i>Chironomus riparius</i> gr. | | | 4 | | 6 | | GC |
| <i>Dicrotendipes fumidus</i> | 70 | 4 | 2 | 2 | 146 | 1 | GC |
| <i>Dicrotendipes neomodestus</i> | 1 | | | | 8 | | GC |
| <i>Dicrotendipes simpsoni</i> | 1 | | | | | | GC |
| <i>Microtendipes</i> sp. | | | | | | 1 | GC |
| <i>Paratendipes</i> sp. | | | | | 1 | | GC |
| <i>Phaenopsectra flavipes</i> | | | | | 1 | | GC |
| <i>Phaenopsectra obediens</i> | | | | | | | GC |
| gr. | | | 2 | 1 | 22 | 3 | GC |
| <i>Polypedilum convictum</i> | | 4 | | | 1 | 1 | GC |
| <i>Polypedilum fallax</i> gr. | 2 | | 2 | | | | GC |

| Taxon | Biocriteria Site 2 HD Count | Biocriteria Site 2 KS Count | Biocriteria Site 4 HD Count | Biocriteria Site 4 KS Count | Biocriteria Site 6 HD Count | Biocriteria Site 6 KS Count | Functional Feeding Group |
|-----------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|--------------------------|
| <i>Polypedilum illinoense</i> | 1 | 1 | 1 | | 2 | | GC |
| <i>Polypedilum scalaenum</i> | | | | | 9 | | GC |
| <i>Stictochironomus</i> sp. | 2 | | | | | | GC |
| <i>Rheotanytarsus</i> | | | | | | | FC |
| <i>distinctissimus</i> gr. | 44 | 2 | | | | | FC |
| <i>Rheotanytarsus exiguus</i> gr. | | | | 1 | 53 | | FC |
| <i>Stempellinella</i> sp. | | 1 | | | | | FC |
| <i>Tanytarsus glabrascens</i> | 8 | | | | 31 | 1 | FC |
| <i>Tanytarsus guerlus</i> gr. | 2 | | | | | | GC |
| | | | | | | | GC |
| | | | | | | | GC |
| Mollusca | | | | | | | - |
| Gastropoda | | | | | | | |
| Physidae, <i>Physella</i> sp. | 11 | | 2 | 3 | 8 | 3 | GR |
| Planorbidae | | | | | | | |
| <i>Gyraulus parvus</i> | | | | | 6 | | |
| Lymnaeidae | | | | | | | |
| <i>Fossaria humilis</i> | | | | 1 | | 1 | GR |
| Pelecypoda | | | | | | | |
| Sphaeriidae | | | | | | | |
| <i>Musculium</i> sp. | | 2 | | 2 | | 2 | FC |
| | 410 | 262 | 93 | 55 | 628 | 94 | |

¹ FC = Filterer Collector; GC = Gatherer Collector; PR = Predator; SH = Shredder; GR = Grazer/Scraper

Table 2: Metric and Index Scores for West Creek Nature Preserve Sites 2000

| Index / Metric | Site 2 | Site 2 | Site 4 | Site 4 | Site 6 | Site 6 |
|--|---------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | HD Score Value | KS Score Value | HD Score Value | KS Score Value | HD Score Value | KS Score Value |
| Total Organisms in Sample | 410 | 262 | 93 | 55 | 628 | 94 |
| ICI Score | 30 Fair | NA | 22 Fair | NA | 30 Fair | NA |
| QCTV | 34 Good | 37 Good | 31 Fair | 33 Good | 32 Fair | 38 Good |
| HBI (tolerances adjusted to Ohio) | 4.88 Good | 4.53 Good | 5.20 Good | 4.63 Good | 6.17 Fair | 3.97 Very Good |
| Taxa Richness | 28 | 37 | 25 | 28 | 33 | 23 |
| Shannon Diversity Index | 2.54 | 2.88 | 2.92 | 3.03 | 2.71 | 2.35 |
| EPT Taxa Richness | 2 | 6 | 2 | 7 | 3 | 5 |
| Percent EPT Composition | 2.20 | 47.33 | 7.53 | 40.00 | 2.39 | 21.28 |
| EPT/Chironomidae | 0.02 | 1.85 | 0.10 | 1.29 | 0.03 | 1.18 |
| Cricotopus+Chironomus sp./ Chironomidae | 0.21 | 0.36 | 0.09 | 0.118 | 0.33 | 0.35 |
| Total Ephemeroptera (Mayfly) Taxa | 1 | 1 | 0 | 2 | 1 | 2 |
| Total Trichoptera (Caddisfly) Taxa | 1 | 5 | 2 | 5 | 2 | 3 |
| Total Diptera Taxa | 21 | 22 | 19 | 13 | 24 | 10 |
| Percent Ephemeroptera (Mayfly) Composition | 0.24 | 19.47 | 0.00 | 21.82 | 0.48 | 17.02 |
| Percent Trichoptera (Caddisfly) Composition | 1.95 | 27.86 | 7.53 | 18.18 | 1.91 | 4.26 |
| Percent Tanytarsini Midge Composition | 13.17 | 1.15 | 0.00 | 1.82 | 13.38 | 1.06 |
| Percent Other Diptera and Non- Insect Composition | 83.17 | 45.04 | 90.32 | 56.36 | 84.08 | 39.36 |
| Percent Tolerant Organisms (Ohio EPA, ICI list) | 7.80 | 5.34 | 19.35 | 12.73 | 8.44 | 7.45 |
| Percent Toxic Tolerant Organism Composition | 28.29 | 11.83 | 17.20 | 9.09 | 28.98 | 9.57 |
| Percent Selected Toxic Tolerant Organism Composition | 19.51 | 9.54 | 5.38 | 3.64 | 28.03 | 6.38 |
| Percent Organic Tolerant Organism Composition | 3.66 | 4.96 | 16.13 | 14.55 | 10.03 | 13.83 |
| Midge mentum deformity distribution by Class ¹ | 12 C-1 10 C-2 1 C-3 | 4 C-1 2 C-2 0 | 0 0 0 | 0 0 0 | 26 C-1 13C-2 0 | 0 0 0 |

¹ Midge mentum deformities are divided into 3 Classes; Class 1 (C-1) Slight Similar to Chipped Teeth, Class 2 (C-2) extra teeth, missing teeth, large gaps, distinct asymmetry, and Class 3 (C-3) severe deformation, including at least two Class 2 characters (Lenat, 1993). Deformed midge mentums have been associated with exposure to environmental stressors.

APPENDIX C

Bird Inventory

West Creek Bird Inventory

Observers: Gabe Leidy, Dave LeGalle, Dave Vasarhelyi
Observation: 2000, 2001

Number of Species: 115
N = Nesting (49 species)

| | | |
|------------------------------|---------------------------------|-------------------------------|
| American Goldfinch -N | Eastern Bluebird - N | Red Bellied Woodpecker-N |
| American Redstart | Eastern Phoebe - N | Red Eyed Vireo - N |
| American Robin - N | Eastern Towhee - N | Red Headed Woodpecker |
| American Kestrel | Eastern Wood Pewee - N | Red Shouldered Hawk |
| American Crow - N | European Starling - N | Red Tailed Hawk - N |
| American Tree Sparrow | Field Sparrow - N | Red Winged Blackbird-N |
| Bald Eagle | Fox Sparrow | Ring Billed Gull |
| Baltimore Oriole - N | Golden-Crowned Kinglet | Rock Dove |
| Barn Swallow | Gray Catbird- N | Rose-Breasted Grosbeak-N |
| Barred Owl- N | Gray-Cheeked Thrush | Ruby-Crowned Kinglet |
| Belted Kingfisher - N | Great Blue Heron | Ruby Throated Hummingbird - N |
| Blackburnian Warbler | Great Crested Flycatcher - N | Rusty Blackbird |
| Black-Capped Chickadee - N | Great Horned Owl - N | Savannah Sparrow |
| Black Poll Warbler | Green Heron | Scarlet Tanager-N |
| Black-Throated Green Warbler | Hairy Woodpecker- N | Sharp-Shinned Hawk |
| Black-and-White Warbler | Hermit Thrush | Solitary Sandpiper |
| Blue Jay - N | Hooded Warbler | Song Sparrow-N |
| Blue-Gray Gnatcatcher | House Finch- N | Spotted Sandpiper |
| Blue-Headed Cowbird | House Wren - N | Swainson's Thrush |
| Blue-Headed Vireo | House Sparrow - N | Swamp Sparrow |
| Broad-Winged Hawk | Indigo Bunting-N | Tennessee Warbler |
| Brown Creeper | Killdeer - N | Tree Swallow - N |
| Brown Headed Cowbird- N | Lincoln's Sparrow | Tufted Titmouse - N |
| Brown Thrasher | Mallard | Turkey Vulture |
| Canada Warbler | Mourning Dove - N | Veery - N |
| Cape May Warbler | Nashville Warbler | Vesper Sparrow |
| Carolina Wren - N | Northern Cardinal - N | Whip-Poor-Will |
| Cedar Waxwing - N | Northern Flicker - N | White-Breasted Nuthatch - N |
| Chipping Sparrow- N | Northern Harrier | White Crowned Sparrow |
| Chestnut-Sided Warbler | Northern Mockingbird | White-Throated Sparrow |
| Chimney Swift | Northern Par | Wild Turkey |
| Common Grackle- N | Northern Rough Winged Swallow-N | Wilson's Warbler |
| Common Nighthawk | Northern Walterthrush | Wood Duck |
| Common Yellowthroat | Oliver Sided Flycatcher | Wood Thrush - N |
| Cooper's Hawk | Ovenbird | Winter Wren |
| Dark-Eyed Junco | Palmwarbler | Yellow Bellied Flycatcher |
| Downy Woodpecker - N | Philadelphia Vireo | Yellow Bellied Sapsucker |
| Eastern Screech Owl - N | Pileated Woodpecker | Yellow Warbler-N |
| Eastern Kingbird- N | Purple Finch | |

APPENDIX D

Vegetative Communities and Plant Species

West Creek Preserve Plant Inventory

| GENUS | SPECIES | COMMON NAME |
|---------------|---------------|---------------------------------------|
| Agalinis | tenuifolia | Slender leaf false foxglove |
| Agrostis | perennans | Upland |
| Allium | schoenoprasum | Chives |
| Alopecurus | geniculatus | Water foxtail |
| Amelanchier | arborea | Serviceberry |
| Apocynum | cannabinum | Indian hemp |
| Aster | racemosus | White old field aster |
| Aster | umbellatus | Parasol Aster |
| Athyrium | felix-femina | Lady fern |
| Atriplex | hastata | Hastate orach |
| Atriplex | patula | Spear saltbush |
| Batula | populifolia | Gray birch |
| Bromus | commutatus | Meadow brome |
| Carex | annectens | Var. xanthocarpa - Yellow fruit sedge |
| Carex | cephalophora | Ovalleaf sedge |
| Carex | convoluta | Rosy sedge |
| Carex | cristatella | Crested sedge |
| Carex | digitalis | Slender woodland sedge |
| Carex | glaucodea | Carex glaucodea |
| Carex | granularis | Var. granularis |
| Carex | hirsutella | Fuzzy Wuzzy sedge |
| Carex | normalis | see field notes |
| Carex | prasina | Drooping sedge |
| Carex | scoparia | Broom sedge |
| Carex | tribuloides | Blunt broom sedge |
| Carex | umbrellata | Parasol sedge |
| Carex | wildenovii | Willdenow's sedge |
| Carya | glabra | Pignut hickory |
| Castanea | dentata | American chestnut |
| Catalpa | bignonioides | Southern catalpa |
| Cicuta | maculata | Spotted water hemlock |
| Cleome | hassleriana | Pink queen |
| Comandra | umbellata | Bastard toadflax |
| Conopholis | americana | American squawroot |
| Cymbalaria | muralis | Kenilworth ivy |
| Danthonia | compressa | Flattened oakgrass |
| Danthonia | spicata | Poverty Danthonia |
| Dennstaedtia | punctilobula | Eastern hayscented fern |
| Dentaria | diphylla | Pepperroot |
| Dentaria | laciniata | Pepperroot |
| Dichanthelium | clandestinum | Deer tongue panicgrass |
| Dichanthelium | depauperatum | Starved panicgrass |
| Dichanthelium | dichotomum | Cypress panicgrass |
| Dichanthelium | dichotomum | see field notes |

| GENUS | SPECIES | COMMON NAME |
|---------------|----------------|------------------------------|
| Dichanthelium | implicatum | Western panicgrass |
| Dichanthelium | lindheimeri | Lindheimer panicgrass |
| Dichanthelium | linearifolium | Slime leaf panicum |
| Disporum | lanuginosum | Yellow fairybells |
| Dryopteris | carthusiana | Spirulose woodfern |
| Dryopteris | noveboracensis | New York fern |
| Epifagus | virginiana | Beechdrops |
| Eupatorium | perfoliatum | Common boneset |
| Eupatorium | purpureum | Sweetscented joeypyeweed |
| Festuca | pratensis | Lolium pratense |
| Festuca | trachyphylla | Hard Fescue |
| Galium | lanceolatum | Largeleaf wild licorice |
| Gaultheria | procumbens | Eastern teaberry |
| Gaylussacia | baccata | Black huckleberry |
| Geum | laciniatum | Rough avers |
| Hackelia | virginiana | beggarslice |
| Hedeoma | pulegioides | American falsepenny royal |
| Hieracium | auantiacum | Orange hawkweed |
| Hieracium | flagellare | Hawkweed |
| Hieracium | paniculatum | Allegheny hawkweed |
| Hieracium | piolosella | Mouseear hawkweed |
| Hieracium | venosum | Rattlesnakeweed |
| Holcus | lanatus | Common velevetgrass |
| Houstonia | caerulea | Azure Bluets |
| Juncus | acuminatus | Tapertip rush |
| Kickxia | elatine | Sharpleaf cancerwort |
| Leersia | virginica | Whitegrass |
| Liriodendron | tulipifera | Tulip tree |
| Lobelia | inflata | Indian tobacco |
| Lobelia | siphilitica | Great blue lobelia |
| Lotus | sp. | Narrowleaf birdsfoot trefoil |
| Lotus | tenuis | Narrowleaf birdsfoot trefoil |
| Lysimachia | quadrifolia | Whorled yellow loosestrife |
| Medeola | virginiana | Indian cucumber root |
| Microstegium | vimineum | Repalese browntop |
| Monotropa | uniflora | Indianpipe |
| Narcissus | biflorus(?) | Daffodil |
| Oenothera | perennis | Small evening primrose |
| Osmunda | claytoniana | Interrupted fern |
| Ostrya | virginiana | Ironwood |
| Ostrya | virginiana | for. glandulosa ironwood |
| Penstemon | digitalis | Talus slope penstemon |
| Phalaris | arundinaceae | Reed canary grass |
| Poa | alsodes | Grove bluegrass |
| Podophyllum | peltatum | Mayapple |
| Populus | grandidentata | Bigtooth aspen |
| Potentilla | simplex | Common cinquefoil |

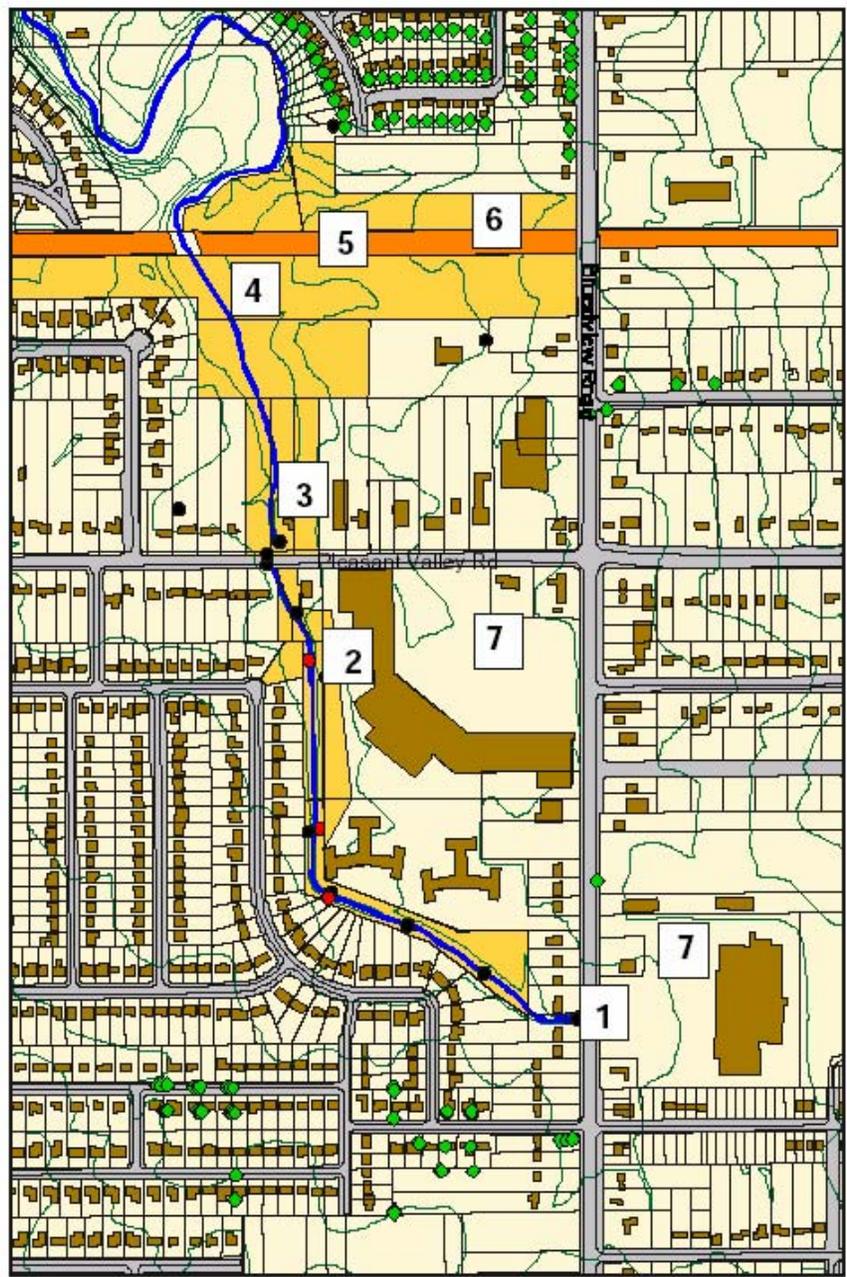
| GENUS | SPECIES | COMMON NAME |
|--------------|----------------|----------------------------|
| Prunus | avium | Sweet cherry |
| Prunus | cerasus | Sour cherry |
| Pteridium | aquilinum | Bracker fern |
| Pycnanthemum | muticum | Mountain mint |
| Quercus | coccinea | Scarlet oak |
| Quercus | velutina | Black oak |
| Ranunculus | abortivus | Little leaf buttercup |
| Ranunculus | hispidus | Bristly buttercup |
| Ranunculus | repens | Creeping buttercup |
| Rhus | copallina | Dwarf sumac |
| Rosa | carolina | Carolina rose |
| Rubus | allegheniensis | Allegheny blackberry |
| Rubus | recurvicaulis | Arching dewberry |
| Rumex | acetosella | Sheeps sorrel |
| Salix | nigra | Black willow |
| Scirpus | validus | Bulrush |
| Sisyrinchium | angustifolium | Narrowleaf blueyed grass |
| Smilax | rotundifolia | round leaf greenbrier |
| Solidago | bicolor | White goldenrod |
| Spergularia | marina | Sandspurry |
| Sphenopholis | intermedia | Slender wedgescale |
| Spiraea | tomentosa | Sleeplebrush |
| Suaeda | calceoliformis | Pursh seepweed |
| Thelypteris | hexangnoptera | Maiden fern |
| Trifolium | aureum | Golden clover |
| Vaccinium | angustifolium | Lowbrush blueberry |
| Vaccinium | pallidum | Dryland blueberry |
| Viburnum | opulus | var. opulus |
| Vicia | angustifolia | Black common vetch |
| Viola | fimbriatula | Arrowleaf violet |
| Viola | hastata | Halberd leaf yellow violet |
| Viola | sagittala | Arrowleaf violet |

SOURCE: Dr. George Wilder, Cleveland State University, 2000. See Also: Davey Resource Group Biocriteria Study and Riparian Corridor Assessment Report, Appendix K, Vegetative Communities and Species Lists.

APPENDIX E

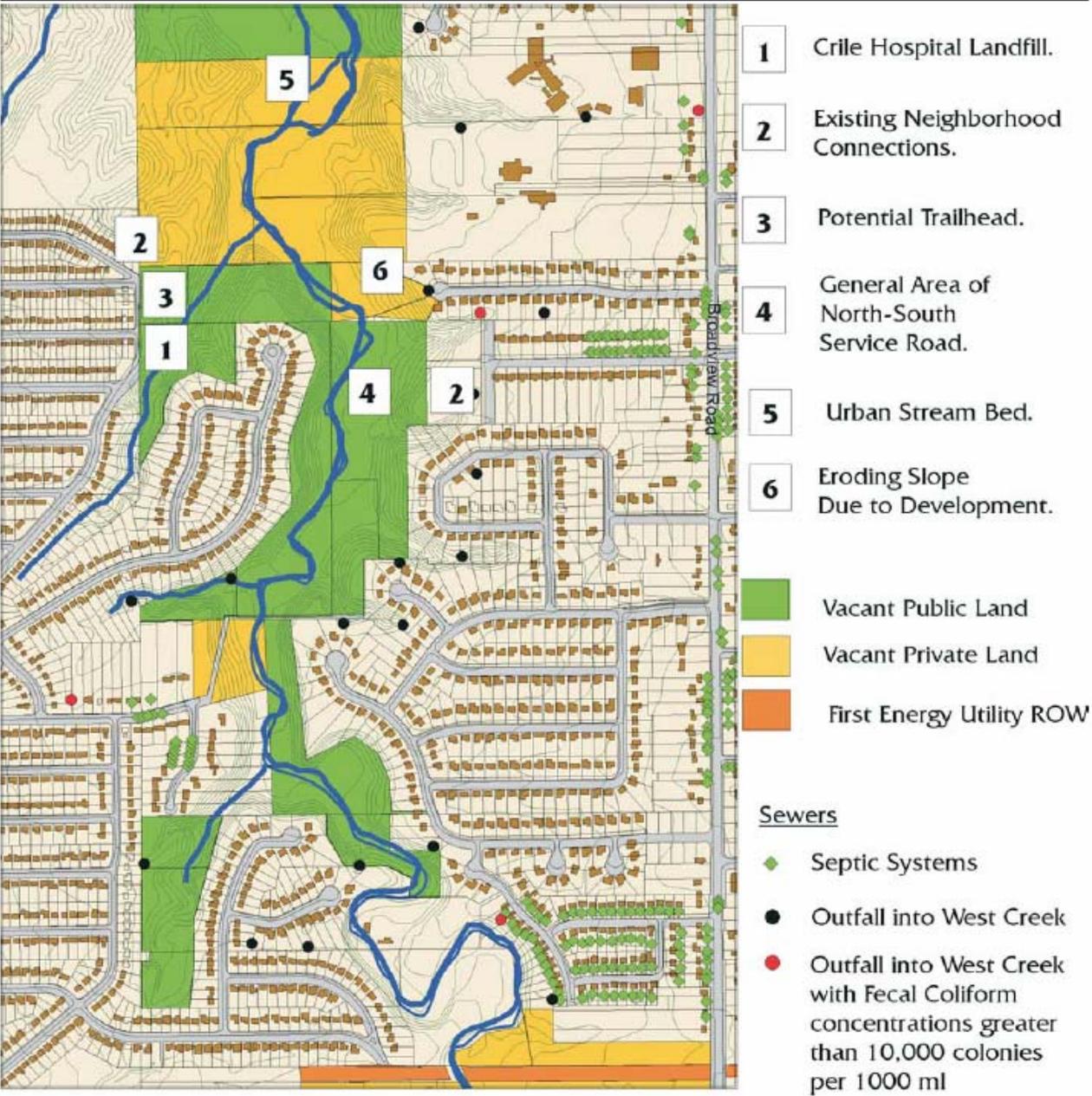
Maps Reach Areas

Headwaters at Reach 1: Broadview Road to Utility ROW

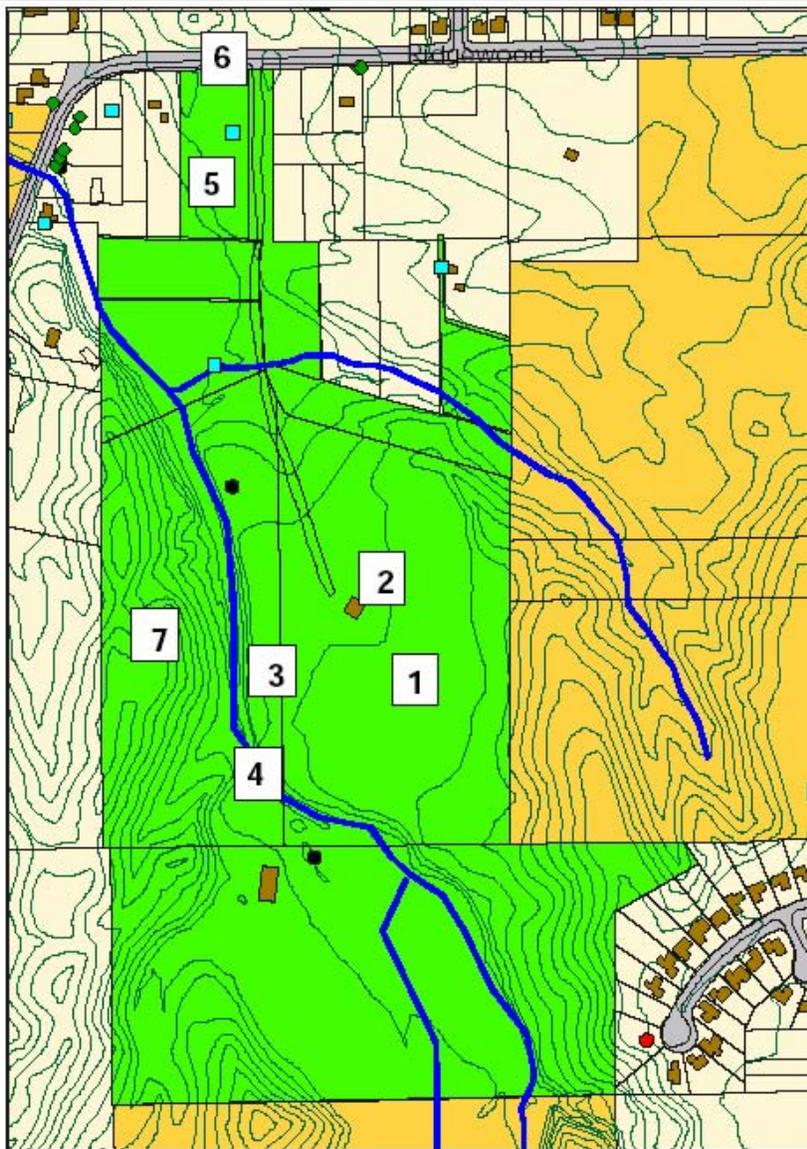


- 1** Daylight of West Creek.
 - 2** Existing Pedestrian Bridge to Neighborhood.
 - 3** Vacant Lot - Potential Trailhead Location.
 - 4** Diverse habitat to protect but with severe erosion problems.
 - 5** First Energy Utility ROW Regional Trail Connector Potential.
 - 6** Vacant Lot with Wetlands.
 - 7** Large Areas of Impervious Surfaces.
- Vacant Private Land**
- First Energy Utility ROW**
- Sewers
- ◆ Septic Systems
 - Outfall into West Creek
 - Outfall into West Creek with Fecal Coliform concentrations greater than 10,000 colonies, per 1000 ml

Reach 2: North of Utility ROW to South End of Closed Landfill



Reach 3:
 South End of
 Closed Landfill to
 West Ridgewood
 Drive



- 1** Closed Landfill.
- 2** TV Tower and Service Road
- 3** Unstable Slope Along Landfill.
- 4** Realigned Streambed.
- 5** Existing Parking Area and Trail Spur.
- 6** Entrance with Limited Sightlines.
- 7** Diverse Forest Habitat.

- Vacant Public Land
- Vacant Private Land

Wells

Sewers

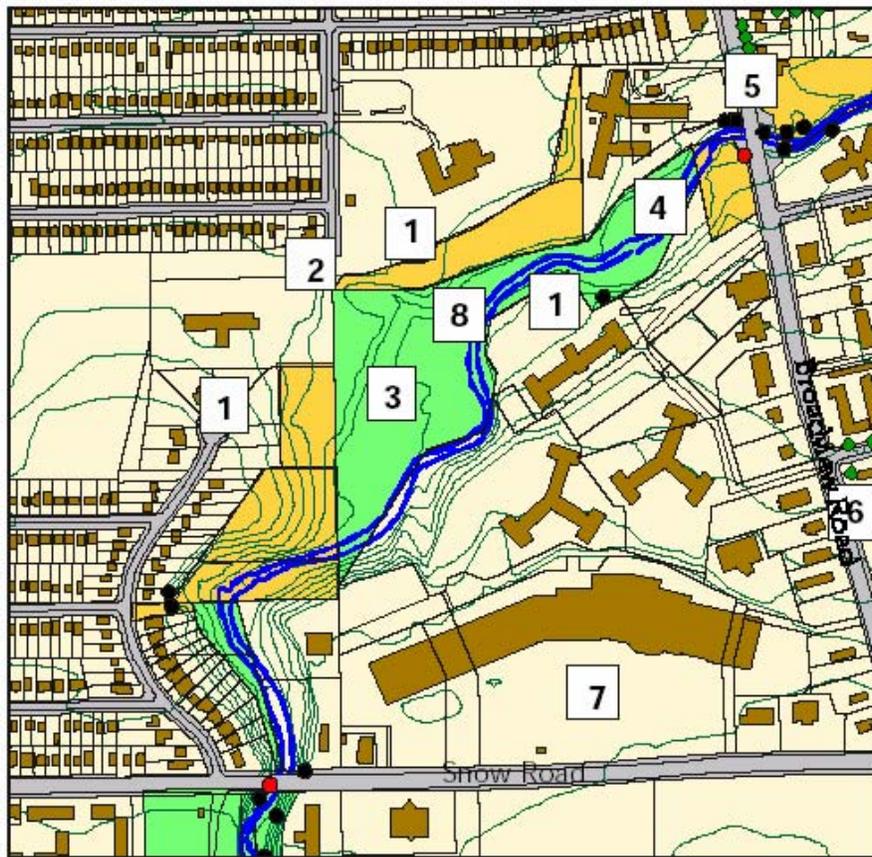
- Septic Systems
- Outfall into West Creek
- Outfall into West Creek with Fecal Coliform concentrations greater than 10,000 colonies, per 100 ml

Reach 4:
West Ridgewood
Drive to Snow
Road



- 1** Floodplain provides relief from stream overflow.
 - 2** Restricted access due to topography and existing development.
 - 3** Existing Pedestrian Walkway Connector.
 - 4** Natural Water Cascade and Geologic Formation.
 - 5** Public Library and New Garden Path.
 - 6** Existing Park. Potential Trailhead.
 - 7** Road Crossing.
- Vacant Public Land
 - Vacant Private Land
 - Wells
- Sewers
- Septic Systems
 - Outfall into West Creek
 - Outfall into West Creek with Fecal Coliform concentrations greater than 10,000 colonies per 100 ml

Reach 5: Snow Road to Broadview Road



- 1 Neighborhood Access
- 2 Potential Connector to Big Creek Parkway
- 3 Floodplain and Forested Area.
- 4 Existing Dam Structures.
- 5 Broadview Road Crossing.
- 6 Henninger House.
- 7 Large Areas of Impervious Surfaces.
- 8 Erosion Areas with Debris.

- Vacant Public Land
- Vacant Private Land

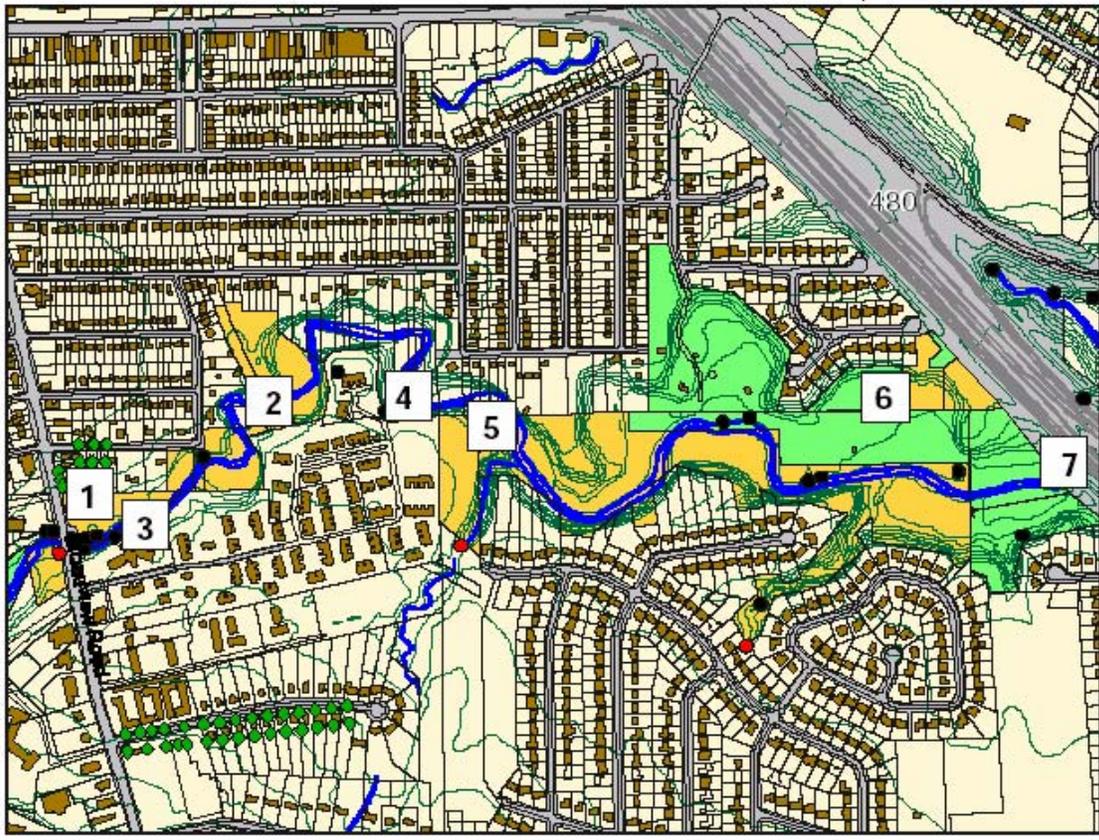
Sewers

- Septic Systems
- Outfall into West Creek
- Outfall into West Creek with Fecal Coliform concentrations greater than 10,000 colonies, per 100 ml

Reach 6: Broadview Road to I-480



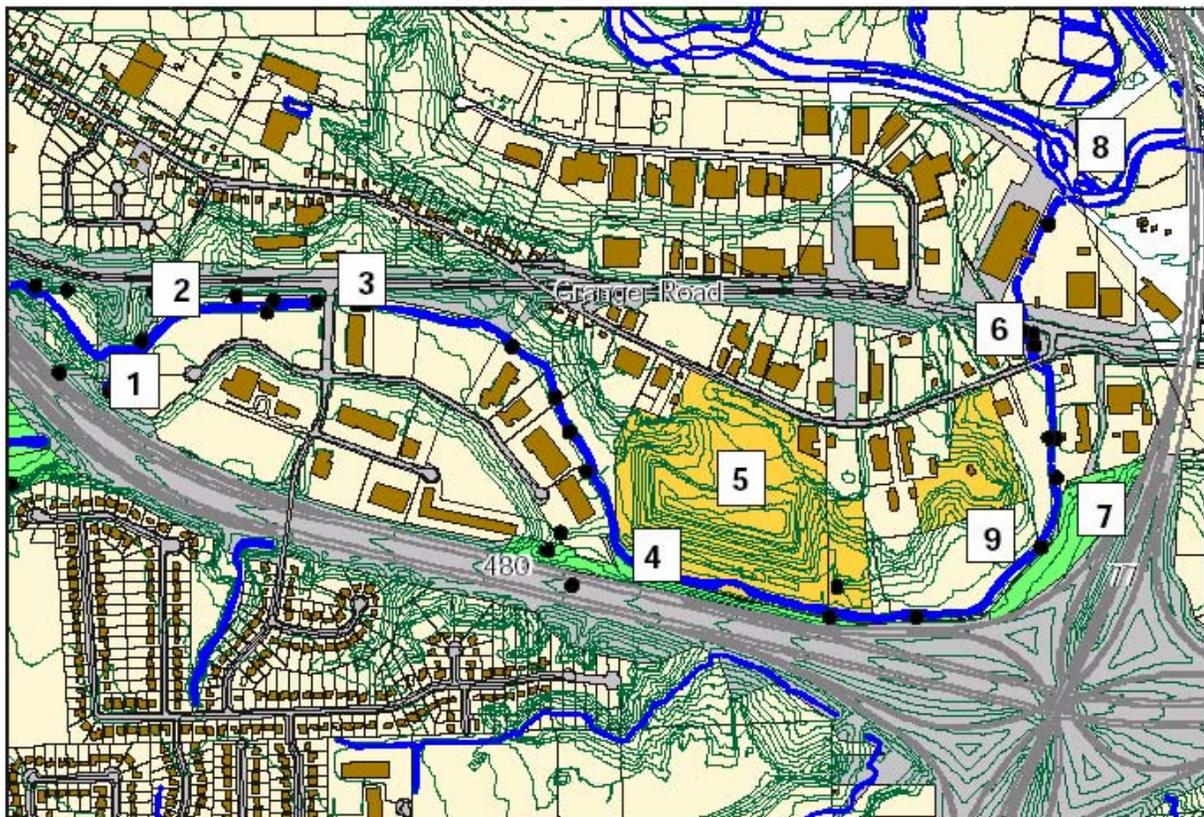
- | | | |
|-------------------------------------|--|---|
| 1 Potential Trailhead. | 5 Natural Water Feature and Geologic Formation. | Vacant Public Land |
| 2 Interurban Rail Artifacts. | 6 Public Park Access. | Vacant Private Land |
| 3 Retaining Wall. | 7 I-480 Culvert - Restricted Crossing. | <u>Sewers</u> |
| 4 Steep Terrain. | | Septic Systems |
| | | Outfall into West Creek |
| | | Outfall into West Creek with Fecal Coliform concentrations greater than 10,000 colonies per 100 ml |



**I-480 to Cuyahoga
Reach 7: River North of
Granger Road**



- | | | |
|---|--|---|
| <p>1 Culvert and Dam.</p> <p>2 High Erosion Area.</p> <p>3 Failed Retaining Wall and Culvert.</p> <p>4 Concrete Channel and Pool.</p> | <p>5 Closed Sanitary Landfill.</p> <p>6 Road and Bridge Crossings.</p> <p>7 ODOT Property - Potential Restoration.</p> <p>8 West Creek Meets Cuyahoga River.</p> <p>9 Existing Construction and Demolition Landfill</p> | <p> Vacant Public Land</p> <p> Vacant Private Land</p> <p style="text-align: center;"><u>Sewers</u></p> <p> Outfall into West Creek</p> <p> Outfall into West Creek with Fecal Coliform concentrations greater than 10,000 colonies, per 100 ml</p> |
|---|--|---|



APPENDIX F

Ohio EPA Known Spills Data

Ohio EPA RRS

6/10/2005

Spill Number: 8511-18-3903
 County: CUYAHOGA
 TWP/City: INDEPENDENCE
 Reported: 11/01/1985 :
 Area Affected: SANITARY SEWER

 Waterway: WEST CREEK
 Size: S

Entity: GREAT LAKES CONSTRUCTION
 Address: N/A

 Source: FIXED FACILITY - INDUSTRY - TANK
 STORAGE (ABOVE GROUND)

 Cause: LEAK
 Location: N/A

 Priority: 3

| Material Spilled | Amt. Spilled | Units | Size | Type |
|------------------|--------------|-------|------|------|
| LATEX LIQUID | .0 | UNK | S | C |

Spill Number: 9205-18-1780
 County: CUYAHOGA
 TWP/City: PARMA
 Reported: 05/07/1992 13:57
 Area Affected: SURFACE WATER/STORM SEWERS

 Waterway: WEST CREEK
 Size: U

Entity: MR ED BEDFORD B CARR D INC
 Address: 5700 ALLENDALE
 NORTH OLMSTEAD, OH 44070
 Source: UNKNOWN

 Cause: UNKNOWN
 Location: 1723 BROOKPARK AVE

 Priority: 3

| Material Spilled | Amt. Spilled | Units | Size | Type |
|------------------|--------------|-------|------|------|
| GERMICIDE | 150.0 | GAL | S | A |

Spill Number: 0106-18-1982
 County: CUYAHOGA
 TWP/City: BROOKLYN HTS.
 Reported: 06/02/2001 21:32
 Area Affected: SURFACE WATER/STORM SEWERS
 LAND OR LAND SURFACE IMPACT

 Waterway: WEST CREEK, THEN THE CUYAHOGA
 Size: S

Entity: FED EX
 Address: 990 RESOURCE DRIVE
 BROOKLYN HEIGHTS, OH 44131
 Source: TRANSPORTATION - TRUCK - ENGINE
 OR FUEL SUPPLY

 Cause: LEAK
 Location: 990 RESOURCE DRIVE

 Priority: 2

| Material Spilled | Amt. Spilled | Units | Size | Type |
|------------------|--------------|-------|------|------|
| DIESEL | 120,200.0 | GAL | S | H |
| DIESEL | 200.0 | GAL | S | H |

Spill Number: 0502-18-0983
 County: CUYAHOGA
 TWP/City: PARMA
 Reported: 02/22/2005 15:13
 Area Affected: SURFACE WATER/STORM SEWERS

 Waterway: WEST CREEK PRESERVE PONDS
 Size: U

Entity: NO SPILL
 Address: N/A

 Source: UNKNOWN

 Cause: UNKNOWN
 Location: RIDGWOOD DR NEAR BROADVIEW RD

 Priority: R

| Material Spilled | Amt. Spilled | Units | Size | Type |
|------------------|--------------|-------|------|------|
| SHEEN | .0 | UNK | U | H |

APPENDIX G

West Creek Watershed Community Ordinances

4/1/02

L-344-01 vaz
(Substitute #2)
(As Amended)

ORDINANCE NO. 128-02

BY: **DEBORAH LIME, STUART J. BOYDA, MICHELE DANIELS,
BRIAN DAY, MARK A. DRABIK, MARY GALINAS,
ROY J. JECH, JOHN R. STOVER, MICHELLE J. STYS**

AN ORDINANCE TO ENACT CHAPTER 1111
"RIPARIAN SETBACKS" OF CODIFIED ORDINANCES
OF THE CITY OF PARMA, AND DECLARING AN
EMERGENCY

WHEREAS, flooding is a threat to public health and safety and public and private property in the West Creek, Big Creek, Baldwin Creek, Cuyahoga River, and Rocky River watersheds, and vegetated riparian areas lessen the damage from such flooding by slowing runoff, enabling water to soak into the ground, and by absorbing excess flow during flood events; and,

WHEREAS, stream bank erosion in the West Creek, Big Creek, Baldwin Creek, Cuyahoga River, and Rocky River watersheds is a threat to public health and safety and public and private property, and vegetated riparian areas slow runoff and stabilize streambanks, thus reducing the erosive force of runoff and strengthening banks against high velocity waters; and,

WHEREAS, the presence of natural vegetation on streambanks provides protection against erosive forces both within streams and on adjacent lands, whether publicly or privately owned; and,

WHEREAS, the protection of riparian areas results in the presence of plants best suited to each individual environment along a stream, with proven capability for survival and regeneration at no cost; and,

WHEREAS, vegetated riparian areas filter and trap sediments, chemicals, salts, septic discharge, and other pollutants from runoff and floodwaters, thus protecting surface and ground water quality; and,

WHEREAS, vegetated riparian areas can provide a dense tree canopy that helps to maintain and improve the stability of watercourse temperatures, thus protecting aquatic ecosystems, and helps to reduce the presence of aquatic nuisance species; and,

WHEREAS, the protection of riparian areas can result in a diverse and interconnected riparian corridor that provides habitat to a wide array of wildlife; and,

WHEREAS, there is a watershed-wide effort to reduce the flooding and erosion within the West Creek, Big Creek, Baldwin Creek, Cuyahoga River and Rocky River watersheds and to protect and enhance the water resources of West Creek and Big Creek in the Cuyahoga River watershed and Baldwin Creek in the Rocky River watershed, and the City of Parma recognizes its obligation as a part of these watersheds to reduce flooding and erosion by controlling runoff within its borders; and,

WHEREAS, the Cuyahoga Soil and Water Conservation District; the Northeast Ohio Areawide Coordinating Agency; the Natural Resource Conservation Service of the U.S. Department of Agriculture; the Ohio Department of Natural Resources, Division of Natural Areas

and Preserves and Division of Forestry; the Ohio Environmental Protection Agency; and the U.S. Environmental Protection Agency recommend riparian setbacks as a valuable tool in an overall natural resource management program for flood risk reduction, erosion control, water quality control, and aquatic habitat protection; and,

WHEREAS, studies undertaken by, and reviewed by, the Ohio Environmental Protection Agency and other independent scientific bodies recommend the minimum widths for riparian setbacks; and,

WHEREAS, the Council of the City of Parma has reviewed and adopted the recommendations of the above government agencies, and the Council finds that in order to minimize encroachment on watercourses and the need for costly engineering solutions to protect structures and reduce property damage and threats to the safety of residents; to protect and enhance the scenic beauty of the City of Parma; and to preserve the character of the City of Parma, the quality of life of the residents of the City of Parma, and corresponding property values, it is necessary and appropriate to regulate the construction of structures and uses within a riparian setback along the banks of watercourses in the City of Parma; and,

WHEREAS, Article XVIII, Section 3 of the Ohio Constitution grants municipalities the legal authority to adopt land use and control measures for promoting the peace, health, safety, and general welfare of its citizens; and,

WHEREAS, 40 C.F.R. Parts 9, 122, 123, and 124, referred to as NPDES Storm Water Phase II, require designated communities to develop a Storm Water Management Program to address the quality of storm water runoff during and after soil disturbing activities;

NOW, THEREFORE, BE IT ORDAINED BY THE COUNCIL OF THE CITY OF PARMA, STATE OF OHIO:

Section 1. That Chapter 1111 "Riparian Setbacks" of the Codified Ordinances of the City of Parma is hereby enacted to read as follows:

"1111.01 DEFINITIONS.

For the purpose of these regulations, the following terms shall have the meaning herein indicated:

(a) "Best Management Practice (BMP)". Any practice or combination of practices that is determined to be the most effective, practicable (including technological, economic, and institutional considerations) means of preventing or reducing the amount of pollution generated by nonpoint sources of pollution to a level compatible with water quality goals. BMP's may include structural practices, conservation practices and operation and maintenance procedures.

(b) "Community". Throughout these regulations, this shall refer to the City of Parma or its designated representative.

(c) "Damaged or Diseased Trees". This shall mean trees that have split trunks; broken tops; heart rot; insect or fungus problems that will lead to imminent death; undercut root systems that put the tree in imminent danger of falling; lean as a result of root failure that puts the tree in imminent danger of falling; or any other condition that puts the tree in imminent danger of being uprooted or falling into or along a watercourse or on to a structure.

(d) "Federal Emergency Management Agency" (FEMA). The agency with overall responsibility for administering the National Flood Insurance Program.

(e) "Impervious Cover". This shall mean any surface that cannot effectively absorb or infiltrate water. This may include concrete or asphalt paved roads, streets, parking lots, rooftops,

sidewalks, and other areas not covered by vegetation.

(f) "Intermittent Stream". This shall mean a natural watercourse that may have some water in pools but where surface flows are non-existent or interstitial for periods of one week or more during typical summer months.

(g) "Natural Succession". This shall mean a gradual and continuous replacement of one kind of plant and animal group by a more complex group. The plants and animals present in the initial group modify the environment through their life activities thereby making it unfavorable for themselves. They are gradually replaced by a different group of plants and animals better adapted to the new environment.

(h) "Noxious Weed". This shall mean any plant species defined by the Ohio Department of Agriculture as a "noxious weed" and listed as such by the Department. For the purposes of these regulations, the most recent version of this list at the time of application of these regulations shall prevail.

(i) "100-Year Floodplain". This shall mean any land susceptible to being inundated by water from a base flood. The base flood is the flood that has a one percent or greater chance of being equaled or exceeded in any given year. For the purposes of these regulations, the 100-year floodplain shall be defined by FEMA or a site-specific floodplain delineation in conformance with standard engineering practices and approved by the Community.

(j) "Ordinary High Water Mark". This shall mean the point of the bank or shore to which the presence and action of surface water is so continuous as to leave a district marked by erosion, destruction or prevention of woody terrestrial vegetation, predominance of aquatic vegetation, or other easily recognized characteristic. The ordinary high water mark defines the bed of a watercourse.

(k) "Perennial Stream". This shall mean a natural watercourse that contains water throughout the year except possibly during periods of extreme drought.

(l) "Riparian Area". This shall mean naturally vegetated land adjacent to watercourses that, if appropriately sized, limits erosion, reduces flood size flows, and/or filters and settles out runoff pollutants, or performs other functions consistent with the purposes of these regulations.

(m) "Riparian Setback". This shall mean those lands within the Community that fall within the area defined by the criteria set forth in these regulations.

(n) "Qualified Forester". This shall mean any forester employed by the Ohio Department of Natural Resources, Division of Forestry or any person attaining the credential of Certified Forester as conferred by the Society of American Foresters.

(o) "Cuyahoga Soil And Water Conservation District". This shall mean the entity organized under Chapter 1515 of the Ohio Revised Code referring to either the Soil and Water Conservation District Board or its designated employees, hereinafter referred to as Cuyahoga SWCD.

(p) "Soil Disturbing Activity". This shall mean clearing, grading, excavating, filling, or other alteration of the earth's surface where natural or human made ground cover is destroyed and which may result in, or contribute to, erosion and sediment pollution.

(q) "Watercourse". This shall mean any natural, perennial or intermittent channel, stream, river, or brook with a defined bed and bank

(r) "Wetland". This shall mean those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal

circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions, including swamps, marshes, bogs, and similar areas.

(s) "Delineation" The clear identification and marking of the boundary of wetlands, riparian areas, floodplains and/or setbacks, in the field and on site plans.

(t) "Official Soil Survey". The soil survey of Cuyahoga County, Ohio that has been approved and adopted by the Natural Resources Conservation Service, USDA.

1111.02 PUBLIC PURPOSE.

(a) It is hereby determined that the system of rivers, streams, and other natural watercourses within the Community contributes to the health, safety, and general welfare of the residents of the Community. The specific purpose and intent of these regulations is to regulate uses and developments within riparian setbacks that would impair the ability of riparian areas to:

1. Reduce flood impacts by absorbing peak flows, slowing the velocity of flood waters, and regulating base flow.
2. Stabilize the banks of watercourses to reduce bank erosion and the downstream transport of sediments eroded from watercourse banks.
3. Reduce pollutants in watercourses during periods of high flows by filtering, settling, and transforming pollutants already present in watercourses.
4. Reduce pollutants in watercourses by filtering, settling, transforming and absorbing pollutants in runoff before they enter watercourses.
5. Provide watercourse habitats with shade and food.
6. Provide habitat to a wide array of wildlife by maintaining diverse and connected riparian vegetation.
7. Benefit the Community economically by minimizing encroachment on watercourse channels and the need for costly engineering solutions such as dams, retention basins, and rip rap to protect structures and reduce property damage and threats to the safety of watershed residents; and by contributing to the scenic beauty and environment of the Community, and thereby preserving the character of the Community, the quality of life of the residents of the Community, and corresponding property values.

(b) The following regulations have been enacted to protect these services of riparian areas by providing reasonable controls governing structures and uses in riparian setbacks.

1111.03 APPLICABILITY, COMPLIANCE, & VIOLATIONS.

(a) These regulations shall apply to all lands that are within the jurisdiction of the Community and that border designated watercourses as defined in these regulations.

(b) No subdivision plan approval, site plan approval, nor land development plan approval shall be issued by the Community without full compliance with the terms of these regulations. No building permits which involves soil disturbing activities shall be issued by the Community without full compliance with the terms of these regulations.

(c) Any person who shall violate any section of these regulations shall be guilty of a misdemeanor of the fourth degree and upon conviction thereof, shall be subject to punishment as

provided in 1123.99 of the Planning and Zoning Code and shall be required to restore the riparian area through a restoration plan approved by the Community. In addition, the City shall have the authority to enforce the provisions in Section 1123.09 of the Parma Planning and Zoning Code which includes, in addition to other recourse provided by law, the power to institute a suit for an injunction to prevent, remove, abate, enjoin, or terminate a violation of the regulations within this Chapter.

1111.04 CONFLICTS WITH OTHER REGULATIONS & SEVERABILITY.

(a) Where these regulations impose a greater restriction upon land than is imposed or required by any other provision of law, regulation, contract, or deed, the provisions of these regulations shall control.

(b) These regulations shall not limit or restrict the application of other provisions of law, regulation, contract, or deed, or the legal remedies available thereunder, except as provided in subsection (a) above.

(c) If any clause, section, or provision of these regulations is declared invalid or unconstitutional by a court of competent jurisdiction, validity of the remainder shall not be affected thereby.

1111.05 ESTABLISHMENT OF RIPARIAN SETBACKS.

A. Designated watercourses shall include those watercourses meeting any one of the following criteria:

1. All watercourses draining an area greater than $\frac{1}{2}$ square mile, or
2. All watercourses draining an area less than $\frac{1}{2}$ square mile and having a defined bed and bank.
3. In determining if watercourses have a defined bed and bank, the Community may consult with a representative of the Cuyahoga SWCD or other technical experts as necessary.

B. Riparian setbacks are established as follows:

1. A minimum of 75 feet on both sides of Big Creek.
2. A minimum of 75 feet on both sides of West Creek.
3. A minimum of 75 feet on both sides of all other watercourses draining an area greater than $\frac{1}{2}$ square mile and up to 20 square miles.
4. 25 feet on both sides of all other watercourses draining an area less than $\frac{1}{2}$ square mile with a defined bed and bank as determined by the criteria in this ordinance.

C. Riparian Setback Map:

1. The Community shall use the Soil Survey of Cuyahoga County, Ohio, issued in December 1980 or the latest edition that shows drainage features as the map identifying designated watercourses and their riparian setbacks. The drainage features identified on the paper maps in the official soil survey and the information contained therein shall be believed to be accurate.
2. At the time of application of this regulation, if any discrepancy is found between the Riparian Setback Map and the criteria for designated watercourses or riparian setbacks as set forth in these regulations, the criteria shall prevail.
3. In reviewing and interpreting the maps the Community may consult with a

City of Parma Chapter 1111 Riparian Setbacks of the Codified Ordinances of the City of Parma and declaring an emergency.

representative of the Cuyahoga SWCD and other technical experts as necessary.

4. The base maps used to determine the riparian setback areas in Parma at the time of passage of this ordinance are the maps in the Soil Survey of Cuyahoga County issued in 1980. The soil survey maps covering the community at the time of passage of this ordinance are maps number 30, 31, 38, 39, 47, and 48. The drainage features shown on the maps are designated watercourses.

D. The following conditions shall apply in riparian setbacks:

1. Riparian setbacks shall be measured in a horizontal and perpendicular direction outward from the ordinary high water mark of each watercourse.
2. Except as otherwise provided in these regulations, riparian setbacks shall be preserved in their natural state and shall be established and marked in the field prior to any soil disturbing or land clearing activities.
3. Where the 100-year floodplain is wider than a riparian setback on either or both sides of a watercourse, the riparian setback shall be extended to the outer edge of the 100-year floodplain. The 100-year floodplain shall be defined by FEMA or by the project engineer conducting a hydrologic analysis of the project area in conformance with standard engineering practices and approved by the City Engineer.
4. Where wetlands are identified within a riparian setback, the minimum riparian setback width shall consist of the full extent of the wetland plus a 75 foot minimum setback extending beyond the outer boundary of these wetlands.
5. Wetlands shall be delineated by a site survey approved by the City Engineer using delineation protocols accepted by the US Army Corps of Engineers and the Ohio Environmental Protection Agency at the time of application of these regulations. If a conflict exists between the delineation protocols of these two agencies, the delineation protocol that results in the most inclusive area of wetlands shall apply.
6. In the case of new subdivisions or land development plans, the developer, applicant, or designated representative shall be responsible for delineating riparian setbacks, including any expansions or modifications as required by D.3 and D.4 of this section, and identifying these setbacks on all subdivisions, land development plans, and/or building permit applications submitted to the City Engineer. This delineation shall be done at the time of application of the preliminary plan or at the time of submission of any permit applications. This delineation shall be done through a metes and bounds, or higher level survey and shall be subject to review and approval by the City Engineer. As the result of this review, the City Engineer may require further studies from the developer, applicant, or designated representative. The City Engineer may consult with the Cuyahoga SWCD or other technical experts as necessary.
7. Prior to any soil disturbing activity, riparian setbacks shall be clearly delineated, on-site by the landowner through the use of clearly viewed, above ground markers such as stakes, posts or other methods approved by the City Engineer, and such delineation shall be maintained throughout soil

Ord. to enact Chapter 1111 "Riparian Setbacks" of the Codified Ordinances of the City of Parma and declaring an emergency.

disturbing activities.

8. No subdivision plan approval, site plan approval, nor land development plan approval shall be issued by the City prior to delineation of riparian setbacks in conformance with these regulations. No building permits which include soil disturbing activities shall be issued by the City prior to delineation of riparian setbacks in conformance with these regulations.
9. Upon completion of an approved subdivision or land development or other improvement, riparian setbacks shall be permanently recorded on the plat records for the Community and shall be maintained as open space thereafter.

1111.06 USES PERMITTED IN RIPARIAN SETBACKS.

A. By Right Uses Without A Permit

Open space uses that are passive in character shall be permitted in riparian setbacks, including, or similar to, those listed in subsections 1 through 3 of this section. No use permitted under these regulations shall be construed as allowing public trespass on privately held lands.

1. Recreational Activity: Passive recreational uses, as permitted by federal, state, and local laws, such as hiking, bicycling, fishing, picnicking, and similar uses.
2. Removal of Damaged or Diseased Trees. Damaged or diseased trees may be removed.
3. Revegetation and/or Reforestation. The revegetation and/or reforestation of riparian areas shall be allowed without approval of the City Engineer.
4. Maintenance of residential lawns, gardens, and landscaping
5. Trails. Right of way and construction of walking paths and multi-purpose trails for non-motorized access, non-motorized recreation and/or educational purposes only and not to exceed 12 feet in width including berms.

B. By Right Uses With A Permit

1. Streambank Stabilization/Erosion Control Measures. Streambank stabilization/erosion control measures may be allowed provided that such measures are ecologically compatible and substantially utilize natural materials and native plant species where practical and available. The streambank stabilization and erosion control measures shall only be undertaken upon approval of an erosion and sediment control plan by the City Engineer.
2. Crossings. Crossings of designated watercourses through riparian set backs by bridges, publicly or privately owned sewer and/or water lines and public or private utility transmission lines may only be allowed upon approval of a Crossing Plan by the City Engineer. Such crossings shall minimize disturbance to riparian areas and shall mitigate any necessary disturbances. In reviewing this plan, the City Engineer may consult with a representative of the Ohio Department of Natural Resources, Division of Natural Areas and Preserves; Ohio Environmental Protection Agency, Division of Surface Water; Cuyahoga Soil and Water Conservation District; or other technical experts as necessary.

1111.07 USES PROHIBITED IN RIPARIAN SETBACKS.

Any use not authorized under these regulations shall be prohibited in riparian setbacks. By way of example, the following uses are specifically prohibited, however, prohibited uses are not limited to those examples listed here:

- (a) Construction. There shall be no structures of any kind.
- (b) Dredging or Dumping. There shall be no drilling, filling, dredging, or dumping of soil, spoils, liquid, or solid materials, except for noncommercial composting of uncontaminated natural materials and except as permitted under Section 1111.06 of these regulations.
- (c) Roads or Driveways. There shall be no roads or driveways, except as permitted under Section 1111.06 of these regulations. There shall be no roads or driveways permitted in wetlands or watercourses without a permit issued by the US Army Corps of Engineers and/or the Ohio EPA.
- (d) Motorized Vehicles. There shall be no use of motorized vehicles, except as permitted under Section 1111.06 of these regulations.
- (e) Disturbance of Natural Vegetation. There shall be no disturbance of the natural vegetation, except for such conservation maintenance that the landowner deems necessary to control noxious weeds; for such plantings as are consistent with these regulations; for such disturbances as are approved under Section 1111.06 of these regulations; and for the passive enjoyment, access, and maintenance of landscaping or lawns existing at the time of passage of these regulations. Nothing in this section shall be construed as requiring a landowner to plant or undertake any other activities in riparian setbacks.
- (f) Parking Lots. There shall be no parking lots or other human made impervious cover, except as permitted under Section 1111.06 of these regulations.
- (g) New Surface and/or Subsurface Sewage Disposal or Treatment Areas. Riparian setback areas shall not be used for the disposal or treatment of sewage except in accordance with Cuyahoga County District Board of Health regulations at the time of application of these regulations.

1111.08 NON-CONFORMING STRUCTURES OR USES IN RIPARIAN SETBACKS.

Non-conforming structures or uses in riparian setbacks shall be regulated under the provisions of Section 1181.01 of the Parma Codified Ordinances. Where the following language is more restrictive than Section 1181.01 of the Parma Codified Ordinances, the following language shall prevail:

- (a) A non-conforming use, existing at the time of passage of these regulations and within a riparian setback, that is not permitted under these regulations may be continued but shall not be changed or enlarged unless changed to a use permitted under these regulations.
- (b) A non-conforming structure, existing at the time of passage of these regulations and within a riparian setback, that is not permitted under these regulations may be continued but shall not have the existing building footprint or roofline expanded or enlarged in such a way that would move the structure closer to the stream.

- (c) A non-conforming structure or use, existing at the time of passage of these regulations and within a riparian setback, that has substantial damage or which is discontinued, terminated, or abandoned for a period of six (6) months or more may not be revived, restored, or re-established.

1111.09 VARIANCES WITHIN RIPARIAN SETBACKS.

- (a) The Community may grant a variance to these regulations provided herein in cases where practical difficulties in the use of the property are imposed by the regulations and the need for requested relief outweighs the potential harm or reduction in riparian area functions which may be caused by a proposed use.
- (b) In making a determination under subsection (a), the Community shall consider the following factors:
 - 1. The soil type and natural vegetation of the parcel as well as the percentage of the parcel that is in the 100-year floodplain.
 - 2. The extent to which the requested variance impairs the flood control, erosion control, sediment control water quality protection, and other functions of the riparian area. This determination shall be based on sufficient technical and scientific data.
 - 3. The degree of hardship these regulations place on the landowner and the availability of alternatives to the proposed activity.
 - 4. Soil-disturbing activities permitted in the riparian setback through variances should be implemented to minimize clearing to the extent possible and to include Best Management Practices necessary to minimize erosion and maximize sediment control.
 - 5. The presence of significant impervious cover or smooth vegetation such as maintained lawns in the riparian setback compromises its benefits to the Community.
 - 6. Variances should not be granted for asphalt or concrete paving within the riparian setback. Variances may be granted for gravel or porous driveways in riparian setbacks when necessary.
 - 7. A parcel existing at the time of passage of this ordinance is made unbuildable.
 - 8. Varying the front, rear, and side yard setbacks before the riparian setback is varied.

1111.10 BOUNDARY INTERPRETATION AND APPEALS PROCEDURE.

- A. When a landowner or applicant disputes the boundary of a riparian setback or the ordinary high water mark of a watercourse, the landowner or applicant shall submit evidence to the City Engineer that describes the boundary, the landowner or applicant's proposed boundary, and justification for the proposed boundary change.
- B. The City Engineer shall evaluate materials submitted and shall make a written determination within a reasonable period of time not to exceed sixty (60) days, a copy of which shall be submitted to the landowner or applicant. If during this

evaluation the City requires further information, he or she may require this be provided by the landowner or applicant. In the event that the community requests such additional information, the sixty (60) day limit on the community's review shall be postponed until such information is provided by the landowner or applicant.

- C. Any party aggrieved by any determination or other decision under these regulations may appeal to the Board of Zoning Appeals under the provisions of Section 1127.04 of the Parma Codified Ordinances. The party contesting the location of the riparian setback or the ordinary high water mark of a watercourse shall have the burden of proof in case of any such appeal.

1111.11 INSPECTION OF RIPARIAN SETBACKS.

- A. Riparian setbacks shall be inspected by the City when:
 1. A preliminary subdivision plat or other land development plan is submitted to the Community.
 2. A building permit is requested for an activity that will disturb the soil surface.
 3. Prior to any soil disturbing activity to inspect the delineation of riparian setbacks as required under these regulations.
 4. Prior to starting any of the activities authorized by the Community under these regulations, the applicant shall provide the Community with at least five (5) working days notice prior to starting such activity.

Riparian setbacks may be inspected periodically by the City Engineer or his representative for compliance with approvals under Section 1111.06(b) of these regulations or at any time evidence is brought to the attention of the Community that uses or structures are occurring that may reasonably be expected to violate the provisions of these regulations"

Section 2. That it is found and determined that all formal actions of this Council concerning and relating to the adoption of this Ordinance were adopted in an open meeting of this Council and any of its committees that resulted in such formal action were in meetings open to the public in compliance with all legal requirements.

Section 3. That this Ordinance is hereby declared to be an emergency measure necessary for the immediate preservation of the public health, safety, and welfare of the City of Parma, and for the further reason that this measure is necessary in order to update the Zoning Code in the Codified Ordinances of the City of Parma, and this Ordinance shall become immediately effective upon receiving the affirmative vote of two-thirds of all members elected to Council and approval by the Mayor, otherwise from and after the earliest period allowed by law.

PASSED: DECEMBER 29, 2003

/S/ CHARLES M. GERMANA
PRESIDENT OF COUNCIL

ATTEST: /S/ MICHAEL F. HUGHES
CLERK OF COUNCIL

APPROVED: DECEMBER 31, 2003

FILED WITH
THE MAYOR: DECEMBER 31, 2003

/S/ GERALD M. BOLDT
MAYOR, CITY OF PARMA, OHIO

I, Michael F. Hughes, Clerk of Council, City of Parma, County of Cuyahoga and State of Ohio, hereby certify this to be a true and correct copy of Ordinance/Resolution No. 158-02 of 266, passed by Parma City Council on the 29th day of December, 2003.

9/7/04

L-315-04 vaz
(Substitute)

ORDINANCE NO. 289-04

BY: THOMAS MASTROIANNI, BRIAN DAY, MARY GALINAS, ROY J. JECH, LARRY NAPOLI,
ANTHONY C. ZIELINSKI, STUART J. BOYDA, MICHELLE J. STYS, SEAN P. BRENNAN
(By Request - City Engineer/Building Commissioner)

AN ORDINANCE TO AMEND SECTIONS 1111.01
"DEFINITIONS", 1111.05 "ESTABLISHMENT OF
RIPARIAN SETBACKS", 1111.06 "USES PERMITTED IN
RIPARIAN SETBACKS", 1111.08 "NON-CONFORMING
STRUCTURES OR USES IN RIPARIAN SETBACKS", AND
1111.09 "VARIANCES WITHIN RIPARIAN SETBACKS"
OF CHAPTER 1111 "RIPARIAN SETBACKS" OF THE
CODIFIED ORDINANCES OF THE CITY OF PARMA, AND
DECLARING AN EMERGENCY

BE IT ORDAINED BY THE COUNCIL OF THE CITY OF PARMA, STATE OF OHIO:

Section 1. That subsections (l) and (q) of Section 1111.01
"Definitions" of Chapter 1111 "Riparian Setbacks" of the Codified
Ordinances of the City of Parma, which presently reads as follows:

"1111.01 DEFINITIONS.

(l) "Riparian Area". This shall mean naturally vegetated land
adjacent to watercourses that, if appropriately sized, limits
erosion, reduces flood size flows, and/or filters and settles out
runoff pollutants, or performs other functions consistent with the
purposes of these regulations."

(q) "Watercourse". This shall mean any natural, perennial or
intermittent channel, stream, river, or brook with a defined bed
and bank."

is hereby amended to read as follows:

"1111.01 DEFINITIONS.

(l) "Riparian Area". This shall mean land adjacent to
watercourses that, if **NATURALLY VEGETATED AND/OR APPROPRIATELY RE-
VEGETATED AND** appropriately sized, limits erosion, reduces flood
size flows, and/or filters and settles out runoff pollutants, or
performs other functions consistent with the purposes of these
regulations."

(q) "Watercourse". This shall mean any natural, perennial or
intermittent **LAKE, POND**, channel, stream, river, **CREEK** or brook
with a defined bed and bank **OR SHORE**."

Section 2. That subsections (d) (2), (d) (7), and (d) (8) of
Section 1111.05 "Establishment of Riparian Setbacks" of the
Codified Ordinances of the City of Parma, which presently read as
follows:

Pg. 3 of L-315-04 Ord. to amend Sections of Chapter 1111 "Riparian Setbacks" of the Codified Ordinances of the City of Parma, and declaring an emergency

1111.06 USES PERMITTED IN RIPARIAN SETBACKS.

- (b) By Right Uses With a Permit
- (3) CONSTRUCTION OF FENCING WITH THE CONDITION THAT REASONABLE EFFORTS BE TAKEN TO MINIMIZE THE DESTRUCTION OF EXISTING VEGETATION, PROVIDED THE FENCE DOES NOT IMPEDE STREAM OR FLOOD FLOW, AND THE DISTURBED AREA IS REPLANTED TO THE NATURAL OR PREEXISTING CONDITIONS BEFORE THE ADDITION OF THE FENCE, AS APPROVED BY THE CITY ENGINEER."

Section 4. That subsection (c) of Section 1111.08 "Non-conforming Structures or Uses in Riparian Setbacks" of the Codified Ordinances of the City of Parma, which presently reads as follows:

"1111.08 NON-CONFORMING STRUCTURES OR USES IN RIPARIAN SETBACKS.

- (c) A non-conforming structure or use, existing at the time of passage of these regulations and within a riparian setback, that has substantial damage or which is discontinued, terminated, or abandoned for a period of six (6) months or more may not be revived, restored, or re-established."

is hereby amended to read as follows:

"1111.08 NON-CONFORMING STRUCTURES OR USES IN RIPARIAN SETBACKS.

- (c) A non-conforming structure or use, existing at the time of passage of these regulations and within a riparian setback, that has substantial damage or which is discontinued, terminated, or abandoned for a period of six (6) months or more may not be revived, restored, or re-established. THIS SECTION SHALL NOT APPLY TO A RESIDENCE THAT IS VACANT AND WHICH IS NOT SUBJECT TO CONDEMNATION ORDERS BY THE BUILDING COMMISSIONER. THIS SECTION SHALL ALSO NOT PROHIBIT ORDINARY REPAIRS TO A RESIDENCE OR RESIDENTIAL ACCESSORY STRUCTURE."

Section 5. That new subsections (d) and (e) of Section 1111.08 "Non-conforming Structures or Uses in Riparian Setbacks" of the Codified Ordinances of the City of Parma, are hereby enacted to read as follows:

"1111.08 NON-CONFORMING STRUCTURES OR USES IN RIPARIAN SETBACKS.

- (d) IN THE CASE OF A NON-CONFORMING STRUCTURE WITHIN A RIPARIAN SETBACK, THE CITY WILL ALLOW A TEN (10) FOOT MAINTENANCE ACCESS ZONE MEASURED PERPENDICULAR TO THE STRUCTURE, TO TEMPORARILY EXTEND FURTHER INTO THE RIPARIAN SETBACK AS LONG AS DISTURBANCE TO EXISTING VEGETATION IS MINIMIZED AND VEGETATION IS RESTORED TO THE PRE-EXISTING STATE, AS NEAR AS PRACTICAL, UPON COMPLETION.

Section 4. That only those portions of Sections 1111.01 "Definitions", 1111.05 "Establishment of Riparian Setbacks", 1111.06 "Uses Permitted in Riparian Setbacks", 1111.08 "Non-Conforming Structures or Uses in Riparian Setbacks", and 1111.09 "Variances within Riparian Setbacks" of Chapter 1111 "Riparian Setbacks" of the Codified Ordinances of the City of Parma, as they existed heretofore, are hereby repealed.

Section 5. That it is found and determined that all formal actions of this Council concerning and relating to the adoption of this Ordinance were adopted in an open meeting of this Council, and that all deliberations of the Council and any of its committees that resulted in such formal action were in meetings open to the public in compliance with all legal requirements.

Section 6. That this Ordinance is hereby declared to be an emergency measure necessary for the immediate preservation of the public health, safety and welfare of the City of Parma, and for the further reason that this measure is necessary in order for the City to include this language in these sections of the Codified Ordinances at the earliest possible time, and this Ordinance shall become immediately effective upon receiving the affirmative vote of two-thirds of all members elected to Council and approval of the Mayor, otherwise from and after the earliest period allowed by law.

PASSED: December 20, 2004 /s/ Charles M. Germana
PRESIDENT OF COUNCIL

ATTEST: /s/ Michael F. Hughes APPROVED: December 22, 2004
CLERK OF COUNCIL

FILED WITH
THE MAYOR: December 22, 2004 /s/ Dean E. DePiero
MAYOR, CITY OF PARMA, OHIO

I, Michael F. Hughes, Clerk of Council, City of Parma, County of Cuyahoga and State of Ohio, hereby certify this to be a true and correct copy of Ordinance/Resolution No. 289-04, passed by Parma City Council on the 20th day of December, 2004.

Michael F. Hughes
MICHAEL F. HUGHES, CLERK OF COUNCIL

**ORDINANCE RECORD
COUNCIL OF THE VILLAGE OF BROOKLYN HEIGHTS**

Ordinance No. 22-02

By SUCHOCKI

**AN ORDINANCE ENACTING NEW CHAPTER 1225
(ESTABLISHING RIPARIAN SETBACKS)**

WHEREAS, flooding is a significant threat to public health and safety and public and private property in the West Creek watershed, and vegetated riparian areas lessen the damage from such flooding by slowing runoff, enabling water to soak into the ground, and by absorbing excess flow during flood events; and

WHEREAS, streambank erosion in the West Creek watershed is a significant threat to public health and safety and public and private property, and vegetated riparian areas slow runoff and stabilize streambanks, thus reducing the erosive force of runoff and strengthening banks against high velocity waters; and

WHEREAS, the presence of natural vegetation on streambanks provides protection against erosive forces both within streams and on adjacent lands, whether publicly or privately owned; and

WHEREAS, the protection of riparian areas results in the presence of plants best suited to each individual environment along a stream, with proven capability for survival and regeneration at no cost; and

WHEREAS, vegetated riparian areas filter and trap sediments, chemicals, salts, septic discharge, and other pollutants from runoff and floodwaters, thus protecting surface and ground water quality; and

WHEREAS, vegetated riparian areas can provide a dense tree canopy that helps to maintain and improve the stability of watercourse temperatures, thus protecting aquatic ecosystems, and helps to reduce the presence of aquatic nuisance species; and

WHEREAS, the protection of riparian areas can result in a diverse and interconnected riparian corridor that provides habitat to a wide array of wildlife; and

WHEREAS, there is a watershed-wide effort to reduce the flooding and erosion within the West Creek watershed and to protect and enhance the water resources of West Creek and its tributaries and the City of Brooklyn Heights recognizes its obligation as a part of the watershed to reduce flooding and erosion by controlling runoff within its borders; and

ORDINANCE RECORD
COUNCIL OF THE VILLAGE OF BROOKLYN HEIGHTS

Ordinance No. _____

By _____

WHEREAS, the Cuyahoga Soil and Water Conservation District, the Northeast Ohio Areawide Coordinating Agency, the Natural Resource Conservation Service of the U.S. Department of Agriculture, the Ohio Department of Natural Resources, Division of Natural Areas and Preserves and Division of Forestry, the Ohio Environmental Protection Agency, and the U.S. Environmental Protection Agency recommend riparian setbacks as a valuable tool in an overall natural resource management program for flood risk reduction, erosion control, water quality control, and aquatic habitat protection; and

WHEREAS, studies undertaken by, and reviewed by, the Ohio Environmental Protection Agency and other independent scientific bodies recommend the minimum widths for riparian setbacks; and

WHEREAS, Council for the Village of Brooklyn Heights has reviewed and adopted the recommendations of the above government agencies and finds that in order to minimize encroachment on watercourses and the need for costly engineering solutions to protect structures and reduce property damage and threats to the safety of watershed residents; to protect structures and reduce property damage and threats to the safety of watershed residents, to protect and enhance the scenic beauty of Brooklyn Heights, and to preserve the character of Brooklyn Heights, the quality of life of the residents of Brooklyn Heights, and corresponding property values, it is necessary and appropriate to regulate the construction of structures and uses within a riparian setback along the banks of designated watercourses in Brooklyn Heights; and

WHEREAS, Article XVIII, Section 3 of the Ohio Constitution grants municipalities the legal authority to adopt land use and control measures for promoting the peace, health, safety, and general welfare of its citizens; and

WHEREAS, 40 C.F.R. Parts 9, 122, 123, and 124, referred to as NPDES Storm Water Phase II, require designated communities, including Brooklyn Heights, to develop a Storm Water Management Program to address the quality of storm water runoff during and after soil disturbing activities.

ORDINANCE RECORD
COUNCIL OF THE VILLAGE OF BROOKLYN HEIGHTS

Ordinance No. _____

By _____

THE VILLAGE OF BROOKLYN HEIGHTS HEREBY ORDAINS THAT:

Section 1.

Section 1225.01: Public Purpose.

1. It is hereby determined that the system of rivers, streams, and other natural watercourses within the Village contributes to the health, safety, and general welfare of the residents of the Village. The specific purpose and intent of these regulations is to regulate uses and developments within riparian setbacks that would impair the ability of riparian areas to:
 1. Reduce flood impacts by absorbing peak flows, slowing the velocity of flood waters, and regulating based flow.
 2. Stabilize the banks of watercourses to reduce bank erosion and the downstream transport of sediments eroded from watercourse banks.
 3. Reduce pollutants in watercourses during periods of high flows by filtering, settling, and transforming pollutants already present in watercourses.
 4. Reduce pollutants in watercourses by filtering, settling, and transforming pollutants in runoff before they enter watercourses.
 5. Provide high quality watercourse habitats with shade and food.
 6. Reduce the presence of aquatic nuisance species to maintain a diverse aquatic system.
 7. Provide habitat to a wide array of wildlife by maintaining diverse and connected riparian vegetation.
 8. Benefit the Village economically by minimizing encroachment on watercourse channels and the need for costly engineering solutions such as dams, retention basins, and rip rap to protect structures and reduce property damage and threats to the safety of watershed

ORDINANCE RECORD

COUNCIL OF THE VILLAGE OF BROOKLYN HEIGHTS

Ordinance No. _____

By _____

residents, and by contributing to the scenic beauty and environment of the Village, and therefore, preserving the character of the Village, the quality of life of the residents of the Village, and corresponding property values.

2. The following regulation has been enacted to protect these services of riparian areas by providing reasonable controls governing structures and uses in riparian setbacks.

Section 1225.02: Applicability, Compliance & Violations.

1. These regulations shall apply to all lands that are within the jurisdiction of the Village and that border designated watercourses as defined in these regulations.
2. No approvals or permits shall be issued by the Village without full compliance with the terms of these regulations where applicable.
3. Any person who shall violate any section of these regulations shall be guilty of a misdemeanor of the fourth degree and, upon conviction thereof, shall be subject to punishment as provided in Chapter 698 of the Brooklyn Heights Code of Codified Ordinances and shall be required to restore the riparian area through a restoration plan approved by the Village.

Section 1225.03: Conflicts With Other Regulations & Severability.

1. Where these regulations impose a greater restriction upon land than is imposed or required by any other provision of law, regulation, contract, or deed, the provisions of these regulations shall control.
2. These regulations shall not limit or restrict the application of other provisions of law, regulation, contract, or deed, or the legal remedies available thereunder, except as provided in A of this section.
3. If any clause, section, or provision of these regulations is declared invalid or unconstitutional by a court of competent jurisdiction, validity of the remainder shall not be affected thereby.

ORDINANCE RECORD
COUNCIL OF THE VILLAGE OF BROOKLYN HEIGHTS

Ordinance No. _____

By _____

Section 1225.04: Definitions.

For the purpose of these regulations, the following terms shall have the meaning herein indicated:

1. **VILLAGE:** Throughout these regulations, this shall refer to the Village of Brooklyn Heights or its designated representative.
2. **DAMAGED OR DISEASED TREES:** Trees that have split trunks, broken tops, heart rot, insect or fungus problems that will lead to imminent death, undercut root systems that put the tree in imminent danger of falling, lean as a result of root failure that puts the tree in imminent danger of falling, or any other condition that puts the tree in imminent danger of being uprooted or falling into or along a watercourse or on to a structure.
3. **FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA):** The agency with overall responsibility for administering the National Flood Insurance Program.
4. **IMPERVIOUS COVER:** Any surface that cannot effectively absorb or infiltrate water. This may include roads, streets, parking lots, rooftops, sidewalks, and other areas not covered by vegetation.
5. **INTERMITTENT STREAM:** A natural watercourse that may have some water in pools but where surface flows are non-existent or interstitial for periods of one week or more during typical summer months.
6. **NATURAL SUCCESSION:** A gradual and continuous replacement of one kind of plant and animal group by a more complex group. The plants and animals present in the initial group modify the environment throughout their life activities thereby making it unfavorable for themselves. They are gradually replaced by a different group of plants and animals better adapted to the new environment.
7. **NOXIOUS WEED:** Any plant species defined by the Ohio Department of Agriculture as a "noxious weed" and listed as such by the ODA. For the

ORDINANCE RECORD
COUNCIL OF THE VILLAGE OF BROOKLYN HEIGHTS

Ordinance No. _____

By _____

purposes of these regulations, the most recent version of this list at the time of application of these regulations shall prevail.

8. **100-YEAR FLOODPLAIN:** Any land susceptible to being inundated by water from a base flood. The base flood is the flood that has a one percent or greater chance of being equaled or exceeded in any given year. For the purposes of these regulations, the 100-year floodplain shall be defined by FEMA or a site-specific flood plain delineation in conformance with standard engineering practices and approved by the Village.
9. **ORDINARY HIGH WATER MARK:** The point of the bank or shore to which the presence and action of surface water is so continuous as to leave a district marked by erosion, destruction, or prevention of wood terrestrial vegetation, predominance of aquatic vegetation, or other easily recognized characteristic. The ordinary high water defines the bed of a watercourse.
10. **PERENNIAL STREAM:** A natural watercourse that contains water throughout the year except possibly during periods of extreme drought.
11. **RIPARIAN AREA:** Naturally vegetated land adjacent to watercourses that, if appropriately sized, stabilizes streambanks, limits erosion, reduces flood size flows, and/or filters and settles out runoff pollutants, or performs other functions consistent with the purposes of these regulations.
12. **RIPARIAN SETBACK:** Those lands within the Village that fall within the area defined by the criteria set forth in these regulations.
13. **QUALIFIED FORESTER:** Any forester employed by the Ohio Department of Natural Resources, Division of Forestry or any person attaining the credential of Certified Forester as conferred by the Society of American Foresters.
14. **SOIL AND WATER CONSERVATION DISTRICT:** An entity organized under Chapter 1515 of the Ohio Revised Code referring to either the Soil and Water Conservation District Board or its designated employees, hereinafter referred to as the Cuyahoga SWCD.

ORDINANCE RECORD
COUNCIL OF THE VILLAGE OF BROOKLYN HEIGHTS

Ordinance No. _____

By _____

15. **SOIL DISTURBING ACTIVITY:** Clearing, grading, excavating, filling, or other alteration of the earth's surface where natural or human made ground cover is destroyed and which may result in, or contribute to, erosion and sediment pollution.
16. **WATERCOURSE:** Any natural, perennial or intermittent, stream, river, or brook with a defined bed and bank that is contained within, flows through, or borders the Village.
17. **WETLAND:** Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support a prevalence of vegetation typically adapted for life in saturated soil conditions, including swamps, marshes, bogs, and similar areas. (40 CFR 232, as amended.)

Section 1225.05: Establishment of Riparian Setbacks.

- A. Riparian setbacks are established as follows:
 1. seventy-five feet (75') on either side of the main stem of West Creek as depicted on Attachment "A";
 2. seventy-five feet (75') on either side of tributary streams of West Creek as depicted on Attachment "A";
 3. three hundred feet (300') on either side of the Cuyahoga River as depicted on Attachment "A."
- B. The following conditions shall apply in riparian setbacks:
 1. Riparian setbacks shall be measured in a horizontal direction outwards from the ordinary high water mark of each watercourse.
 2. Except as otherwise provided in these regulations, riparian setbacks shall be preserved in their natural state.
 3. Where the 100-year old floodplain is wider than a riparian setback on either or both sides of a watercourse, the riparian setback shall be extended to the outer edge of the 100-year old floodplain. The 100-year old floodplain shall be

ORDINANCE RECORD
COUNCIL OF THE VILLAGE OF BROOKLYN HEIGHTS

Ordinance No. _____

By _____

defined by FEMA or a site-specific floodplain delineation in conformance with standard engineering practices and approved by the Zoning Inspector.

4. Where wetlands are identified within a riparian setback, the riparian setback shall consist of the full extent of the wetland plus a 50 foot minimum setback extending beyond the outer boundary of these wetlands. Wetlands shall be delineated by a site survey approved by the Zoning Inspector using delineation protocols accepted by the U.S. Army Corps of Engineers at the time of application of these regulations. All wetland delineations shall also include the latest version of the Ohio Rapid Assessment Method for wetland evaluation approved at the time of application of these regulations.
- C. The developer or applicant, or designated representative shall be responsible for delineating riparian setbacks, including any expansions or modifications as required by B.3 and B.43 of this section, and identifying these setbacks on all subdivisions, land development plans, and/or building permit applications submitted to the Zoning Inspector. This delineation shall be done at the time of application of the preliminary plan or at the time of submission of any permit applications. This delineation shall be done through a meets and bounds survey and shall be subject to review and approval by the Zoning Inspector. As the result of this review, the Zoning Inspector may require further studies from the developer, applicant, or designated representative.
- D. Prior to any soil disturbing activity, riparian setbacks shall be clearly delineated by the landowner on site, and such delineation shall be maintained throughout soil disturbing activities.
- E. No approvals or permits shall be issued by the Zoning Inspector prior to delineation of riparian setbacks shall be permanently recorded on the plat records for the Village.

Section 1225.06: Uses Permitted in Riparian Setbacks.

- A. By Right Uses Without A Permit.

Open space uses that are passive in character shall be permitted in riparian setbacks, including, but not limited to, those listed in A.1 and A.3 of this section. No use permitted under these regulations shall be construed as allowing trespass on privately held lands.

ORDINANCE RECORD
COUNCIL OF THE VILLAGE OF BROOKLYN HEIGHTS

Ordinance No. _____

By _____

1. **Recreational Activity.** Passive recreational uses, as permitted by federal, state, and local laws, such as hiking, fishing, hunting, picknicking, and similar uses.
2. **Removal of Damaged or Diseased Trees.** Damaged or diseased trees may be removed. Due to the potential for felled logs and branches to damage downstream properties and/or block ditches or otherwise exacerbate flooding, logs and branches resulting the removal of damaged or diseased trees that are greater than six inches (6") in diameter at the cut end shall be cut into sections no longer than six feet (6'), anchored to the shore, or removed from the 100-year flood plain.
3. **Revegetation and/or Reforestation.** The revegetation and/or reforestation of riparian areas shall be allowed without approval of the Zoning Inspector. Appendix A lists species of shrubs and vines recommended for stabilizing flood prone areas of the West Creek watershed.

B. By Right Uses With A Permit.

1. **Streambank Stabilization/Erosion Control Measures.** Streambank stabilization/erosion control measures may be allowed provided that such measures are ecologically compatible and substantially utilize natural materials and native plant species where practical and available. Such streambank stabilization/erosion control measures shall only be undertaken upon approval of an Erosion Control Plan by the Zoning Inspector. In reviewing this plan, the Zoning Inspector may consult with a representative of the Ohio Department of Natural Resources, Division of Natural Areas and Preserves, Ohio Environmental Protection Agency, Division of Surface Water, Cuyahoga Soil and Water Conservation District, or other technical experts as necessary.
2. **Crossings.** Crossings of designated watercourses through riparian setbacks by publicly owned sewer and/or water lines and public utility transmission lines may only be allowed upon approval of a Crossing Plan by the Zoning Inspector. Such crossings shall minimize disturbance to riparian areas and shall mitigate any necessary disturbances. In reviewing this plan, the Zoning Inspector may consult with a representative of the Ohio Department of Natural Resources, Division of Natural Areas and Preserves, Ohio Environmental

ORDINANCE RECORD
COUNCIL OF THE VILLAGE OF BROOKLYN HEIGHTS

Ordinance No. _____

By _____

Protection Agency, Division of Surface Water, Cuyahoga Soil and Water Conservation District, or other technical experts as necessary.

3. Multi-Purpose Trail. Right-of-way and construction of multi-purpose trails for recreational purposes only and not to exceed ten feet (10') in width constructed of either a porous or non-porous surface may be allowed upon approval of Council.

Section 1225.07: Uses Prohibited in Riparian Setbacks.

Any use not authorized under these regulations shall be prohibited in riparian setbacks. By way of example, the following uses are specifically prohibited, however, prohibited uses are not limited to those examples listed here:

1. Construction. There shall be no structures of any kind.
2. Dredging or Dumping. There shall be no drilling, filling, dredging, or dumping of soil, spoils, liquid, or solid materials, except for noncommercial composting of uncontaminated natural materials and except as permitted under Section 1225.06 of these regulations.
3. Roads or Driveways. There shall be no roads or driveways, except as permitted under Section 1225.06 of these regulations.
4. Motorized Vehicles. There shall be no use of motorized vehicles, except as permitted under Section 1225.06 of these regulations.
5. Disturbance of Natural Vegetation. There shall be no disturbance of the natural vegetation, except for such conservation maintenance that the landowner deems necessary to control noxious weeds, for such plantings as are consistent with these regulations, for such disturbances as are approved under Section 1225.06 of these regulations, and for the passive enjoyment, access, and maintenance of landscaping or lawns existing at the time of passage of these regulations.

ORDINANCE RECORD
COUNCIL OF THE VILLAGE OF BROOKLYN HEIGHTS

Ordinance No. _____

By _____

Nothing in this section shall be construed as required a landowner to plant or undertake any other activities in riparian setbacks provided the landowner allows for natural succession.

6. Parking Lots. There shall be no parking lots or other human-made impervious cover, except as permitted under Section 1225.06 of these regulations.
7. New Surface and/or Subsurface Sewage Disposal or Treatment Areas. Riparian areas shall not be used for the disposal or treatment of sewage except in accordance with Cuyahoga County Board of Health regulations at the time of application of these regulations.

Section 1225.08: Non-Conforming Structures or Uses in Riparian Setbacks.

Non-conforming structures or uses in riparian setbacks shall be regulated under the provisions of Section 1286 of the Brooklyn Heights Code of Codified Ordinances. Where the following language is more restrictive than Section 1286, the following language shall prevail.

1. A non-conforming use, existing at the time of passage of these regulations and within a riparian setback, that is not permitted under these regulations may be continued but shall not be changed or enlarged unless changed to a use permitted under these regulations.
2. A non-conforming structure, existing at the time of passage of these regulations and within a riparian setback, that is not permitted under these regulations may be continued but shall not have the existing building footprint or roofline expanded or enlarged.
3. A non-conforming structure or use, existing at the time of passage of these regulations and within a riparian setback, that has substantial damage and which is discontinued, terminated, or abandoned for a period of six months or more may not be revived, restored, or re-established.

Section 1225.09: Variances Within Riparian Setbacks.

1. The Village may grant a variance to these regulations provided herein in cases where practical difficulties in the use of th property are imposed by the

ORDINANCE RECORD
COUNCIL OF THE VILLAGE OF BROOKLYN HEIGHTS

Ordinance No. _____

By _____

regulations and the need for requested relief outweighs the potential harm or reduction in riparian area functions which may be caused by a proposed use.

- 2. In making a determination under A, the Village should consider the following factors:
 - 1. The soil type and natural vegetation of the parcel as well as the percentage of the parcel that is in the 100-year flood plain.
 - 2. The extent to which the requested variance impairs the flood control, erosion control, water quality protection, and other functions of the riparian area. This determination shall be based on sufficient technical and scientific data.
 - 3. The degree of hardship these regulations place on the landowner and the availability of alternatives to the proposed activity.
 - 4. Soil-disturbing activities permitted in the riparian setback should be implemented to minimize clearing to the extent possible and to include best management practices necessary to minimize erosion and control sediment.
 - 5. The presence of significant impervious cover in the riparian setback compromises its benefits to the Village. Variances should not be granted for asphalt or concrete paving within the riparian setback. Variances may be granted for gravel driveways.

Section 2. This Ordinance shall take effect at the earliest period allowed by law.

PASSED: APRIL 2, 2002

ATTEST: James J. Vavrek
James J. Vavrek,
Clerk/Treasurer

APPROVED: Michael S. Prociuk
Michael S. Prociuk,
Mayor

City of Seven Hills

Ordinance No. 79-2001

Introduced By Councilmen Stimetz, Curtis, Cannata

AN ORDINANCE ENACTING NEW CHAPTER 1147, ENTITLED "RIPARIAN SETBACKS", AS CONTAINED IN TITLE THREE, LOCAL BUILDING PROVISIONS, OF PART ELEVEN, BUILDING CODE, OF THE CODIFIED ORDINANCES OF THE CITY OF SEVEN HILLS.

WHEREAS, flooding is a significant threat to public health and safety and public and private property in the West Creek watershed, and vegetated riparian areas lessen the damage from such flooding by slowing runoff, enabling water to soak into the ground, and by absorbing excess flow during flood events; and,

WHEREAS, streambank erosion in the West Creek watershed is a significant threat to public health and safety and public and private property, and vegetated riparian areas slow runoff and stabilize streambanks, thus reducing the erosive force of runoff and strengthening banks against high velocity waters; and

WHEREAS, the presence of natural vegetation on streambanks provides protection against erosive forces both within streams and on adjacent lands, whether publicly or privately owned; and,

WHEREAS, the protection of riparian areas results in the presence of plants best suited to each individual environment along a stream, with proven capability for survival and regeneration at no cost; and,

WHEREAS, vegetated riparian areas filter and trap sediments, chemicals, salts, septic discharge, and other pollutants from runoff and flood waters, thus protecting surface and ground water quality; and,

WHEREAS, vegetated riparian areas can provide a dense tree canopy that helps to maintain and improve the stability of watercourse temperatures, thus protecting aquatic ecosystems, and helps to reduce the presence of aquatic nuisance species; and,

WHEREAS, the protection of riparian areas can result in a diverse and interconnected riparian corridor that provides habitat to a wide array of wildlife; and,

WHEREAS, there is a watershed-wide effort to reduce the flooding and erosion within the West Creek watershed and to protect and enhance the water resources of West Creek and its tributaries and the City of Seven Hills recognizes its obligation as a part of the watershed to reduce flooding and erosion by controlling runoff within its borders; and,

WHEREAS, the Cuyahoga Soil and Water Conservation District; the Northeast Ohio Areawide Coordinating Agency; the Natural Resource Conservation Service of the U.S. Department of Agriculture; the Ohio Department of Natural Resources, Division of Natural Areas and Preserves and Division of Forestry; the Ohio Environmental Protection Agency; and the U.S. Environmental Protection Agency recommend riparian setbacks as a valuable tool in an overall natural resource management program for flood risk reduction, erosion control, water quality control, and aquatic habitat protection; and,

WHEREAS, studies undertaken by, and reviewed by, the Ohio Environmental Protection Agency and other independent scientific bodies recommend the minimum widths for riparian setbacks; and,

WHEREAS, the Council of the City of Seven Hills has reviewed and adopted the recommendations of the above government agencies, the Council finds that in order to minimize encroachment on watercourses and the need for costly engineering solutions to protect structures

City of Seven Hills

Ordinance No. 79-2001

Introduced By Councilmen Stimetz, Curtis, Cannata

Page 2

and reduce property damage and threats to the safety of watershed residents; to protect and enhance the scenic beauty of Seven Hills; and to preserve the character of Seven Hills, the quality of life of the residents of Seven Hills, and corresponding property values, it is necessary and appropriate to regulate the construction of structures and uses within a riparian setback along the banks of designated watercourse in Seven Hills; and,

WHEREAS, Article XVIII, Section 3 of the Ohio Constitution grants municipalities the legal authority to adopt land use and control measures for promoting the peace, health, safety, and general welfare of its citizens; and,

WHEREAS, 40 C.F.R. Parts 9, 122, 123, and 124, referred to as NPDES Storm Water Phase II, require designated communities, including Seven Hills, to develop a Storm Water Management Program to address the quality of storm water runoff during and after soil disturbing activities; now, therefore:

BE IT ORDAINED BY THE COUNCIL OF THE CITY OF SEVEN HILLS, OHIO:

Section 1. There is hereby enacted to Title Three, Local Building Provisions, of Part Eleven, Building Code, of the Codified Ordinances of the City of Seven hills, new Chapter 1147 entitled "Riparian Setbacks", which shall read as follows:

"CHAPTER 1147 RIPERIAN SETBACKS

| | |
|---------|---|
| 1147.01 | Public Purpose |
| 1147.02 | Applicability, Compliance and Violations. |
| 1147.03 | Conflicts with other Regulations and Severability. |
| 1147.04 | Definitions. |
| 1147.05 | Establishment of Riparian Setbacks. |
| 1147.06 | Uses Permitted in Riparian Setbacks. |
| 1147.07 | Uses Prohibited in Riparian Setbacks. |
| 1147.08 | Non-conforming Structures or Uses in Riparian Setbacks. |
| 1147.09 | Variances within Riparian Setbacks. |
| 1147.10 | Boundary Interpretation and Appeals Procedure. |
| 1147.11 | Inspection of riparian Setbacks. |

1147.01 PUBLIC PURPOSE.

A. It is hereby determined that the system of rivers, streams, and other natural water courses within the City of Seven Hills contributes to the health, safety, and general welfare of the residents of the City of Seven Hills. The specific purpose and intent of these regulations is to regulate uses and developments within riparian setbacks that would impair the ability of riparian areas to:

1. Reduce flood impacts by absorbing peak flows, slowing the velocity of flood waters, and regulating base flow.
2. Stabilize the banks of watercourses to reduce bank erosion and the downstream transport of sediments eroded from watercourse banks.
3. Reduce pollutants in watercourses during periods of high flows by filtering, settling, and transforming pollutants already present in watercourses.
4. Reduce pollutants in watercourses by filtering, settling, and transforming pollutants in runoff before they enter watercourses.
5. Provide high quality watercourse habitats with shade and food.
6. Reduce the presence of aquatic nuisance species to maintain a diverse aquatic system.

City of Seven Hills

Ordinance No. 79-2001

Introduced By Councilmen Stimetz, Curtis, Cannata

Page 3

7. Provide habitat to a wide array of wildlife by maintaining diverse and connected riparian vegetation.
8. Benefit the City of Seven Hills economically by minimizing encroachment on watercourse channels and the need for costly engineering solutions such as dams, retention basins, and rip rap to protect structures and reduce property damage and threats to the safety of watershed residents; and by contributing to the scenic beauty and environment of the City of Seven Hills, and thereby preserving the character of the City of Seven Hills, the quality of life of the residents of the City of Seven Hills and corresponding property values.

B. The following regulation has been enacted to protect these services of riparian areas by providing reasonable controls governing structures and uses in riparian setbacks.

1147.02 APPLICABILITY, COMPLIANCE AND VIOLATIONS.

- A. These regulations shall apply to all lands that are within the jurisdiction of the City of Seven Hills and that border designated watercourses as defined in these regulations.
- B. No approvals or permits shall be issued by the City of Seven Hills without full compliance with the terms of these regulations where applicable.
- C. Any person who shall violate any section of these regulations or failing to comply therewith, shall, for each and every violation or failure, be guilty of a misdemeanor and, upon conviction thereof, shall be fined not less than twenty-five dollars (\$25.00) nor more than five hundred dollars (\$500.00) and shall be required to restore the riparian are through a restoration plan approved by the City of Seven Hills. Each day such violation or failure to comply is permitted to exist after notification thereof shall constitute a separate offense.

1147.03 CONFLICTS WITH OTHER REGULATIONS AND SEVERABILITY.

For the purpose of these regulations, the following terms shall have the meaning herein indicated:

1. DAMAGED OR DISEASED TREES: Trees that have split trunks; broken tops; heart rot; insect or fungus problems that will lead to imminent death; undercut root systems that put the tree in imminent danger of falling; lean as a result of root failure that puts the tree in imminent danger of falling; or any other condition that puts the tree in imminent danger of being uprooted or falling into or along a watercourse or on to a structure.
2. FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA): The agency with overall responsibility for administering the National Flood Insurance Program.
3. IMPERVIOUS COVER: Any surface that cannot effectively absorb or infiltrate water. This may include roads, streets, parking lots, rooftops, sidewalks, and other areas not covered by vegetation.
4. INTERMITTENT STREAM: A natural watercourse that may have some water in pools but where surface flows are non-existent or interstitial for periods of one week or more during typical summer months.
5. NATURAL SUCCESSION: A gradual and continuous replacement of one kind of plant and animal group by a more complex group. The plants and animals present in the initial group modify the environment through their life activities thereby making it unfavorable for themselves. They are gradually replaced by a different group of plants and animals better adapted to the new environment.
6. NOXIOUS WEED: Any plant species defined by the Ohio Department of Agriculture as a "noxious weed" and listed as such by the Department. For the purposes of these regulations, the most recent version of this list at the time of application of these regulations shall prevail.

City of Seven Hills

Ordinance No. 79-2001

Introduced By Councilmen Stimetz, Curtis, Cannata

Page 4

7. **100-YEAR FLOODPLAIN:** Any land susceptible to being inundated by water from a base flood. The base flood is the flood that has a one percent or greater chance of being equaled or exceeded in any given year. For the purposes of these regulations, the 100-year floodplain shall be defined by FEMA or a site-specific floodplain delineation in conformance with standard engineering practices and approved by the City of Seven Hills.
8. **ORDINARY HIGH WATER MARK:** The point of the bank or shore to which the presence and action of surface water is so continuous as to leave a district marked by erosion, destruction or prevention of woody terrestrial vegetation, predominance of aquatic vegetation, or other easily recognized characteristic. The ordinary high water mark defines the bed of a watercourse.
9. **PERENNIAL STREAM:** A natural watercourse that contain water throughout the year except possibly during periods of extreme drought.
10. **RIPARIAN AREA:** Naturally vegetated land adjacent to watercourses that, if appropriately sized, stabilizes streambanks, limits erosion, reduces flood size flows, and/or filters and settles out runoff pollutants, or performs other functions consistent with the purposes of these regulations.
11. **RIPARIAN SETBACK:** Those lands within the City of Seven Hills that fall within the area defined by the criteria set forth in these regulations.
12. **QUALIFIED FORESTER:** Any forester employed by the Ohio Department of Natural Resources, Division of Forestry or any person attaining the credential of Certified Forester as conferred by the Society of American Foresters.
13. **SOIL AND WATER CONSERVATION DISTRICT:** An entity organized under Chapter 1515 of the Ohio Revised Code referring to either the Soil and Water conservation District Board or its designated employees, hereinafter referred to as the Cuyahoga SWCD.
14. **SOIL DISTURBING ACTIVITY:** Clearing, grading, excavating, filling, or other alteration of the earth's surface where natural or human made ground cover is destroyed and which may result in, or contribute to, erosion and sediment pollution.
15. **WATERCOURSE:** Any natural, perennial or intermittent, stream, river, or brook with a defined bed and bank that is contained within, flows through or borders the City of Seven Hills.
16. **WETLAND:** Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions, including swamps, marshes, bogs, and similar areas (40 CFR 232, as amended).

1147.05

ESTABLISHMENT OF RIPARIAN SETBACKS

- A. Riparian setbacks are established as follows:
1. Seventy-five feet (75') on either side of the main stem of West Creek as depicted on Attachment "A".
- The following conditions shall apply in riparian setbacks:
2. Riparian setbacks shall be measured in a horizontal direction outward from the ordinary high water mark of each watercourse.
 3. Except as otherwise provided in these regulations, riparian setbacks shall be preserved in their natural state.
 4. Where the 100-year floodplain is wider than a riparian setback on either or both sides of a watercourse, the riparian setback shall be extended to the outer edge of the 100-year floodplain. The 100-year floodplain shall be defined by FEMA or a site-specific floodplain delineation in conformance with standard engineering practices and approved by the City Engineer.
 5. Where wetlands are identified within a riparian setback, the riparian setback shall consist of the full extent of the wetland plus a 50 foot minimum setback extending beyond the outer boundary of these wetlands. Wetlands shall be delineated by a site survey approved by the City Engineer using delineation protocols accepted by the US Army corps of Engineers at the time of

City of Seven Hills

Ordinance No. 79-2001

Introduced By Councilmen Stimetz, Curtis, Cannata

Page 6

by publicly owned sewer and/or water lines and public utility transmission lines may only be allowed upon approval of a Crossing Plan by the City Engineer. Such crossings shall minimize disturbance to riparian areas and shall mitigate any necessary disturbances. In reviewing this plan, the Building Commissioner may consult with a representative of the Ohio Department of Natural Resources, Division of Natural Areas and Preserves; Ohio Environmental Protection Agency, Division of Surface Water; Cuyahoga soil and Water Conservation District; or other technical experts as necessary.

3. *Multi-Purpose Trail.* Right-of-way and construction of multi-purpose trails for recreational purposes only and not to exceed 10' feet in width constructed of either a porous or non-porous surface may be allowed upon approval of City Council.

1147.07 USES PROHIBITED IN RIPARIAN SETBACKS.

Any Use not authorized under these regulations shall be prohibited in riparian setbacks. By way of example, the following uses are specifically prohibited, however, prohibited uses are not limited to those examples listed here:

1. *Construction.* There shall be no structures of any kind.
2. *Dredging or Dumping.* There shall be no drilling, filling, dredging, or dumping of soil, spoils, liquid, or solid materials, except for noncommercial composting of uncontaminated natural materials and except as permitted under Section 1147.06 of these regulations.
3. *Roads or Driveways.* There shall be no roads or driveways, except as permitted under Section 1147.06 of these regulations.
4. *Motorized Vehicles.* There shall be no use of motorized vehicles, except as permitted under Section 1147.06 of these regulations.
5. *Disturbance of Natural Vegetation.* There shall be no disturbance of the natural vegetation, except for such conservation maintenance that the landowner deems necessary to control noxious weeds; for such plantings as are consistent with these regulations; for such disturbances as are approved under Section 1147.06 of these regulations; and for the passive enjoyment, access, and maintenance of landscaping or lawns existing at the time of passage of these regulations.
6. *Parking Lots.* There shall be no parking lots or other human made impervious cover, except as permitted under Section 1147.06 of these regulations.

Nothing in this section shall be construed as requiring a landowner to plant or undertake any other activities in riparian setbacks provided the landowner allows for natural succession.

7. *New Surface and/or Subsurface Sewage Disposal or Treatment Areas.* Riparian areas shall not be used for the disposal or treatment of sewage except in accordance with Cuyahoga County Board of Health regulations at the time of application of these regulations.

1147.08 NON-CONFORMING STRUCTURES OR USES IN RIPARIAN SETBACKS.

Non-conforming structures or uses in riparian setbacks shall be regulated under the provisions of Section 981.01. Where the following language is more restrictive than Section 981.01, the following language shall prevail.

1. A non-conforming use, existing at the time of passage of these regulations and within a riparian setback, that is not permitted under these regulations may be continued but shall not be changed or enlarged unless changed to a use permitted under these regulations.
2. A non-conforming structure, existing at the time of passage of these regulations and within a riparian setback, that is not permitted under these regulations may be

City of Seven Hills

Ordinance No. 79-2001

Introduced By Councilmen Stimetz, Curtis, Cannata

Page 7

continued but shall not have the existing building footprint or roofline expanded or enlarged.

3. A non-conforming structure or use, existing at the time of passage of these regulations and within a riparian setback, that has substantial damage and which is discontinued, terminated, or abandoned for a period of six (6) months or more may not be revived, restored, or re-established.

1147.09 VARIANCES WITHIN RIPARIAN SETBACKS.

- A. The City of Seven Hills may grant a variance to these regulations provided herein in cases where practical difficulties in the use of the property are imposed by the regulations and the need for requested relief outweighs the potential harm or reduction in riparian area functions which may be caused by a proposed use.
- B. In making a determination under A, the city of Seven hills should consider the following factors.
 1. The soil type and natural vegetation of the parcel as well as the percentage of the parcel that is in the 100-year floodplain.
 2. The extent to which the requested variance impairs the flood control, erosion control, water quality protection, and other functions of the riparian area. This determination shall be based on sufficient technical and scientific data.
 3. The degree of hardship these regulations place on the landowner and the availability of alternatives to the proposed activity.
 4. Soil-disturbing activities permitted in the riparian setback should be implemented to minimize clearing to the extent possible and to include best management practices necessary to minimize erosion and control sediment.
 5. The presence of significant impervious cover in the riparian setback compromises its benefits to the City of Seven Hills. Variances should not be granted for asphalt or concrete paving within the riparian setback. Variances may be granted for gravel driveways.

1147.10 BOUNDARY INTERPRETATION AND APPEALS PROCEDURE.

- A. When a landowner or applicant disputes the boundary of a riparian setback or the ordinary high water mark of a watercourse, the landowner or applicant shall submit evidence to the City Engineer that describes the boundary, the landowner or applicant's proposed boundary, and justification for the proposed boundary change.
- B. The City Engineer shall evaluate materials submitted and shall make a written recommendation within a reasonable period of time not to exceed sixty (60) days, a copy of which shall be submitted to the landowner or applicant. If during this evaluation the City Engineer requires further information, he or she may require this be provided by the landowner or applicant.
- C. Any party aggrieved by any such determination or other decision or determination under these regulations may appeal to the Board of Zoning Appeals under the provisions of Section 981.01. The party contesting the location of the riparian setback or the ordinary high water mark of a watercourse shall have the burden of proof in case of any such appeal.

1147.11 INSPECTION OF RIPARIAN SETBACKS.

- A. Riparian setbacks shall be inspected by the City Engineer when:
 1. A preliminary subdivision plat or other land development plan is submitted to the Community.
 2. A building permit is requested.
 3. Prior to any soil disturbing activity to inspect the delineation of riparian setbacks as required under these regulations.
- B. Riparian setbacks shall also be inspected periodically by the Building Commissioner for compliance with approvals under Section 1147.06(B) of these regulations or at any time evidence is brought to the attention of the Building Commissioner that uses or structures are occurring that may reasonably be expected to violate the provisions

City of Seven Hills

Ordinance No. 79-2001

Introduced By Councilmen Stimetz, Curtis, Cannata

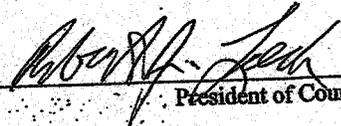
Page 8

of these regulations.”

Section 2. That except as herein amended and supplemented, all the provisions of Title Three, Local Building Provisions, of part Eleven, Building Code, of the Codified Ordinances of the City of Seven Hills, Ohio shall remain in full force and effect.

Section 3. This Ordinance shall take effect and be in force from and after the earliest period allowed by law.

First Reading December 10, 2001



President of Council

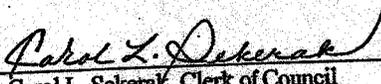
Second Reading December 26, 2001

Filed With
the Mayor January 15, 2002

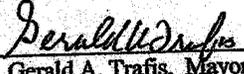
Third Reading January 14, 2002

Approved January 15, 2002

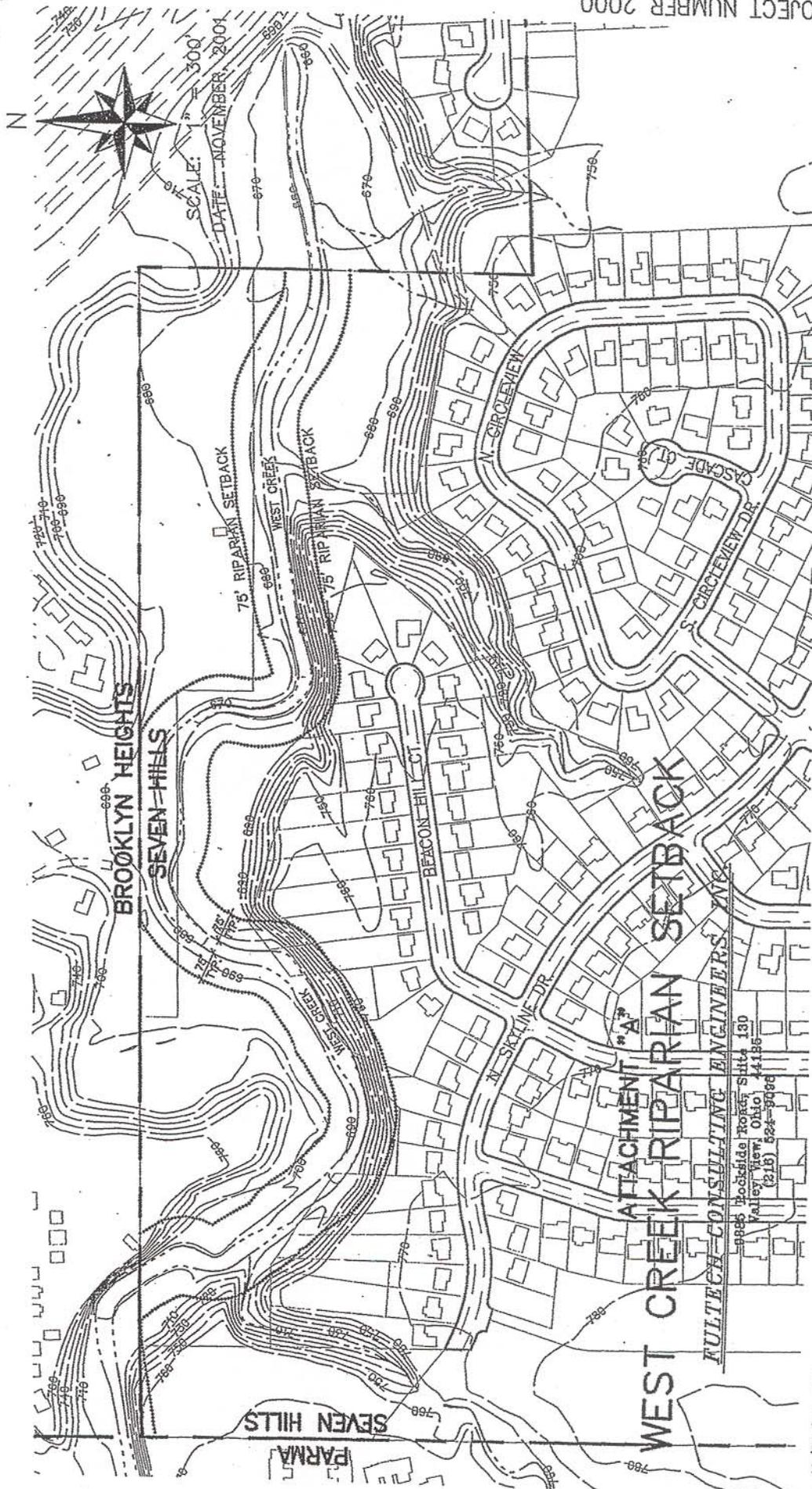
Passed January 14, 2002

Attest 

Carol L. Sekerak, Clerk of Council



Gerald A. Trafis, Mayor



SCALE: 1" = 300'
 DATE: NOVEMBER, 2004



ATTACHMENT "A"
 WEST CREEK RIPARIAN SETBACK

KULTECH CONSULTING ENGINEERS, INC.

8885 Lockside Tower, Suite 130
 Valley View, Ohio 44135
 (216) 594-9000

DATE: 11/06/01 TIME: 13:51

1/22/02

L-343-01 vaz
(Substitute #2)
(As Amended)

ORDINANCE NO. 35-02

BY: **DEBORAH LIME, STUART J. BOYDA, MICHELE DANIELS,
BRIAN DAY, MARK A. DRABIK, MARY GALINAS,
ROY J. JECH, JOHN R. STOVER, MICHELLE J. STYS**

**AN ORDINANCE TO ENACT CHAPTER 1109 "WETLANDS
SETBACK" OF THE CODIFIED ORDINANCES OF THE CITY
OF PARMA, AND DECLARING AN EMERGENCY**

WHEREAS, wetlands protect the public health and safety of the City of Parma by:

- Reducing peak flood flows, storing flood waters, and maintaining stream flow patterns;
- Minimizing streambank erosion by reducing runoff volume and velocity;
- Protecting ground water quality by filtering pollutants from storm water runoff;
- Recharging groundwater reserves;
- Maintaining surface water quality by minimizing sediment pollution from streambank erosion, and trapping sediments, chemicals, salts, and other pollutants from flood waters and storm water runoff; and,
- Providing habitat for aquatic and terrestrial organisms, many of which are on Ohio's Endangered and/or Threatened Species listings; and,

WHEREAS, wetlands cannot continue to provide these functions unless protected from the effects of fluctuations in storm water flow; urban pollutants; disposal of fill or dredged materials; and other impacts of land use change; and,

WHEREAS, replacement of the public health and safety benefits of wetlands including flood control, erosion control, ground water recharge, and water quality protection will require significant public expenditure; and,

WHEREAS, the State of Ohio has lost over 90 percent of its original wetlands and significant wetland acreage has been lost or degraded in the Big Creek, West Creek, Cuyahoga River, Baldwin Creek, and Rocky River watersheds due to draining, dredging, filling, excavating, and other acts; and,

WHEREAS, there are watershed-wide efforts to protect and enhance the water resources of the Cuyahoga River and its tributaries, including Big Creek and West Creek, and also the Rocky River and its tributaries, including Baldwin Creek; and,

WHEREAS, the City of Parma recognizes its obligation as a part of the watershed to reduce flooding, erosion, and pollution by controlling runoff and flood waters within its borders; and,

WHEREAS, studies undertaken by independent scientific bodies recommend minimum widths for wetland setbacks; and,

WHEREAS, the Council of the City of Parma has reviewed and adopted recommendations for wetland setbacks, and the Council finds that in order to minimize encroachment on wetlands and the need for costly engineering solutions to control flooding and erosion and to protect watershed residents; to protect and enhance the scenic beauty of the City of Parma; and, to preserve the character of the City of Parma, the quality of life of the residents of the City of Parma and corresponding property values, it is necessary and appropriate to regulate

the construction of structures and uses within a wetland setback surrounding Category 2 and 3 wetlands in the City of Parma; and,

WHEREAS, Article XVIII, Section 3 of the Ohio Constitution grants municipalities the legal authority to adopt land use and control measures for promoting the peace, health, safety, and general welfare of its citizens; and,

WHEREAS, 40 C.F.R. Parts 9, 122, 123, and 124, referred to as NPDES Storm Water Phase II, require designated communities, including the City of Parma, to develop a Storm Water Management Program to address the quality of storm water runoff during and after soil disturbing activities;

NOW, THEREFORE, BE IT ORDAINED BY THE COUNCIL OF THE CITY OF PARMA, STATE OF OHIO:

Section 1. That Chapter 1109 "Wetlands Setback" of the Codified Ordinances of the City of Parma, is hereby enacted to read as follows:

"1109.01 DEFINITIONS.

- a. "Best Management Practice (BMP) means any practice or combination of practices that is determined to be the most effective, practicable (including technological, economic, and institutional considerations) means of preventing or reducing the amount of pollution generated by nonpoint sources of pollution to a level compatible with water quality goals. BMP's may include structural practices, conservation practices and operation and maintenance procedures.
- b. "Category 2 Wetlands" means those wetlands classified by the Ohio Environmental Protection Agency (Ohio EPA) as Category 2 wetlands under OAC 3745-1-54 (C)(2), or current equivalent Ohio EPA classification, in accordance with generally accepted wetland functional assessment methods acceptable to the U.S. Army Corps of Engineers and Ohio EPA at the time of application of these regulations.
- c. "Category 3 Wetlands" means those wetlands classified by the Ohio EPA as Category 3 wetlands under OAC 3745-1-54(C)(3), or current equivalent Ohio EPA classification, in accordance with generally accepted wetland functional assessment methods acceptable to the U.S. Army Corps of Engineers and Ohio EPA at the time of application of these regulations.
- d. "Community" refers to the City of Parma.
- e. "Cuyahoga County Wetlands Inventory Map" refers to the wetlands map created by the Cuyahoga River Remedial Action Plan.
- f. "Engineer" means the duly appointed engineer for the City of Parma.
- g. "Impervious Cover" means any surface that cannot effectively absorb or infiltrate water. This may include roads, streets, parking lots, rooftops, sidewalks, and other areas not covered by vegetation.
- h. National Wetlands Inventory Map: Wetland maps that were created by the Fish and Wildlife Service, United States Department of Interior. These can be found in City Hall and at the Cuyahoga Soil and Water Conservation District Office.
- i. Natural Succession" means a gradual and continuous replacement of one kind of plant and animal group by a more complex group. The plants and animals present in the initial group modify the environment through their life activities thereby making it unfavorable for themselves. They are gradually replaced by a different group of plants and animals better adapted to the new environment
- j. "Noxious Weeds". This shall mean any plant species defined by the Ohio Department of Agriculture as a "noxious weed" and listed as such by the Department. For the purposes of these regulations, the most recent version of this list at the time of application of these regulations shall prevail.
- k. Ohio Wetlands Inventory Map: Wetland maps that were created by the Natural Resources Conservation Service, USDA and the Ohio Department of Natural Resources. These can be found at City Hall and at the Cuyahoga Soil and Water

Conservation District Office.

- l. "Qualified Professional" means an individual competent in the areas of botany, hydric soils, and wetland hydrology, and is acceptable to the City Engineer.
- m. "Soil Disturbing Activity" means clearing, grading, excavating, filling, or other alteration of the earth's surface where natural or human made ground cover is destroyed and which may result in, or contribute to, erosion and sediment pollution.
- n. "Watercourse" means any natural, public or private body of water including lakes, ponds, streams, gullies, swales, or ravines having banks and a defined bed, either continuously or intermittently flowing.
- o. "Wetland" means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions, including swamps, marshes, bogs, and similar uses.
- p. "Wetland Setback" means those lands within the community that fall within the area defined by the criteria set forth in these regulations.

1109.02: PUBLIC PURPOSE.

It is hereby determined that the wetlands within the Community contribute to the health, safety, and general welfare of the residents of the Community. The specific purpose and intent of this ordinance is to regulate uses and developments within wetland setbacks that would impair the ability of wetlands to:

- a. Minimize flood impacts by reducing peak flows, or slowing the velocity of flood waters, or regulating stream base flows, or maintaining stream flow patterns.
- b. Minimize streambank erosion by reducing runoff volume and velocity.
- c. Protect groundwater quality by filtering pollutants from storm water runoff.
- d. Recharge groundwater reserves.
- e. Protect surface water quality by minimizing sediment pollution from streambank erosion, and trapping sediments, chemicals, salts, and other pollutants from flood waters and storm water runoff.
- f. Provide habitat for aquatic and terrestrial organisms, many of which are on Ohio's Endangered and/or Threatened Species listings.
- g. Benefit the community economically by minimizing encroachment on wetlands and reducing the need for costly engineering solutions, such as retention/detention basins and rip rap; to protect structures and reduce property damage and threats to the safety of watershed residents; and by contributing to the scenic beauty and environment of the community, thereby preserving the character of the community, the quality of life of residents of the community, and corresponding property values.
- h. Provide open space and passive recreation for activities such as hiking, nature observation, and photography.

1109.03 APPLICABILITY, COMPLIANCE AND VIOLATIONS.

- a. These regulations shall apply to all lands that are within the jurisdiction of the community and that border Category 2 and 3 Wetlands as defined in these regulations. No subdivision plan approval, site plan approval, nor land development plan approval shall be issued by the Community without full compliance with the terms of these regulations. No building permits involving soil disturbing activities shall be issued by the Community without full compliance with the terms of these regulations. No approvals or permits shall be issued by the community without full compliance with the terms of these regulations where applicable.
- b. Any person who shall violate any section of these regulations shall be guilty of a misdemeanor of the fourth degree and, upon conviction thereof, shall be subject to punishment as provided in 1123.99 of the Planning and Zoning Code and shall be required to restore the wetland and the wetland setback through a restoration plan approved by the Community. In addition, the City shall have the authority to enforce the provisions in Section 1123.09 of the Parma Planning and Zoning Code which includes, in addition to other recourse provided by law, the power to institute a suit for an injunction to prevent, remove, abate, enjoin, or terminate a violation of the

regulations within this Chapter.

1109.04 CONFLICTS WITH OTHER REGULATIONS AND SEVERABILITY.

- a. Nothing within these regulations shall be construed to conflict with the Clean Water Act or Ohio Revised Code 6111.03 et seq.
- b. Where these regulations impose a greater restriction upon land than is imposed or required by any other provision of law, regulation, contract, or deed, the provisions of these regulations shall control.
- c. These regulations shall not limit or restrict the application of other provisions of law, regulation, contract, or deed, or the legal remedies available thereunder, except as provided in A and B of this section.
- d. If any clause, section, or provision of these regulations is declared invalid or unconstitutional by a court of competent jurisdiction, validity of the remainder shall not be affected thereby.

1109.05 ESTABLISHMENT OF WETLAND SETBACKS.

- a. Wetland setbacks are established as follows:
 1. A minimum of 120 feet surrounding and including all Category 3 Wetlands, or equivalent Ohio EPA classification.
 2. A minimum of 75 feet surrounding and including all Category 2 Wetlands, or equivalent Ohio EPA classification.
- b. The following conditions shall apply in wetland setbacks:
 1. Wetland setbacks shall be measured in a perpendicular direction from the federal or state defined wetland boundary.
 2. Except as otherwise provided in these regulations, the wetland and the wetland setback area shall be preserved in its natural state and shall be established and marked in the field prior to any earth disturbing activities.

1109.06 PROCEDURE.

- a. Prior to filing a request for approval of a preliminary site plan, a preliminary plat or a new construction building permit, the landowner shall check to see if the latest versions of National Wetland Inventory maps, Ohio Wetlands Inventory map or the Cuyahoga County Wetlands Inventory Map indicates that a wetland is present on or within 120 feet of the site. A photo copy of that section of each map will be attached to the permit application. If a potential wetland is shown on any of the three maps or if there is reason to believe that an unmapped wetland exists on or within 120 feet of the site the landowner will retain a qualified professional to survey the proposed development site for wetlands. If no wetlands are found by the qualified professional, the landowner shall submit a letter with the preliminary plat or permit application verifying that a qualified environmental professional has surveyed the site and found no wetlands. If wetlands are found, the following procedures shall be followed.
 1. A qualified professional shall determine the presence of Category 2 or 3 wetlands on or within 120 feet of the proposed development site using the latest version of the Ohio Rapid Assessment Method for wetland evaluation approved at the time of application of these regulations. Acceptance of this determination shall be subject to review and approval by the Engineer. As a result of this review, the Engineer may require further information from the landowner and may consult with the Cuyahoga Soil and Water Conservation District, the Ohio EPA, or other technical experts as necessary.
 2. If Category 2 or 3 wetlands are located on or within 120 feet of the proposed development site, the landowner shall delineate these wetlands and the wetland setback on the development site. The landowners shall identify all delineated wetlands and their associated setbacks on all subdivision plans, land development plans, and/or permit applications submitted to the Community. Wetlands shall be delineated by a site survey approved by the Community Engineer using delineation protocols accepted

- by the US Army Corps of Engineers and Ohio EPA at the time of application of these regulations. Wetland setbacks shall be delineated through a metes and bounds survey, or higher level survey, subject to review and approval by the Community Engineer. The Community Engineer may require further information from the landowner and may consult with the Cuyahoga Soil and Water Conservation District, Ohio EPA, or other technical experts as necessary.
3. Prior to any soil/vegetation disturbing activity, the landowner shall delineate wetland setbacks on the development site through the use of clearly viewed, above ground markers such as stakes, posts or other methods approved by the City Engineer, and such delineation shall be maintained throughout construction.
 4. No approvals or permits shall be issued by the Community prior to delineation of wetland setbacks in conformance with these regulations.
- b. Upon completion of an approved subdivision or commercial land development, wetland setbacks shall be permanently recorded on the plat records for the City and shall be maintained as open space thereafter.

1109.07 USES PERMITTED IN WETLAND SETBACKS.

- a. Open space uses that are passive in character shall be permitted in wetland setbacks, including, but not limited to, the following:
 1. Passive recreational uses, as permitted by federal, state, and local laws, such as hiking, fishing, picnicking, and similar uses.
 2. Damaged or diseased trees may be removed.
 3. The revegetation and/or reforestation of wetland setbacks shall be allowed.
 4. Streambank stabilization and erosion control measures may be allowed provided that such measures are ecologically compatible and substantially utilize natural materials and native plant species where practical and available. Such streambank stabilization and erosion control measures shall only be undertaken upon approval of an erosion control plan by the City Engineer.
 5. Nature trails and raised observation decks or walkways, with all dirt from post holes being removed, for the purpose of education, scientific research, and/or the personal enjoyment of nature.
- b. No use permitted under these regulations shall be construed as allowing public trespass on privately held lands.

1109.08 USES PROHIBITED IN WETLAND SETBACKS.

Any use not authorized under these regulations shall be prohibited in wetland setbacks. By way of example, the following uses are specifically prohibited:

- a. Construction. There shall be no structures of any kind except as permitted under these regulations.
- b. Dredging or Dumping. There shall be no drilling, filling, dredging, or dumping of soil, spoils, liquid, or solid materials, except for noncommercial composting of uncontaminated natural materials and except as permitted under these regulations.
- c. There shall be no roads or driveways.
- d. There shall be no use of motorized vehicles of any kind, except as permitted under these regulations.
- e. There shall be no disturbance, including mowing, of the natural vegetation, except for such conservation maintenance that the landowner deems necessary to control noxious weeds; for such plantings as are consistent with these regulations; and for such disturbances as are approved under these regulations and for the passive enjoyment, access, and maintenance of landscaping or lawns existing at the time of passage of this regulation. Nothing in this section shall be construed as requiring a landowner to plant or undertake any other activities in wetland setbacks provided the landowner allows for natural succession.
- f. There shall be no parking lots.
- g. New Surface and/or Subsurface Sewage Disposal or Treatment Areas. Wetland

setbacks shall not be used for the disposal or treatment of sewage except in accordance with Cuyahoga County District Board of Health regulations at the time of application of these regulations.

- h. Crossings. Crossings of designated wetland setbacks by publicly and privately owned sewer and water lines and utility transmission lines without a permit issued by the US Army Corps of Engineers and/or Ohio EPA.

1109.09 NON-CONFORMING STRUCTURES OR USES IN WETLAND SETBACKS

- a. Non-conforming structures or uses in wetland setbacks shall be regulated under the provisions of Chapter 1181 of the Parma Zoning Code. Where the following language is more restrictive than Sections 1181.01 through 1181.03, the following language shall prevail:

1. A non-conforming use, existing at the time of passage of these regulations and within a wetland setback, that is not permitted under these regulations may be continued but shall not be changed or enlarged unless changed to a use permitted under these regulations.
 2. A non-conforming structure, existing at the time of passage of these regulations and within a wetland setback, that is not permitted under these regulations may be continued but shall not have the existing building footprint or roofline expanded or enlarged in such a way that would move the structure closer to the wetland.
 3. A non-conforming structure or use, existing at the time of passage of these regulations and within a wetland setback, that has substantial damage and which is discontinued, terminated, or abandoned for a period of six (6) months or more may not be revived, restored, or re-established.
 4. A non-conforming structure or use that is discontinued may be resumed any time within six (6) months from such discontinuance but not thereafter. No change or resumption shall be permitted that is more detrimental to wetland setbacks, as measured against the intent and objectives of these regulations and determined by the Community, than the existing or former non-conforming structure or use.
- b. The Community shall be notified by the landowner of the resumption of a discontinued non-conforming structure or use.

1109.10 BOUNDARY INTERPRETATION & APPEALS PROCEDURE.

- a. When a landowner disagrees with the boundary of a wetland setback, the landowner may submit evidence to the City Engineer describing the boundary, presenting the proposed boundary, and justification for the proposed boundary change.
- b. The City Engineer shall evaluate all materials submitted and shall make a written decision within a reasonable period of time, not to exceed sixty (60) days, a copy of which shall be submitted to the landowner. If during this evaluation, the City Engineer requires further information, this shall be provided by the landowner. The sixty day review period will be postponed until such information is provided by the landowner.
- c. Any party aggrieved by any such determination, or other decision or determination under these regulations, may appeal to the Wetland Review Board under the provisions of Section 1127.04. The party contesting the location of the wetland setback as determined by these regulations shall have the burden of proof in case of any such appeal.

1109.11 INSPECTION OF WETLAND SETBACKS

The wetland setback shall be inspected by the City as follows:

- a. When evidence is brought to the attention of the City that uses or structures are

Pg. 8 of L-343-01 Ord. to enact Chapter 1109 "Wetlands Setback" of the Codified Ordinances of the City of Parma, and declaring an emergency

Section 3. That this Ordinance is hereby declared to be an emergency measure necessary for the immediate preservation of the public health, safety, and welfare of the City of Parma, and for the further reason that this measure is necessary in order to update Parma's Zoning Code, and this Ordinance shall become immediately effective upon receiving the affirmative vote of two-thirds of all members elected to Council and approval by the Mayor, otherwise from and after the earliest period allowed by law.

PASSED: DECEMBER 29, 2003

/s/ CHARLES M. GERMANA
PRESIDENT OF COUNCIL

ATTEST: /s/ MICHAEL F. HUGHES
CLERK OF COUNCIL

APPROVED: DECEMBER 31, 2003

FILED WITH
THE MAYOR: DECEMBER 31, 2003

/s/ GERALD M. BOLDT
MAYOR, CITY OF PARMA, OHIO

I, Michael F. Hughes, Clerk of Council, City of Parma, County of Cuyahoga and State of Ohio, hereby certify this to be a true and correct copy of Ordinance/Resolution No. 35-02, passed by Parma City Council on the 29th day of December, 2003.

Michael F. Hughes
MICHAEL F. HUGHES, CLERK OF COUNCIL

APPENDIX H

West Creek Success Stories

Appendix I

West Creek Preservation Committee Preservation Priority List

| PPN | Acres | City | Stream/Wetland |
|----------------------|--------------|------------------|-----------------------|
| 561-02-002 | 1.5 | Independence | 205 LF |
| 561-05-003 | 9 | Independence | |
| 531-30-007 (part of) | 2 | Brooklyn Heights | 700 LF |
| 531-28-008 | 4 | Brooklyn Heights | 975 LF |
| ODOT Flume | 1.5 | Brooklyn Heights | 750 LF |
| 531-28-002 (part of) | 1 | Brooklyn Heights | 200 LF |
| 531-28-006 (part of) | 1.2 | Brooklyn Heights | 350 LF |
| 531-24-009 (part of) | 2 | Brooklyn Heights | 425 LF |
| 531-23-018 (part of) | 1 | Brooklyn Heights | 220 LF |
| 531-26-005 (part of) | 1 | Brooklyn Heights | 300 LF |
| 531-23-003 (part of) | 1.2 | Brooklyn Heights | 510 LF |
| 531-22-018 (part of) | 2.75 | Brooklyn Heights | 830 LF |
| 531-22-013 (part of) | 0.25 | Brooklyn Heights | 210 LF |
| 445-13-002 (part of) | 3.3 | Parma | 260 LF |
| 531-18-050 | 2 | Brooklyn Heights | |
| 445-10-033 | 2.75 | Parma | 750 LF |
| 445-24-003 | 12 | Parma | 2000 LF |
| 446-04-010 | 2.78 | Parma | 500 LF |
| 445-31-010 | 3.7 | Parma | |
| 446-15-001 | 5.5 | Parma | |
| 446-24-027 | 2.1 | Parma | |
| 446-24-025 | 3.1 | Parma | 330 LF |
| 446-24-009 | 2 | Parma | 180 LF |
| 451-46-002 | 15 | Parma | |
| 452-11-019 | 1.5 | Parma | 150 LF |
| 452-28-009 | 1.5 | Parma | 350 LF |
| 453-17-001 | 2.5 | Parma | 1000 LF |
| 453-19-001 | 3.8 | Parma | 1200 LF |
| 453-44-009 | 1.9 | Parma | 600 LF |
| 453-44-015 | 0.5 | Parma | 235 LF |
| 453-44-003 | 4.2 | Parma | wetland |
| | 91.93 | | 13230 LF |
| | | | (29% of West Creek) |

Total Priority Acres: **98.53** 1.12% of total watershed

Total Watershed Acres: **9,024**

Total Currently Protected: **510** 5.5% of total watershed

Appendix J

West Creek Confluence Restoration

A partnership in conservation by:

City of Independence
West Creek Preservation Committee
Northeast Ohio Regional Sewer District

Before Photos (March 2007)



After Photos (Sept. 2008)



*Full Restoration of the Confluence Expected to Commence Fall of 2009
For more information, please visit:*

www.westcreek.org/Confluence

