Euclid Creek Watershed Action Plan

Protection, Restoration and Management for the Future

June, 2006

Euclid Creek Watershed Council
Friends of Euclid Creek
Cuyahoga Soil & Water Conservation District
This plan has been provided through funding support of ODNR Watershed Coordinator Grant Program and Euclid Creek Watershed Council

EUCLID CREEK WATERSHED ACTION PLAN DRAFT

TABLE OF CONTENTS

List of Tables and Figures/Maps

Tables

Figures

Acronyms used in plan

OEPA – Ohio Environmental Protection Agency
NEORSD – Northeast Ohio Regional Sewer District
NOACA – Northeast Ohio Areawide Coordinating Agency
TMDL – Total Maximum Daily Load
CSO – Combined Sewer Overflow
SWCD – Soil & Water Conservation District
CPC – Cuyahoga County Planning Commission
QHEI – Qualitative Habitat Evaluation Index
LQHEI – Lacustuary Qualitative Habitat Evaluation Index
AOC – Area of Concern
GLWQA – Great Lakes Water Quality Agreement
RCRA: Resource Conservation and Recovery Act
QHEI: Qualitative Habitat Evaluation Index
IBI: Index of Biologic/Biotic Integrity
ICI : Invertebrate Community Index
IGLD: International Great Lakes Datum
EPT: Percent of the composite of mayfly, stonefly, and caddisfly larvae
DELT: Deformities,Erosions, Lesions, Tumors
PAH: Polyaromatic Hydrocarbons

Euclid Creek Watershed Plan
Protection, Restoration and Management for the Future

I. Introduction

The Euclid Creek Watershed is referred to as a headwater tributary to Lake Erie. It is not part of a large river system but instead directly drains into Lake Erie and is part of the Lake's direct system. The Watershed has evolved over the past 100 years to one of the most highly urbanized areas along the Ohio Lake Erie coastline, and yet the Creek continues to move through the landscape. As with urban streams throughout the country, Euclid Creek has begun to feel the impact of urbanization on sustaining its function and integrity as a healthy water body to its residents and the Lake Erie ecosystem. The development of this Plan begins to lay the foundation at which to move towards the next twenty years of the Creek's viability within the community.

The Plan development has been part of a cooperative effort that has involved municipal mayors with the Euclid Creek Watershed Council, the advocacy of the Friends of Euclid Creek, the technical assistance of various agencies and the input from City Engineers, residents and property stakeholders. This cooperative and inclusive participation has established a broad and diversified support system to implement the plan at the community level.

As the plan aims to meet the standards of ODNR, EPA and various other programs, the main principle of the plan is that it fits within the environment of Euclid Creek. Euclid Creek is not a scenic river or a pristine preserve. More importantly, it moves through the landscape of an urban environment that people experience in their daily activities. These urban waters are critical to exemplifying the balance of urban living and sustained water resources. Euclid Creek has its challenges, but we are only just beginning to recognize its opportunities and with this plan will realize its potential.

Mission Statement

As a result of the examination of the watershed, input from a variety of stakeholders and what strategies will be needed for the future sustainability of the Euclid Creek watershed, a mission statement is presented to guide the foundation of the plan and its implementation.

Protect and restore Euclid Creek and its Lake Erie shoreline; to sustain its water resources and enhance the quality of life for the future.

A. Euclid Creek Watershed Location

The Euclid Creek watershed is located within two counties of northeast Ohio; Cuyahoga and Lake and covers 24 square miles within eleven municipal communities and drains directly into Lake Erie. The watershed is part of the Lake Erie tributary hydrologic unit code 04110003 010 as defined by the U.S. Geological Survey: East of the Cuyahoga and West of the Grand Rivers excluding Chagrin River. Euclid Creek itself is a subset of this defined drainage area and considered a 14-digit hydrologic unit within. The other associated streams for this hydrologic unit include the Lake Erie tributaries in eastern Cuyahoga County that include Doan Brook, Nine Mile Creek and Dugway Brook as well Lake Erie tributaries in eastern Lake County. For the purpose of this Plan, the Euclid Creek Watershed is the water body examined. The mouth of Euclid Creek is located at the latitude of 41.5861769714957 and longitude of -81.56522738751.

The distribution of the watershed includes 92% in Cuyahoga County and 8% in Lake County. All of the area within the watershed is incorporated consisting of eleven municipal cities of which ten are within Cuyahoga County jurisdiction.

Lake Erie Tributary System

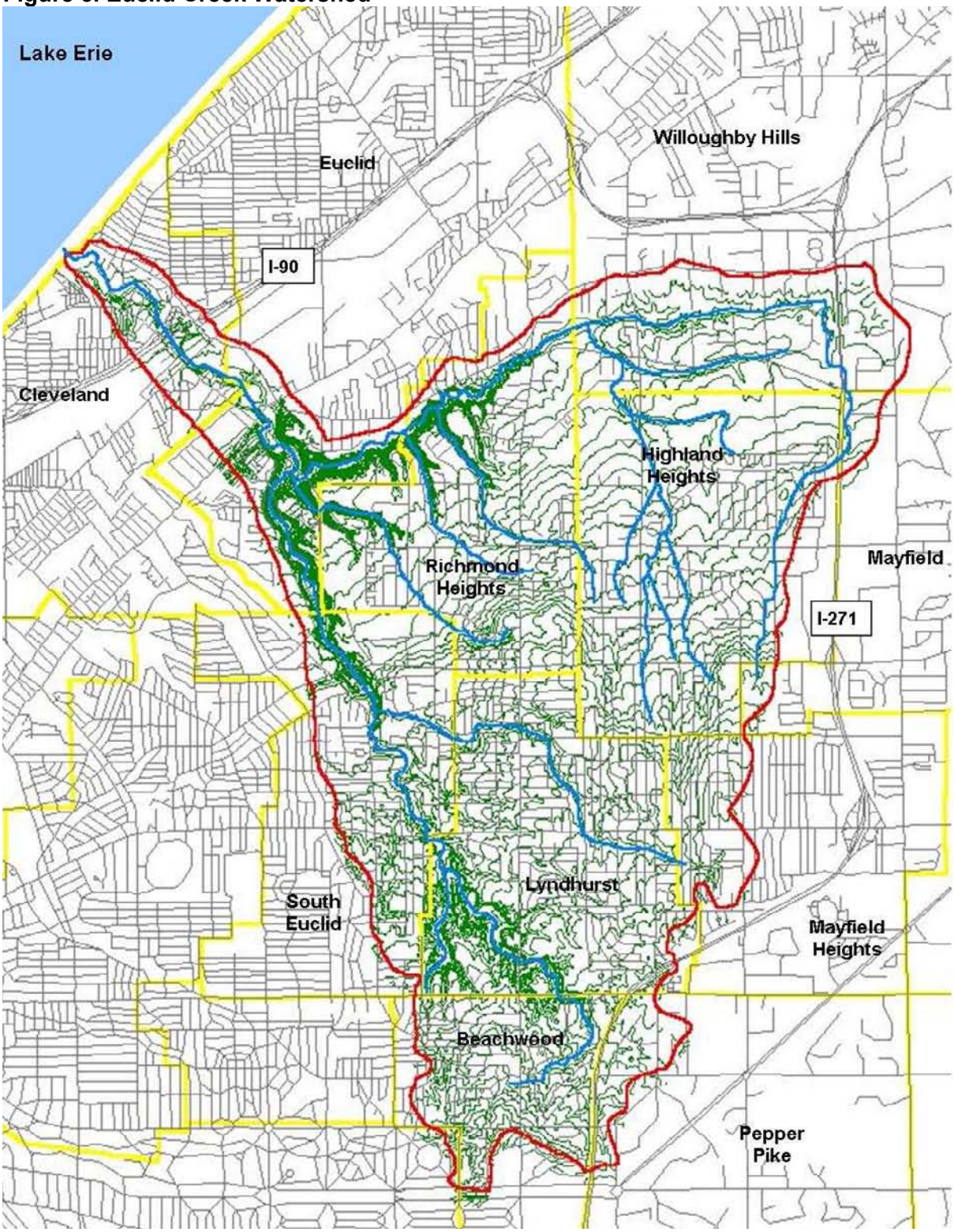
Euclid Creek is part of the Lake Erie and Great Lakes ecosystem comprising as the largest freshwater system in the world. The Lake Erie basin is the most populated and land developed among the Great Lakes. The basin is 30,140 square miles and over 11 million people reside throughout the United States and Canada within its boundaries. Lake Erie is considered the most biologically productive of the Great Lakes.

Figure 1: Lake Erie Basin

Euclid Creek is part of nearly 100 hundred headwater tributaries that feed directly into the Lake and drains all of the elements as a result of its land area. Being part of this system is integral to its existence and will be paramount to sustain and restore the resources needed to maintain the balance of the land and Lake Erie for the future.

Figure 2. Northeast Ohio Regional Watersheds, ODNR

Figure 3. Euclid Creek Watershed



B. Administrative Boundaries

Special Districts

The watershed contains several special districts that administer programs and services to the municipalities. The list below identifies these districts and their purpose.

Northeast Ohio Regional Sewer District

The Northeast Ohio Regional Sewer District (NEORSD) provides, maintains and improves sanitary sewer services within a majority of the Euclid Creek watershed excluding Willoughby Hills and unsewered areas. The past five years, they have produced a number of plans that target improvements within the watershed related to reduction of point source pollution and stormwater management. These studies include the, RIDE Draft Study, 2004, CSO Control Facilities Plan and the RPSD Phase I Stream Survey, 2000

Cleveland Metroparks

The Cleveland Metroparks manages the Euclid Creek Reservation and serves as a regional entity for conservation and recreation within local natural environments.

NOACA

The Northeast Ohio Areawide Coordinating Agency (NOACA) is the federally designated Metropolitan Planning Organization (MPO) for five counties of Northeast Ohio, which include Greater Cleveland and the Lorain area. Its chief functions are to perform long- and short-range transportation planning, transportation-related air quality planning, and areawide water quality management planning, as defined by federal and Ohio mandates. NOACA also administered and prepares the 208 Water Quality Plans for the five county region.

ODOT District 12

The Ohio Department of Transportation Local District provides maintenance, upgrades and engineering studies on the watershed's major roadways, highways and bridges.

Ohio EPA Northeast District

Ohio EPA provides sampling and regulatory review of permits within the watershed pertaining to NPDES, Phase II Storm water, Air, and surface water and alteration or elimination of a wetland or stream. The Ohio EPA also conducts monitoring within the Watershed every five years to evaluate the water quality conditions.

Cuyahoga & Lake Soil & Water Conservation Districts

The SWCD's lead conservation and education of aquatic and land resources within the watershed and their respective counties.

Cuyahoga/Lake County

Various county agencies provide services and administration on a variety of programs related to watershed health and community development. These programs work with local municipalities and their needs to the residents and the community. The following agencies provide services related to these issues:

County Planning Commission
County Engineer
County Board of Health
County Department of Development
County Solid Waste District

All of these agencies and districts will continue to work closely with the local watershed municipalities to ensure watershed stewardship considerations are reflected in their programs and services.

C. Special Designations

Ohio Coastal Management Zone Area

The lower portion of the watershed is within the state and federally designated Coastal Zone Management Area boundary as established by the Ohio Coastal Management Program administered through the Ohio Department of Natural Resources and established by the Coastal Zone Management Act of 1972. The Coastal Program outlines management objectives to sustain and protect the coastal zone. Also, the Euclid Creek watershed is within the Coastal Nonpoint Source Pollution Control Area administered by ODNR.

Figure 4. Coastal Zone Boundary in Euclid Creek Watershed

International Joint Commission Designated Area of Concern

As directed by the International Joint Commission and the Great Lakes Water Quality Agreement (GLWQA) established in 1987, Euclid Creek has been designated as part of the Cuyahoga Area of Concern (AOC). As defined in Annex 2 of the GLWQA an "Area of Concern means a geographic area that fails to meet the General or Specific Objectives of the Agreement where such failure has caused or is likely to cause impairment of beneficial use or of the area's ability to support aquatic life." The Agreement outlines fourteen beneficial uses to meet water quality standards of the Great Lakes.

Phase 2 – Storm water Communities

All of the municipalities within the Euclid Creek watershed are considered MS4 communities and are required to meet the USEPA NPDES Phase II Storm Water Compliance program objectives.

D. Demographics

Population

There are approximately 67,000 people residing within the watershed according to 2000 U.S. Census data. This population is distributed among the watershed communities as follows:

Table 1. Population

Community	Total Population (2000 Census)	Area of each community within the watershed (sq. miles)	% of land area from each community making up the watershed	Est. Population of the Watershed
Beachwood	12,186	1.79	7.6%	4,146
Cleveland	478,403	0.89	3.8%	5,503
Euclid	52,717	1.38	5.9%	6,787
Highland Heights	8,082	4.60	19.8%	7,249
Lyndhurst	15,279	4.26	18.3%	14,825
Mayfield Village	3,435	0.25	1.1%	219
Mayfield Heights	19386	0.76	3.2%	3,494
Pepper Pike	6,040	0.45	1.9%	381
Richmond Heights	10,944	3.98	17.1%	9,964
South Euclid	23,537	2.44	10.4%	12,237
Willoughby Hills	8,595	2.40	10.3%	1,901
Shaker Heights	29405	0.04	0.17%	188

Population Density

The population density of the watershed reflects the urban and suburban nature of Euclid Creek ranging from 792 to 6,162 people per square mile averaging 2,833 persons per square mile. These densities closely correlate to the levels of impervious cover found within the communities that is presented in the inventory section of this report. As a comparison to other watersheds in the Ohio Lake Erie basin, the Chagrin River watershed has a population density of 621 persons per square mile and the Sandusky River has a general population density of 116 persons per square miles. Hence the density of the watershed will play a significant role in determining solutions in Euclid Creek due to its high population density.

Table 2. Population Density

Community	Population Density per square mile
Beachwood	2321
Cleveland	6162
Euclid	4926
Highland Heights	1575
Lyndhurst	3480
Mayfield Village	874
Mayfield Heights	4604
Pepper Pike	847
Richmond Heights	2504
South Euclid	5018
Willoughby Hills	792
Shaker Heights	4660

U. S. Census, 2000, population and area of watershed.

Population Growth Household Projections

The growth projections for Euclid Creek communities are moderate and in many communities decreasing as a result of smaller families and aging of the current population compared to other outlying areas around the state. It also reflects the continuing out-migration of growth to outlying counties adjacent to Cuyahoga County. The following population projections demonstrate these growth patterns for the watershed as it plans for the future.

Table 3. Total Population & Projected Populations: 2000 - 2020

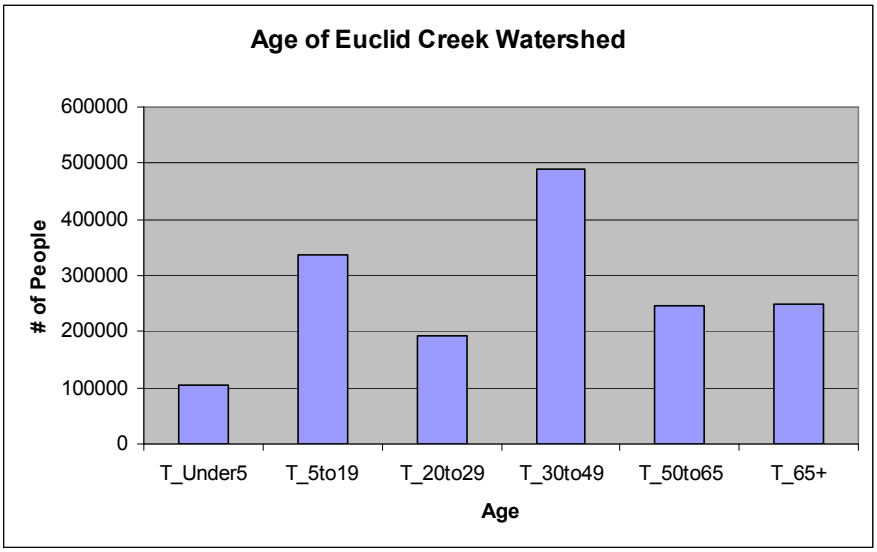
Community	2000	2005	2010	2020
Beachwood	12,186	13,310	14,060	14,910
Euclid	52,717	49,987	48,197	46,042
Highland Heights	8,082	8,483	8,889	9,705
Lyndhurst	15,279	14,891	14,513	13,760
Mayfield Heights	19,386	18,668	18,196	17,616
Mayfield Village	3,435	3,355	3,302	3,235
Pepper Pike	6,040	5,815	5,667	5,486
Richmond Heights	10,944	11,934	12,594	13,341
South Euclid	23,537	22,864	22,421	21,865
Willoughby Hills	8,595	8,574	8,594	8,615
Cleveland	477,459	445,353	424,360	399,411

Source: Certified Community Level Population & Employment Allocation of the Northeast Ohio Areawide Coordinating Agency, December, 2004.

Age

The age of the watershed reflects the high concentration of single family residences with the highest percentage of age is represented by the 30-49 Age Group and its corresponding 5-19 Age Group, typical of families. The second highest age group are the ages over the age 50.

Figure 5. Age Distribution



Cuyahoga County Planning Commission, U.S. Census 2000

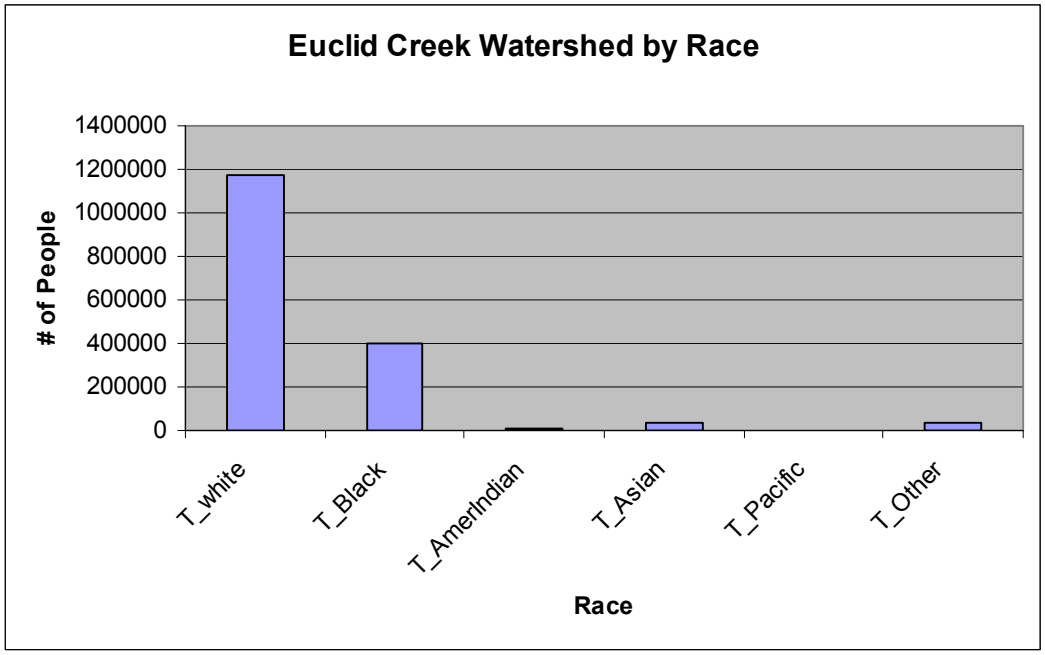
Economic Trends

The populations trends shown demonstrate the trend of the Northeast Ohio region of residents and businesses moving outwards from the central city and inner-ring suburbs to outlying suburban communities. The Euclid Creek communities experiencing limited growth at a rate of 1% or less over the next 15 years include the cities of Beachwood, Highland Heights, Richmond Heights and Willoughby Hills. The watershed is nearly 80% built out as a developed watershed excluding its steep slopes and major waterways.

Due to the developed nature of the watershed, Euclid Creek communities are beginning to examine redevelopment opportunities. This trend will continue and can have a significant impact to the viability of Euclid Creek biological and physical attributes. One aspect of this redevelopment trend is the assemblage of single lot parcels to establish denser development patterns of economic development. This consolidation of land and increase density may reverse the population densities slightly over time.

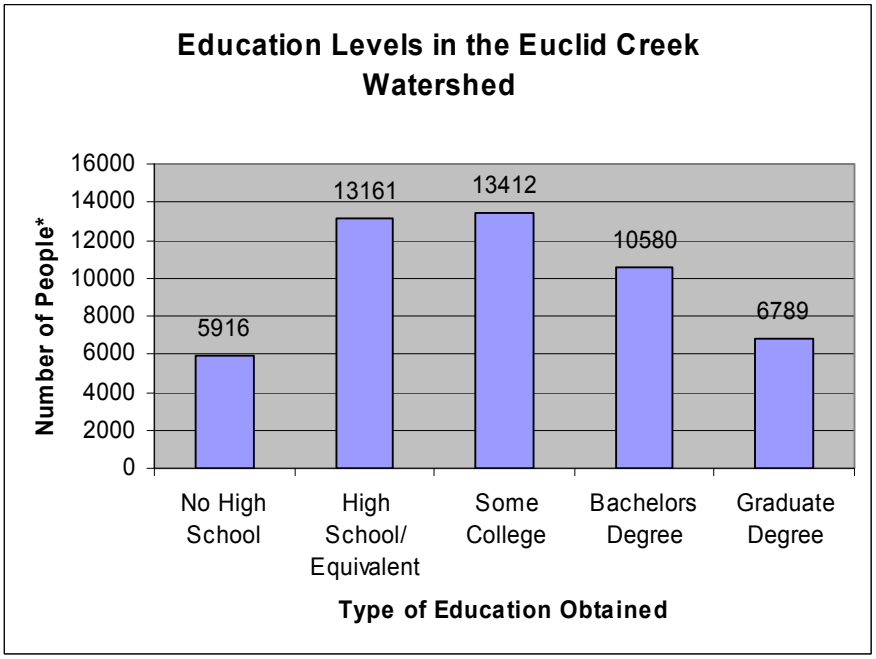
Another economic trend in the watershed and northeast region to highlight is the change from a manufacturing economy to a service economy. Many of the businesses, most notably in the lower section of the watershed were highly industrial, but in the last five years have greatly decreased with many properties not being utilized. It is unknown at this time the future of the industrial sector within the watershed. An increase of service uses primarily office parks and retail establishments such as Legacy Village will continue to be part of the redevelopment trend in the watershed.

Figure 6. Race



Cuyahoga County Planning Commission, U.S. Census ,2000

Figure 7. Education.



Cuyahoga County Planning Commission, U.S. Census , 2000

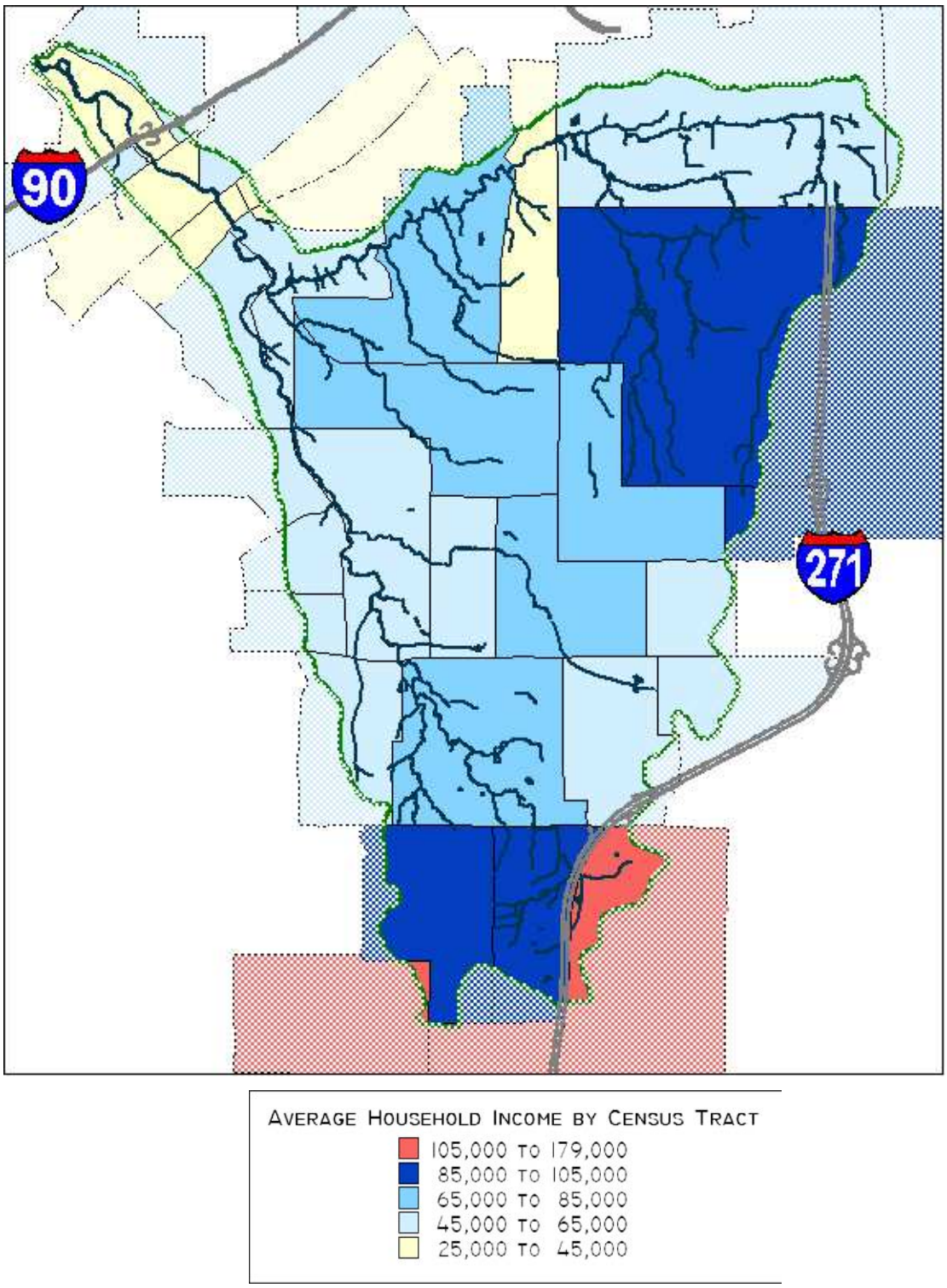


Figure 8. Average Household Income

E. Other Watershed Management Activities

Euclid Creek Total Maximum Daily Load (TMDL) Study

The Ohio EPA is currently developing a Total Maximum Daily Load (TMDL) restoration plan for the Euclid Creek Watershed. TMDL's are developed for impaired waters to determine the extent of pollution reduction necessary for a given stream to regain ecological health and meet the water quality attainment standards as established by the State of Ohio.

The Euclid Creek TMDL is being developed for sediment, habitat, and phosphorous. To maximize our efforts and collaboration, the Euclid Creek Watershed Action Plan and Euclid Creek TMDL process developed a partnership to conduct activities concurrently and provide the public involvement activities simultaneously throughout the process. The Euclid Creek TMDL will be submitted to Ohio EPA and USEPA during the same time frame as the Watershed Action Plan. This collaboration strengthened both planning efforts and provided resources to both OEPA and the Watershed Coordinator in accomplishing the goals of the planning efforts.

The goals, impairments and actions were directly linked to the TMDL findings and recommendations through this close working relationship. Priority status will be given to actions that will help achieve phosphorous reduction and habitat restoration recommendations of the Euclid Creek TMDL.

Cuyahoga County Greenspace Plan

In 2001, the Cuyahoga County Planning Commission developed a Greenspace Vision based upon the waterways and the recreational linkages the County includes. The vision outlines the basis of the watersheds within the County to guide future greenspace enhancements and expansions. The Greenspace Vision outlines goals to define future greenspace efforts within the County.

- builds off of the County's unique geography and natural history,
- emphasizes the environmental, community, and economic importance of greenspace,
- intends to inspire decision makers to make greenspace a priority in the community,
- promotes connecting neighborhoods in the county to greenspace and the county's natural resources,
- encourages the "regreening" of the more urban portions of the county to make them more desirable places to live.

In an effort to provide more place-based application of the County's Greenspace Plan, The Cuyahoga County Planning Commission, in partnership with the Friends of Euclid Creek are developing a Euclid Creek Greenspace Plan to provide more detail recommendations for trail and greenspace enhancement and connections within the watershed. Similar to the TMDL, the Watershed Action Plan process has worked concurrently with the Greenspace planning process and worked closely with Planning Commission staff to develop recommendations for both planning efforts.

Euclid Creek Metropark Reservation

Previous Watershed Management Activities & Planning Documents

Addition to the concurrent activities of the TMDL and Greenspace Plan, other previous watershed documents and activities have been produced or conducted for the watershed specifically or in context with larger regional activities.

Northeast Ohio Regional RIDE Study, 2004 – DRAFT

St. Clair- Nottingham Study, 2001

City of Cleveland Flood Insurance Study, 1978

U.S. Army Corps of Engineers, Environmental Assessment ,
Euclid Creek Floodway Project

NEORSD Water Quality Report, 2001

Northeast Ohio Regional Sewer District CSO Control Facilities Plan, 2002

Euclid Township History, 2004

For sources, please see the reference section of this report.

II. Watershed Plan Development

The watershed plan has been supported and involved participation by a variety of stakeholders within the watershed and its associated agencies to provide a comprehensive and applicable plan to the watershed for implementation. In addition, the meetings held from September 2004 through May, 2005 provided presentation and input on the Euclid Creek TMDL process simultaneously with the Watershed Plan and Greenspace effort. The participation of stakeholders is outlined below as a result of their involvement.

Organizational Structure

The Euclid Creek watershed effort has been evolving over the past three years in creating the structures and organizations to support and implement watershed stewardship practices on a variety of levels. As of 2005, there are two major organizations leading to meet those goals; the Euclid Creek Watershed Council and the Friends of Euclid Creek. These groups with the support of the Cuyahoga Soil & Water Conservation District have created a dynamic that is realizing the potential of collaboration on a variety of levels to foster a successful watershed planning and implementation program.

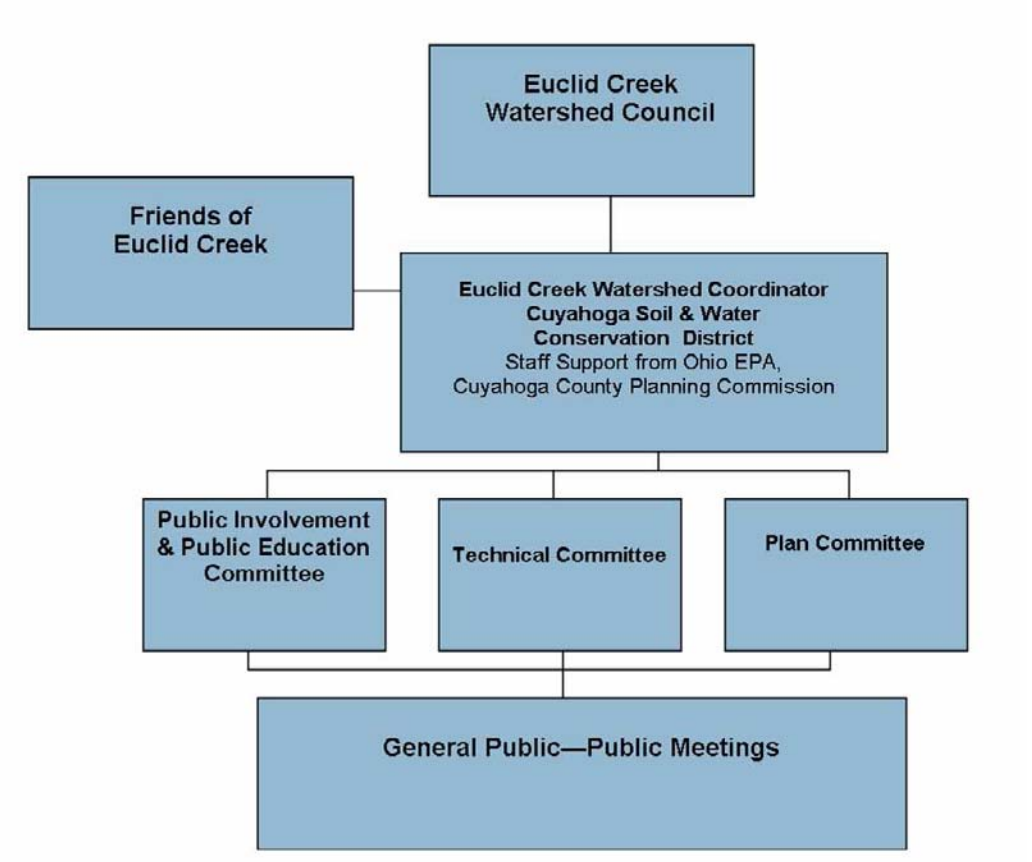


Figure 9. Organizational Structure for Planning Process

A. Euclid Creek Watershed Council

The Council of Mayors of nine of the eleven communities within the watershed have been updated and presented information on the planning process over the course of the past two years at their meetings conducted three times a year. Also each community has staff that has been actively involved in the Committees formed to review plan materials throughout the process.

Background
The Council, formed in 2002, was established as a result of storm water concerns across municipal boundaries. The Council's mission is to: "To address common environmental, storm water and development concerns in the Euclid Creek watershed." In 2004, the Council signed and passed bylaws and has an appointed Chairperson nominated by the Council. The Council bylaws are found in Appendix L of this report.

The Euclid Creek Watershed Council comprises of nine of the eleven communities within the watershed as partner members. The communities are represented on the Council by the Mayor or his/her appointee to serve on the Council. The Council serves as the governing decision making body of activities presented by the Watershed Coordinator and funds the local match for the coordinator. The Euclid Creek Watershed Coordinator serves as Secretary to the council and the staff person to administer programs and activities on the Council's decisions.

Plan Development Input
In addition to the Council directly, the Watershed Planning process included interviews with City Development Directors and coordination with local City Councils and other City staff departments to ensure compatibility and accuracy of the plan.

Watershed Technical Resource Committee

This committee consists of local, state and federal agency technical support staff, Watershed Plan Project team including OEPA TMDL staff and Municipal representatives that includes service directors and City engineers. The Committee has met four times over the course of 2004-2005 during the plan process. This committee serves as an interim review body prior to presentation to the Council.

Watershed Plan Committee

This committee provided a community approach to include input from a variety of stakeholders that reside in the watershed. Invited stakeholders included large property owners, businesses, schools, Friends of Euclid Creek and local neighborhood groups. This committee has met three times in 2004-2005 to provide input into the planning process for the watershed.

Watershed Public Involvement/Public Education Work Group

This group formed for Phase II program requirements provide representation of the watershed communities to foster environmental stewardship outreach activities throughout the watershed. This group has met eight times from 2004-2005 and has been a large contributor to the education component and priorities of the plan development.

Euclid Creek Watershed Council Members and Contact Information:
Mayor Merle Gorden, City of Beachwood
Mayor Georgine Welo, City of South Euclid
Mayor Joseph Cicero, City of Lyndhurst
COO Darnell Brown, City of Cleveland
Mayor Daniel Ursu, City of Richmond Heights
Mayor Scott Coleman, City of Highland Heights
Mayor Bruce Rinker, City of Mayfield Village
Mayor Margaret Egensperger, City of Mayfield Heights
Mayor Bill Cervenik, Chair, City of Euclid

Contact Information:
Mayor Georgine Welo, Council Chair
City of South Euclid
1349 South Green Road
South Euclid, Ohio 44121

B. Friends of Euclid Creek

The Friends of Euclid Creek have evolved over the last four years as an advocacy group for stewardship efforts within the Euclid Creek watershed. In 2004, they established themselves as a 501© 3 non-profit organization and have worked steadily to increase membership from their current roster of nearly 90 members. Their mission is:

- To promote the social welfare through the preservation and protection of Euclid Creek and its associate riparian areas;
- To educate the public regarding the benefits and importance of preservation and protection of Euclid Creek through public dissemination of information and communication with public officials; and
- To encourage cooperative interaction among all of Euclid Creek's watershed stakeholders in order to promote mutually beneficial solutions for the preservation and protection of Euclid Creek.

The Friends have a Board of Directors with officers with some established committees for activities. The Friends hold monthly meetings to present information about the watershed to its members and general public and works closely with the watershed coordinator to administer programs and advance education and outreach activities within the watershed.

The Friends of Euclid Creek have been a close partner with the Watershed Coordinator in identifying needs and programming for the Watershed within its planning process. The Watershed Coordinator attends their monthly meetings on regular basis when feasible and continues to work closely with the Friends to ensure their input is provided for the Plan.

Contact Information
Mr. Larry McFadden, President
18310 Marcella Road
Cleveland OH 44119
216-531-7144

C. Cuyahoga Soil & Water Conservation District

The Cuyahoga Soil & Water Conservation District houses the 319 State funded Watershed Coordinator position and facilitates many of the activities within the watershed for this plan. In addition, the Coordinator serves as the secretary to the Watershed Council and works closely with the Friends of Euclid Creek to coordinate the variety of efforts within the watershed. The Coordinator also coordinates activities with agencies as well as local groups and individuals related to water resources of Euclid Creek.

The Watershed Coordinator is housed within the Cuyahoga Soil & Water Conservation District and serves as the staff person for both the Euclid Creek Watershed Council and liaison to the Friends of Euclid Creek. The coordinator administers all meetings and activities as well as implementation of restoration and protection efforts within the watershed. With the support of the SWCD staff and technical expertise, the coordinator provides resources to the Watershed Council, Friends of Euclid Creek and its various partners.

Contact Information:
Lynn Garrity
Euclid Creek Watershed Coordinator
Cuyahoga Soil & Water Conservation District
6100 West Canal Road
Valley View, OH 44125
216-524-6580 Ext 16

D. Public Meetings/Community Involvement

The Euclid Creek Watershed Plan process has provided five public meetings for the general public to be informed of the Planning process and provide input through various stages of the plan development.

The meetings include:	August, 2003 –	Launching of Watershed Plan Process Needs /Ideas for Euclid Creek
	October 27, 2004 –	Prioritizing Issues in Euclid Creek TMDL Introduction
	January 19 & 26, 2005 –	Ideas for Implementation/Solutions
	May 11, 2005 -	Presentation of Draft Plan

The appendix of this plan provides sign-in sheets, agendas and outcomes/comments from each of these meetings.

In addition, a variety of community stakeholders were invited to participate on the Technical and Watershed Plan Committee. These stakeholders included the Cuyahoga County Airport, Local Chamber of Commerce members, local golf course managers, and local shopping mall managers, and local school board member. Although invited, many of these stakeholders did not participate in the watershed plan process as we had hoped.

E. Various Interviews/Correspondence

In addition to local watershed meetings and correspondence, the development of the plan also included numerous interviews and correspondence with various entities, agencies and individuals to fully understand the watershed's needs and the programs and support that can realize its future. This informal input is invaluable to the development of the plan and is greatly appreciated for the many resources available. A listing of these resources are provided in the appendix of the Plan.

F. Public Comment

Comment on this action plan and the Euclid Creek TMDL were solicited while the plans were still in draft form by both the technical and community planning participants, the Friends of Euclid Creek and Euclid Creek Watershed Council. In addition to the request of comments from the various groups and committees, a public meeting was held May 11, 2005. This meeting provided the general public and community stakeholders to hear a presentation on the plan, receive copies and submit written comments. The meeting and completion of the draft were posted on the Cuyahoga SWCD and Ohio EPA websites, through press releases, the Euclid Creek e-newsletter and to targeted civic associations within the watershed. Also a 30-day public comment period was presented from May 11 to June 10 for both the Watershed Action Plan and TMDL Drafts.

G. Endorsement & Adoption

To fully realize the plan and its implementation, local endorsement is key to its success The Euclid Creek Watershed Council communities have endorsed the Watershed Plan presented to the State through a resolution of each municipality and as a Watershed Council. The endorsement exemplifies the leadership of these communities towards this effort and support its local partners to implement it. These resolutions can be found in Appendix C of this report.

Adoption of plan by local units of government
The adoption of the plan by local units of government will be an integral piece of the implementation effort of the plan. With the support and guidance of the Euclid Creek Watershed Council, the Watershed Coordinator will work closely with the Euclid Creek communities to examine adopting the plan within their local jurisdictions. Implementation activities and timelines for this to occur will be outlined in the implementation section of this plan.

H. Public Outreach Activities

The public outreach activities in Euclid Creek over the past three years have been strong and continue to grow. This is a result of the creation of the Friends of Euclid Creek and the organization of the Euclid Creek Public Education and Public Involvement Committee (PIPE) in 2003. Activities from these two groups have increased awareness and volunteer stewardship through the following programs:

Table 4. Summary of public outreach and educational activities conducted in the watershed 2003 - 2005.

Date	Activity	Description	Number of Participants
2003, 2004, (scheduled in 2005)	Community Event	Euclid Creek Watershed Day	100 in 2004
May 2004	School Presentation	Hawken Field Day	15
October, 2004	School Presentation	Euclid Central Middle School World Water Monitoring Day	300
October 2004	School Presentation	Collinwood H.S.	30
February 2005	Presentation	Glacier Ridge Scout District Council	10
March, 2005	Community Event	Photo Contest Awards – Friends of Euclid Creek	60
April, 2005	School Presentation	Mayfield Schools	30
May, 2005	School Presentation	Beachwood Middle School	30
May, 2005	Stewardship Activities Storm Drain Stenciling, Inv Beach Clean-up, Invasive Plant Removal	Hawken Middle School	80

As the watershed looks forward to engage community stewardship and awareness of Euclid Creek, the recommendations in Chapter 5 lay out the work program for future public outreach and education activities.

I. Future Funding & Sustainability Strategy

As this plan begins to lay out a foundation for implementation activities and recommendations, the sustainability of these organizations, staff and funding resources will be essential for it to occur.

Organizational Sustainability

The existing structures of the Euclid Creek Watershed Council and Friends of Euclid Creek with the partnership of the Cuyahoga Soil & Water Conservation District as established a foundation to build upon to create organizational capacity that is sustainable and practical. Appendix G provides recommendations to further strengthen these existing organizations to consider and the steps needed to implement.

Funding/Financing Strategy for Long Term Success

Financing the implementation of the plan and the staff to make it happen can not come from one source nor fully be the burden of local communities. The funding strategy will require a creative and innovative development plan to pull assets together in a diverse and sustainable fashion. Appendices H and I outline introductions of this strategy and steps to accomplish it from a financial and operational development manner.

J. General Plan contents

The Euclid Creek Watershed Plan provides information on a variety of aspects of the watershed, its impairments and causes and sources as required by the ODNR Appendix 8 guidelines. The Plan then establishes the concept approach and activities to meet the mission of the watershed to restore, protect and manage for future generations.
The watershed approach has been used effectively with a variety of stakeholder participation activities being an integral part of the process.

Outline of the Plan

Watershed Inventory: An assessment and examination of the social, cultural, recreational and environmental conditions of Euclid Creek that influence the water resource quality and its stewardship. The watershed has been divided into seven sub watershed areas to provide further detail descriptions of the watershed to evaluate opportunities and challenges that exist on a site scale.

Impairments: This section provides the results of the Inventory Assessment, the Euclid Creek TMDL findings and the review of meeting the beneficial uses as determined by the Great Lakes Water Quality Agreement.

Water Restoration & Protection Goals: This section outlines targeted goals for Euclid Creek to meet water quality standards based upon the Inventory and Impairment findings.

Implementation: This section outlines the recommended actions to implement in the watershed to meet the goals and objectives established for the watershed.

Information/education Component for Public Understanding and Participation in plan. As stated in this section, involvement and input from a variety of stakeholders from the watershed and the agencies that support them were actively involved in the planning process for Euclid Creek. The implementation plan will outline furthering this involvement as the plan moves toward implementation and on-the-ground efforts.

III. Inventory

Introduction

Exploring the physical, social and cultural characteristics of a watershed can enhance the understanding of the past, present and future influences that have created the landscape and hence what tools are available to sustain and restore it for the future.
Euclid Creek is no exception in this exploration and by its own size has been explored at the tributary level where feasible to its fullest extent. This section provides an inventory and assessment of the watershed's various elements and how they influence each other on its water resources.

The basic elements to evaluate the health of the watershed include chemical, physical and biological integrity. Understanding these elements within Euclid Creek provide the basis in determining areas for protection, restoration and best management practices to be applied.

In addition to the water resource health elements, the watershed inventory outlines the social and cultural values and resources available within the watershed. Overlaying these resources with the water resources elements begin to outline the manner in which a community can weave water quality needs within its land use and community fabric. As part of this evaluation, the determination of integrating watershed resource needs with the Cuyahoga County Greenprint recommendations and greenway objectives within the watershed communities are explored.

The inventory provides a basic foundation in which to establish goals, priorities, solutions and actions for the watershed. So, let's explore the watershed of Euclid Creek.

A. General Description of the Euclid Creek Watershed

The Euclid Creek is a tributary directly draining to Lake Erie in urban and suburban areas of Cuyahoga and Lake counties. It drains 24 square miles and stretches across the landscape with over 43 miles of stream segments.

The watershed is situated along the Ohio Lake Erie coast between the major river systems of the Cuyahoga and Chagrin. Euclid Creek is placed in the Erie-Ontario Lake Plain, formerly glaciated, and characterized by low rounded hills, irregular plains, and areas of wetlands. Lake Erie's influence substantially influences an increased growing seasons, winter cloudiness and snowfall.

Euclid Creek consists of two main stems, the Main Branch and the East Branch. Due to the small size of the watershed and the general consistency of land uses, the inventory is presented for the entire watershed unless noted otherwise.

B. Geology of Euclid Creek

The geology, formed over 300 million years ago, has influenced settlement and development patterns for over two centuries and continues to exemplify Euclid Creek's unique landscape.

Topography

The Euclid Creek watershed is made up within three distinct topographical areas. These areas include:

- The Plateau includes the upper watershed. This part of the watershed is the northwest margin of the Appalachian plateau.
- The Portage Escarpment is the sloped section of land that joins the higher ground of the Plateau south and east in the watershed, and the lower region known as the Lake Plain on the northern end. The escarpment is characterized by dramatic waterfalls. This feature coincides with the long slope ascending from Euclid Avenue to Chagrin Boulevard in Warrensville Township.
- The Lower Watershed, or Lake Plain region, which is the relatively flat area that runs adjacent to Lake Erie, and extends as far south as Euclid Avenue.

The Euclid Creek elevation has a varying degree of elevations based upon the diverse geologic formations from centuries past. The mouth of the creek at Lake Erie enters at an elevation of 570' with it rising to over 1200' near the headwaters in Beachwood. At a gradient of 55 feet per mile, Euclid Creek is considered a very high-gradient stream.

Geology

The Euclid Creek watershed geologic rock formations consist of Devonian and Mississippian age rocks. In ascending stratisgraphic order they are: the Chagrin Shale, the Cleveland Shale, the Bedford Formation and the Cleveland Formation. These rocks were deposited between 350 and 360 million years ago.

The bedrock found in the Euclid Creek watershed contributes to the great diversity in appearance and texture which helps to form the unique features of Euclid Creek. The oldest layer exposed in the Euclid Creek watershed includes the Chagrin Shale. While dating back almost 400 million years ago, the Chagrin Shale extends from several hundred feet below the surface of Lake Erie, to approximately 175 feet above the lake. As this material weathers, it becomes a soft mud texture.

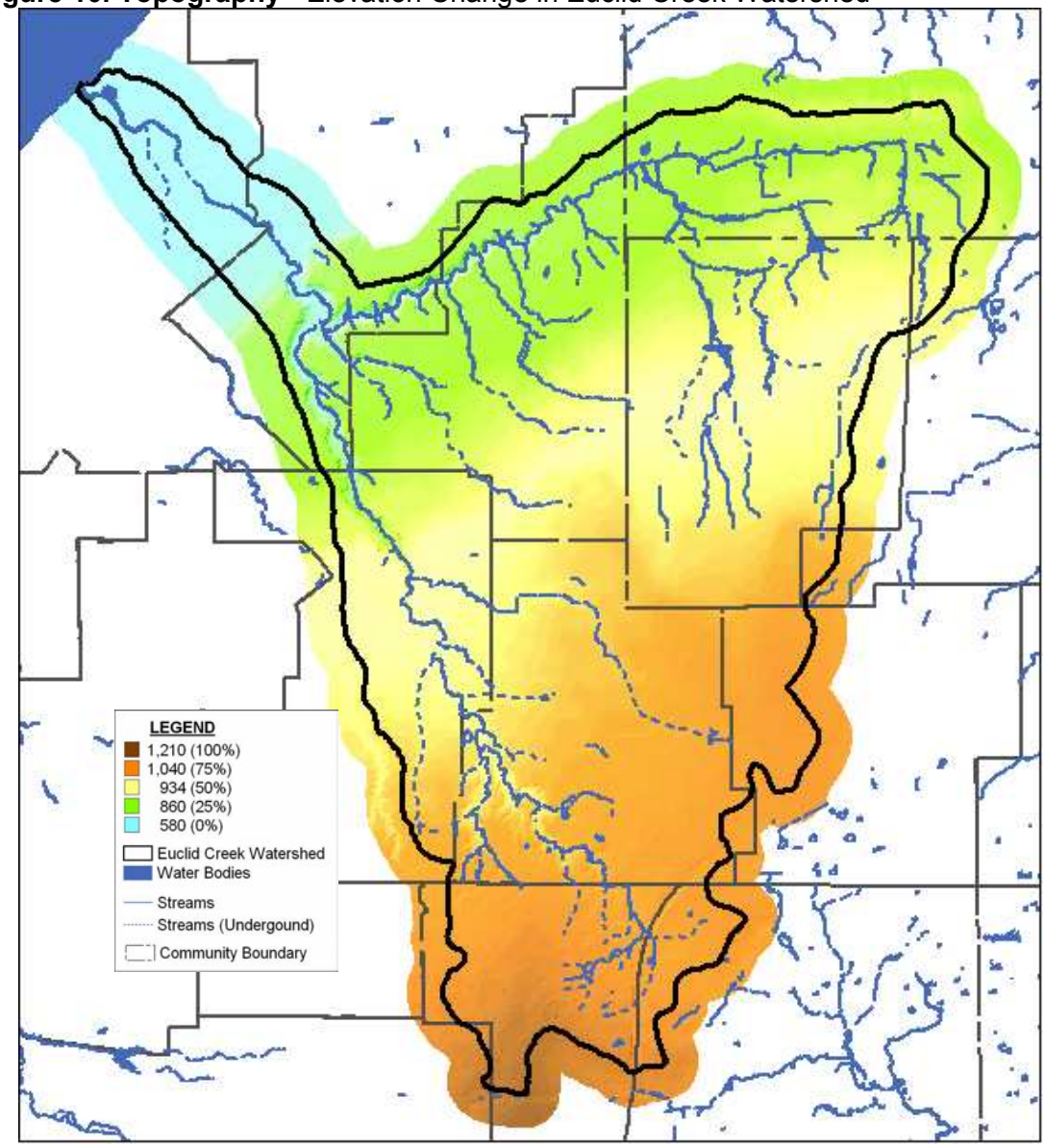
The next layer of bedrock is the Cleveland Shale which is characterized as a hard, brittle shale that weathers into thin, sharp-edged sheets. This layer measures approximately 40 feet in thickness. The next layer of bedrock includes the Bedford Formation, which is home to the greatly valued deposits of Euclid Bluestone. This material was quarried extensively throughout the end of the 19th century for use of in numerous building applications, many of which can be seen throughout the watershed today such in its older sidewalks. The most prevailing area to see the bluestone quarry areas is within the

Cleveland Metroparks near the Quarry Picnic Area. Also included in this formation is a combination of red shale interspersed with sandstone. The Bedford Formation is approximately 60 feet in thickness.

The next formation layer includes the erosion resistant Berea sandstone. Its resiliency has led it to contribute to the steepest waterfalls in the watershed. The final layers of

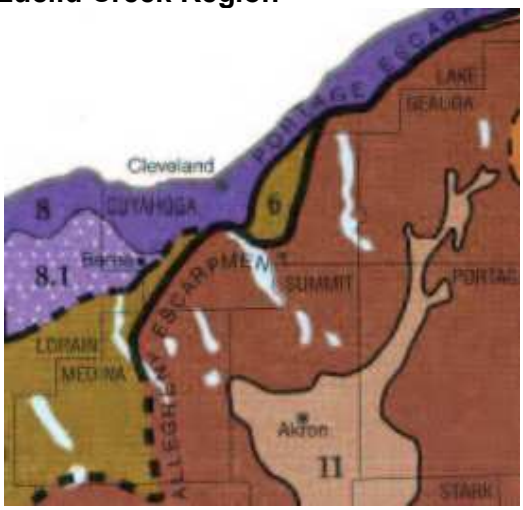
bedrock are referred to as the Cuyahoga Formation include Orangeville Shale, Sharpsville sandstone and Meadville shale. The final layer includes glacial deposits and glacial erratics. The Devonian and Mississippian bedrock is covered in most places by a veneer of glacial deposits.

Figure 10. Topography - Elevation Change in Euclid Creek Watershed



The uniqueness of Euclid Creek geology is that because of its landscape, all of these formations can be observed in a short expanse within the Cleveland Metroparks vividly that is rarely seen in short distances throughout the rest of the County where these formations exist.

Figure 11. Geology of Euclid Creek Region



Soils

The beginnings of Euclid Creek, otherwise known as the headwaters, collect on the rounded hummocky knolls and hillsides of Beachwood, Pepper Pike and Willoughby Hills. These hills were deposited as end moraines of silty and loamy glacial till during the late Wisconsin age (10-12,000 to 28,000 years before present). Over time, these materials evolved through soil-forming processes into the present day soils classified and delineated using USDA “Soil Taxonomy” as soil series, such as, Ellsworth silt loam, Darien silt loam and associated urban land complexes. Urban land complexes of these series are mapped in areas where units are covered by streets, parking lots, buildings, and other structures that obscure or alter the soils so that identification is not feasible. The above noted soil series are very deep, moderately well to somewhat poorly drained, which means that wetness periodically restricts growth of mesophytic (upland) plants, and have permeability that range from slow to moderately slow. Note that as permeability decreases, soil water problems become increasingly more significant.
As the headwaters of Euclid Creek converge, flows in the Euclid Creek watershed traverse the gently undulating to nearly level plateau of Lyndhurst, Mayfield Heights, Richmond Heights and South Euclid. Mapped soil series, such as Allis silt loam, Hornell silt loam, Mahoning silt loam, Mitiwanga silt loam and associated urban land complexes may be found here. The precursor to these soils is silty and loamy glacial till deposited as ground moraine during the aforementioned Wisconsinan age. These soil series are moderately deep, poorly to somewhat poorly drained, which means that wetness markedly restricts mesophytic plant growth, and have permeability that range from very slow to slow.

The main stem of Euclid Creek meanders through valleys cut through glacial drift (deposited by glacial ice or outwash) and into sedimentary rock, such as sandstone and thin bedded shale and siltstone. As a result, mapped soils have evolve from variations of glacial drift, sedimentary rock and/or alluvial materials (deposited by running water). These dissected areas within the limits of Euclid, Richmond Heights and South Euclid have mapped soil series, such as Brecksville silt loam, Loudonville silt loam, Tioga loam and associated urban land complexes. These soils are well drained, which mean that wetness does not inhibit growth of mesophytic plant roots for significant periods during most growing seasons, and have permeability that range from moderately slow to moderately rapid for Brecksville silt loam formed from sedimentary rock (residumm)

and Tioga formed in recent alluvium, respectively.

Finally, Euclid Creek flows traverse a deltaic area of loamy fine sand lacustrine (lake) sediments of the late Wisconsonian age and ultimately discharge into Lake Erie. These sediments have evolved through soil-forming processes into the present day Elnora series. The Elnora loamy fine sand series is very deep, moderately well drained, and rapidly permeable. The potential for surface runoff from areas occupied by this series is negligible to low.

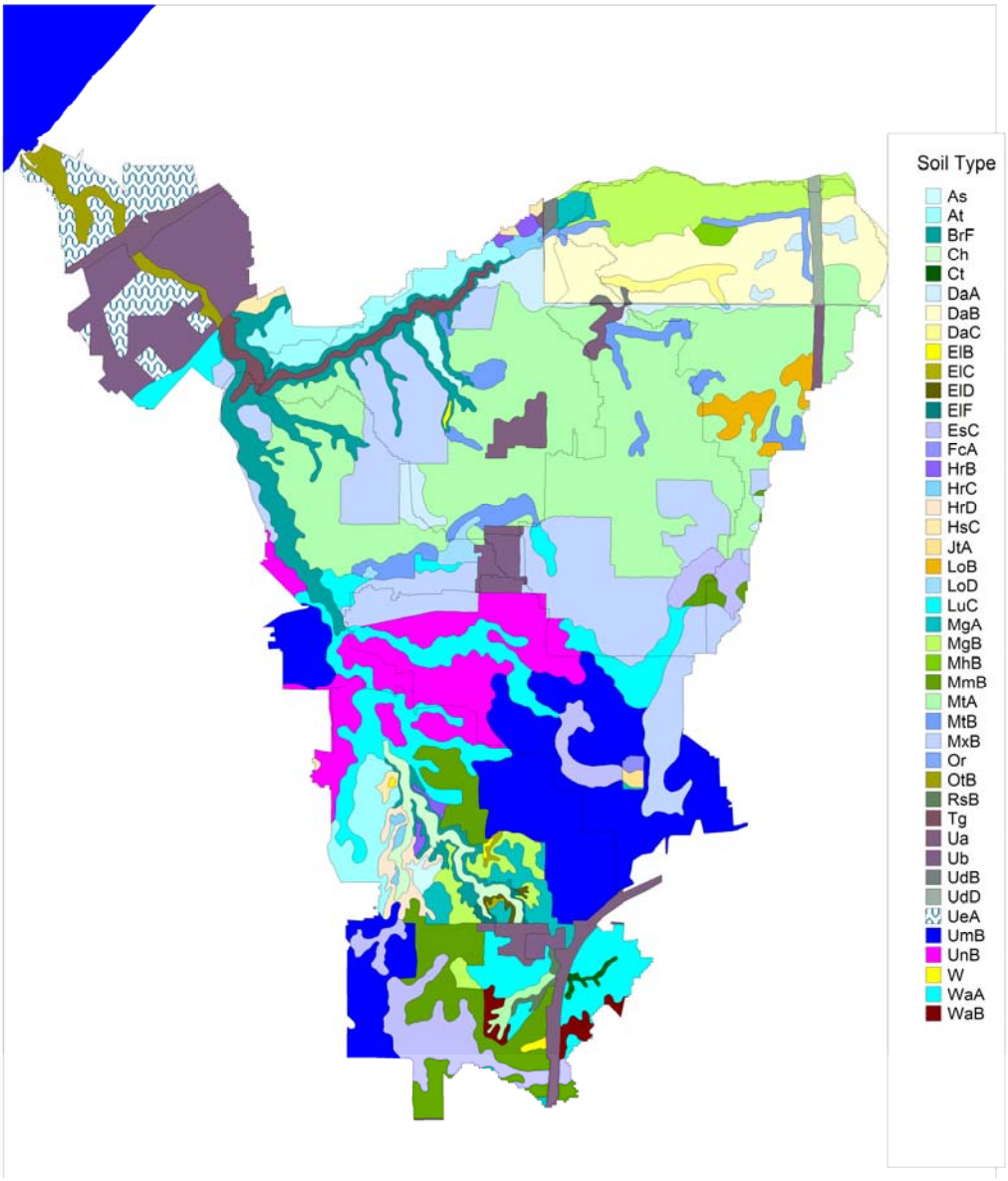


Figure 12. Soils of Euclid Creek
USDA Soil Survey

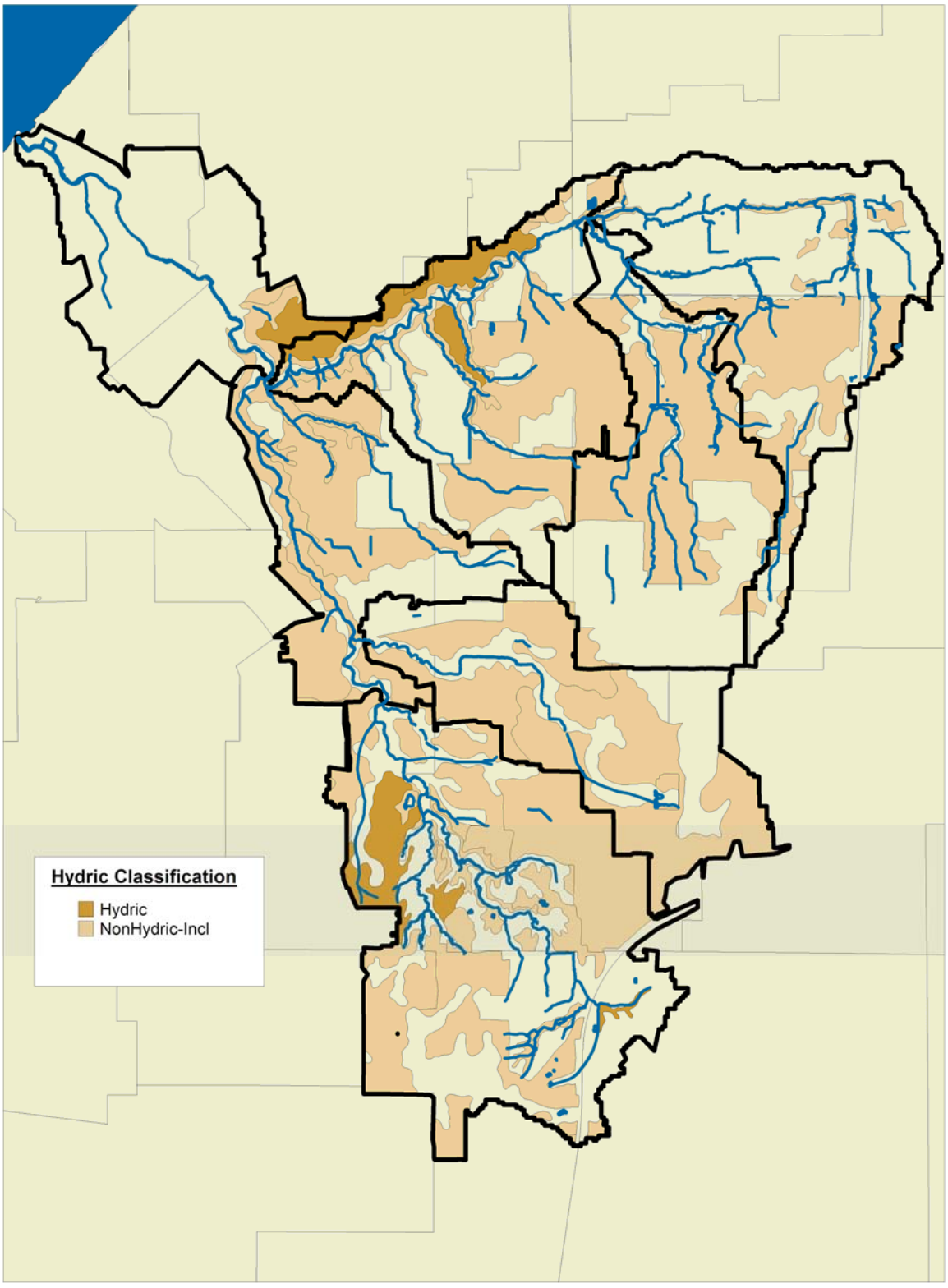


Figure 13. Hydric Soils of Euclid Creek, USDA Soil Survey, Cuyahoga County

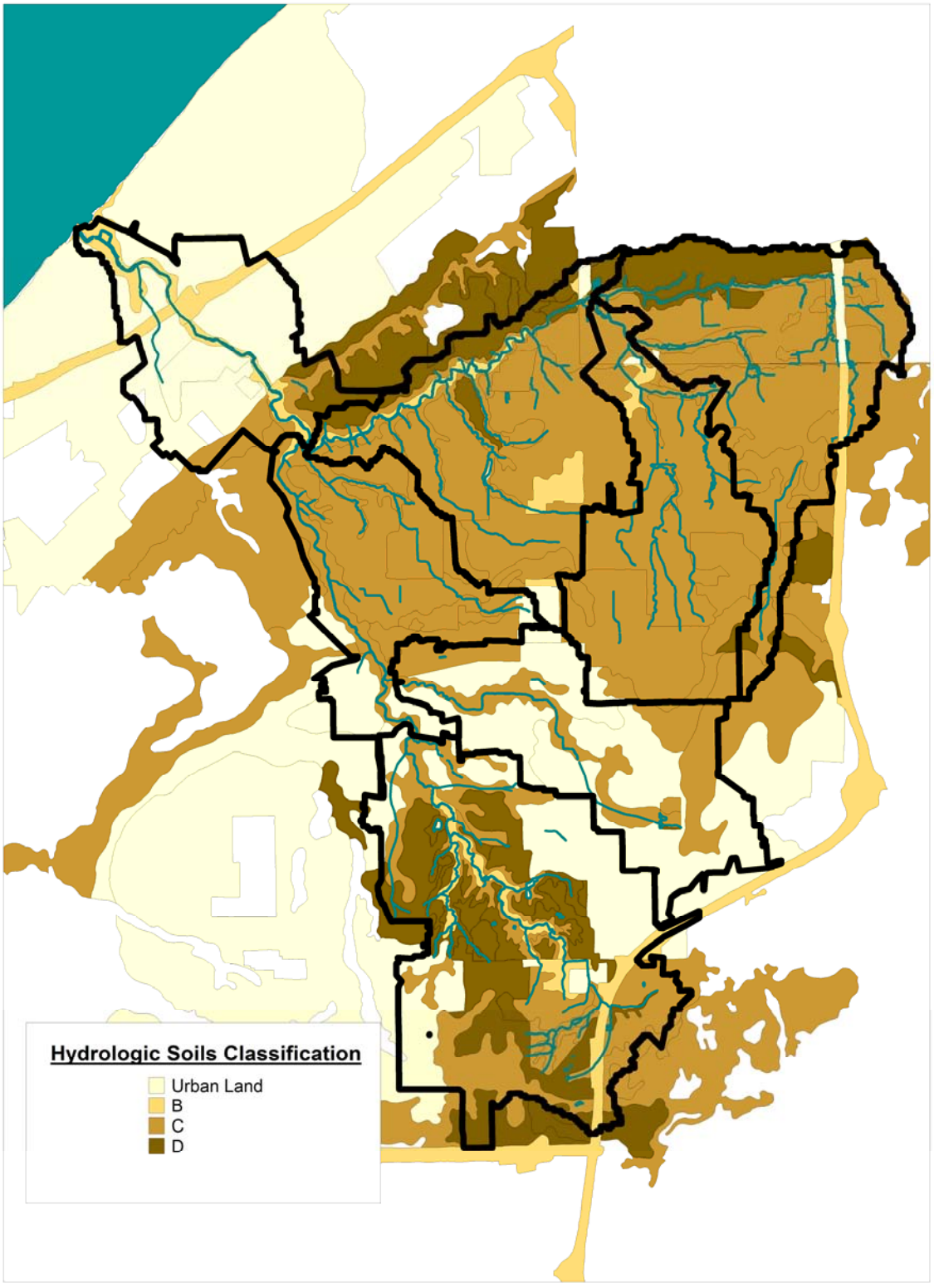


Figure 14. Hydrologic Soils of Euclid Creek, USDA Soil Survey, Cuyahoga County

The hydrologic component of these soils outlines the infiltration characteristics within the watershed to consider in future best management practices and development activities.

Table 5. Hydrologic Soils Distribution

Hydrologic Soil Group	Description	Percentage of the Watershed	Maximum Infiltration (Dry or Initial) (in./hr.)	Minimum Infiltration (Wet or Final) (in./hr.)	Average Erosive Velocity
A	Deep sand/loess, well drained	0	7 in./hr.	0.4 in./hr.	2.5
B	Shallow loess, deep sandy loam, moderately drained	11	3 in./hr.	0.2 in./hr.	3.2
C	Clayey loam, shallow sandy loam, slowly drained	58	2 in./hr.	0.1 in./hr.	3.0
D	Clay, poorly drained	31	1 in./hr.	0.05 in./hr.	3.4

Source: Cuyahoga County Soil Survey and NEORSD DRAFT RIDE Study 2004, Euclid Creek Watershed

Infiltration volume is the amount of soil pore space available for the storage of infiltrated water. It represents the total volume of runoff that can infiltrate into a given soil during a rainfall event and is expressed as a depth in inches over a unit area. The average infiltration volume of soil in the Euclid Creek Watershed is 2.2 inches. (NEORSD)

Soil Erosion

The susceptibility of a soil to erode by water is indicated by the Erosion K factor as part of the Soil Survey for Cuyahoga County. " Factor K is one of six factors used in the Universal Soil Loss Equation to predict the average annual rate of soil loss by sheet and rill erosion. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water." (Cuyahoga County Soil Survey, p.61, 1980.) The soils in the Euclid Creek have an average range of K factor from .28 to .43, hence the soils have a moderate range of erosion. Due to the flashy flows of the stream both by geologic and land use contributions, erosion of soil continues to be a problem in the watershed.

Glacial History

Beginning 2 million years ago, glaciers advanced from the north. They enlarged existing river valleys to create the basins of the ancestral Great Lakes, gouging Lake Erie into the still rising edge of the Appalachian Mountains.

The present-day Euclid Creek is actually a fairly recent geologic phenomenon. It is the result of the advance and retreat of the last great glacial sheets which covered most of Ohio. These large Wisconsonian-era glaciers stretched south into Ohio and Canada around 24,000 years ago and made their final retreat about 14,000 years ago. When the glaciers finally retreated, they left a layer of glacial till on the surface of the topographic plateau. As the glaciers continued to retreat, the ancestor of Lake Erie carved a series of cliffs into the edge of the plateau region. Indications of this retreat are still seen today in Euclid Creek with features such as chagrin shale sponges which are marine life from the previous glacial ages.

C. Biological Features

The Euclid Creek Watershed provides a great opportunity to explore a variety of landscapes and the biological features they uniquely possess within an urban environment. Although the watershed is greatly urbanized, remnants and reference areas of its biology can be observed within the watershed or identified with areas within northeast Ohio. To examine these features, a landscape approach is presented to outline its biological features and the species that inhabit them.

Although the Euclid Creek watershed is an urban landscape, its fortunate history has preserved large tracts managed by the Cleveland Metroparks in the Euclid Creek Reservation established in 1916. The reservation encompasses 345 acres along Euclid Creek just south of the confluence of the East Branch. This serves home to an expanse of a beech-maple forest typical of northeast Ohio landscapes.

Landscape Types, Locations & Conditions

Coastal Plains

The coastal plains within the watershed are largely urban and do not reflect the biodiversity historically found in this land form. The beach at the mouth of Euclid Creek would have been similar to that found at Arcola Creek in Lake County. The sandy beach shelf would contain sandbar willow, switch grass, evening primroses and common milkweed. The marsh directly behind the beach would have been dominated by greater bur-reed, soft stem bulrush, common arrowhead, water smartweed, swamp rose mallow, pink smartweed, yellow water lily, pickerel weed, arrow arum and blue flag. Inland from the non-persistent greater bur-reed marsh, mixed shrub swamp dominated by buttonbush, silky dogwood, northern arrow-wood viburnum, swamp rose, heart-leaf willow, pussy willow, black willow and meadowsweet were present along the shallow-water shoreline of Euclid Creek riverine marsh.

Silver maple, Red Ash, American Elm, Black Walnut floodplain forest covered the low floodplain terraces along lower Euclid Creek. Other trees present within the floodplain forest were American sycamore, bitternut hickory, eastern cottonwood, box-elder and black willow.

The Valley and Escarpment

The Euclid Creek Watershed encompasses the Portage Escarpment which creates a deep valley along the East Branch and in the northern section of the Main branch.

The bluff rims of the valley at Euclid Creek would include a great diversity of understory species, such as wreath goldenrod, white snakeroot, heartleaf aster and zigzag aster. The area would have been an Oak Chestnut Forest, dominated by flowering dogwood, pignut hickory, hop hornbeam, shagbark hickory, red, black and white oaks and American chestnut.

The higher terraces and valley slopes of the lower section of Euclid Creek Valley would have been covered by Mixed Mesophytic Forest with dominant tree species, including sugar maple, American beech, red maple, tulip, red oak, black cherry, white ash, basswood, cucumber magnolia, American elm, red elm, pawpaw, bitternut hickory and shagbark hickory.

The Valley is largely intact due to its steep terrain and difficulty to build upon. These areas will remain critical resources to protect for their biological value in sustaining the few remaining areas of natural biodiversity within the Watershed.

The uplands are largely developed due to the flattening of terrain from the valleys, encompass the largest portion of land cover within the watershed and hence create the largest impact to Euclid Creek resources.

Headwaters

The unique quality of Euclid Creek is its presence of headwater streams throughout its watershed. There are over 100 headwater stream segments that remain part of the Euclid Creek drainage system with varying degrees of quality. The urban nature of the watershed and the continuing development patterns continue to bury these streams across the watershed. In 2004, the Cleveland Metroparks conducted a Headwaters Habitat survey established by Ohio EPA of over 80 of the 100 headwater stream segments of the watershed. This survey once completed in 2005, will provide a baseline of information to target restoration and protection objectives based upon the findings of the assessment of the headwaters.

Wildlife

The wildlife is typical of urban areas with greenspace corridors. The species include white tailed deer, sitings of mink, blue heron, beaver, red fox, wild turkey. There are also sitings of coyote in the Chagrin Reservation just east of Euclid Creek. An extensive wildlife survey has not been conducted for Euclid Creek.

Bird Survey

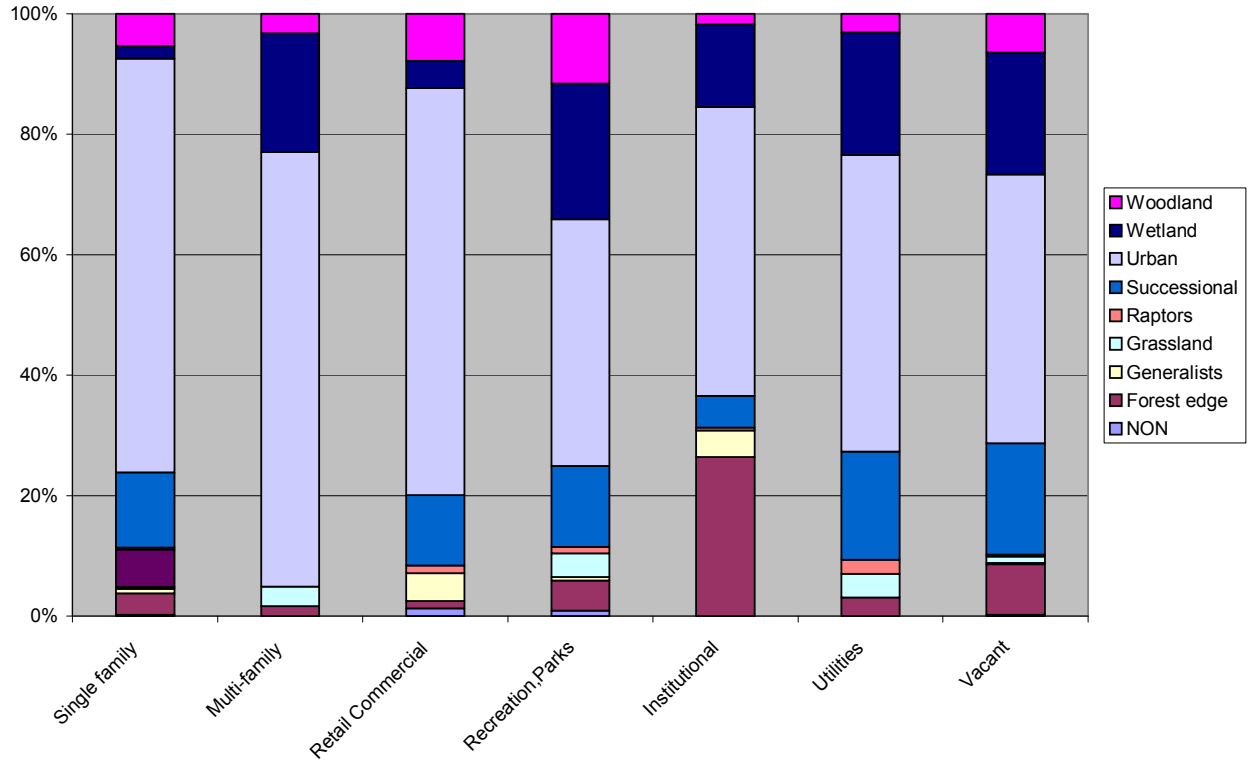
Urban bird population has recreational, conservational and scientific values that are not always fully appreciated. Urban parks and refuges offer stop-over points for migrants as well as nesting habitats for many avian species. Bird feeding an activity enjoyed by urban and suburban enthusiasts generates a multimillion-dollar investment. Bird watching has captured the interest of growing community of individuals, many of whom live in urban areas.

During month of June, 2003 , Friends of Euclid Creek together with the Kirtland Bird Club conducted a Nesting Bird Survey in the area of the Euclid Creek watershed . The goal of the survey is to collect information about density and species diversity of the nesting birds and provide valuable information about bird population and importance of different habitats inside the watershed. The study should help to assess the volubility of different habitat types inside the watershed.

The survey found over 150 bird species in Euclid Creek covering many different landscape types including forest edges, urban, wetlands, woodlands and successional areas. The study also examined the distribution of the different types of birds based on their migratory characteristics that was distinguished by neotropical migrants, shorter distrance migrants and local birds.

Figure15

Percentage of bird guilds in different land use types



Kirtland Bird Club, 2004

Fish

There are a variety of fish that enter Euclid Creek through Lake Erie as well a species within the upper reaches in the headwaters of the watershed. In the lower creek, fish travel into Euclid Creek that include steelhead. The upper portions of the creek typically include pollution tolerant species such as creek chub, blacknose dace, and central stoneroller. More diverse species such as darters in the upper reaches of the creek are not found and limit the habitat capacity within the stream itself as a result of this absence of species.

In addition to the local fish resources, Euclid Creek is used for recreational fishing purposes by local anglers in the lower reaches of the creek from the East 185th Street dam to Lake Erie. The Ohio Department of Natural Resources has conducted CREEL surveys along twelve fishing locations in the Cuyahoga and Lorain counties. According to the 1993 CREEL survey, Wildwood State Park accounts for 8.17% of anglers fishing at these locations and 3% of the harvest. These comparisons are shown in Appendix E of this report. Euclid Creek is not stocked by ODNR, but continues to be a popular fishing location for local anglers. The dams at the lower ends of the creek continue to prohibit greater fishing opportunities within the Creek itself.

Nearshore & Lacustuary Habitat

Nearshore Habitat

Nearshore habitat provides a critical interface between the lacustuary and riverine zones with the open Lake zones of the Lake Erie ecosystem. Typically, the nearshore areas consist of the open Lake Erie waters to a depth of 10 meters, the shoreline areas and the lacustuary areas within the tributaries to the Lake. These nearshore areas comprise the presence of one third of the species found within Lake Erie waters. (Mackey). Its associated habitat of plants and landscape characteristics can have a profound effect on the health and viability of these fish populations within the nearshore zone.
In addition to these fishery benefits, the nearshore areas associated with the tributaries create the vehicles in which to support valuable spawning areas upstream in the tributaries. These resources have a profound effect on the recreational use and biological functions to sustain the economic and natural resources of Lake Erie.
The elements of connecting nearshore habitat resources to Euclid Creek involve two major conditions; 1) it's lacustuary zone and its upstream waterways and 2) it's shoreline. According to the ODNR Coastal Geology Division, the nearshore extent in the Euclid Creek shoreline area is 1.2 km approximately 3,000 feet outward from the shoreline to the 10 meter depth. Identifying future opportunities to strengthen and enhance this interface for both recreational and biological benefits should be explored.

Lacustuary Zone

The lacustuary of Euclid Creek travels from the mouth at Lake Erie upstream to just north of Lake Shore Boulevard about one mile from the mouth at Lake Erie. This is the area in which lake effect waves and activities influence the dynamics of the creek. Re-creating a healthy interface with the lacustuary and nearshore areas will increase diversity of fish populations.

Coastal Structures and Nearshore Habitat

The ODNR Coastal Geology Division conducted a study *(Nearshore Distribution of Shore Structures Along Ohio's Lake Erie Shore and their Erosion Effectiveness and Biological Compatibility)* to determine the erosion effectiveness and biological compatibility of shoreline structures. According to the study results, the structures located within Cuyahoga County demonstrate over 50% effective structures and composition for erosion and 45% demonstrating a non-favorable structure and composition for biological compatibility. Euclid Creek's shoreline is an example of these areas discussed in the study. Associated with the marina use and beaches, breakwalls and revetments are present along the shoreline. The effectiveness of erosion of these areas and its compatibility to retain biological composition are limited in addition to the armoring of the creek banks.

Examining the potential opportunities to integrate natural conditions into these shoreline structures to promote and re-introduce biological communities should be explored with partnering agencies and local stakeholders.

Rare, Endangered and Threatened Species

Fish/Invertebrates/Mammals/Amphibians

There are no known records of any rare, endangered or threatened species of fish, invertebrates, mammals or amphibians within Euclid Creek and its shoreline. However, most of these areas have not been extensively surveyed to identify the presence of these species.

Plants

The *Solidago puberula*, dusty goldenrod, listed endangered by ODNR, was found in the Highland Heights community park and is the only known location in Ohio to support a stable population of this species.

The *Hypericum gentianiodes*, and the *Phynchospora capitellata*, found in the wet portion of Highland Heights Community Park, is the only known place within the county to support this species. (small inset map of area)

A number of forested corridors and remaining lands have not been examined for determination of rare, endangered or threatened land due to their ownership being privately held and lack of resources to evaluate the resources within the watershed for species.

Invasive Nonnative species & Potential Impacts

The ODNR Division of Natural Areas and Preserves has compiled a list of more than 60 plants that are currently impacting natural areas, parks and forests throughout the state. Some of the top invasive non-native plants include: phragmites, bush honeysuckles, buckthorn, garlic mustard, purple loosestrife, common reed grass, reed canary grass, autumn and Russian olive, multiflora rose, Japanese honeysuckle, narrow-leaved cattail, Canada thistle and tree-of-heaven.

The presence of these invasives and non-natives are no exception in Euclid Creek. The Euclid Creek watershed has had a history of land disturbance which has created a breeding ground for the proliferation of invasive and nonnative species both in its natural and built landscapes.

The areas most disturbed with invasives exist along the channelized portions of the creek along the main branch and in the disturbed areas where land alteration has occurred around the headwater tributaries. One of the most abundant invasives present within the Watershed is phragmites, mostly in the lower portions of the creek and disturbed areas throughout the watershed. Japanese knotweed and garlic mustard are also prevalent particularly in the lower three miles of the creek.

Re-introducing native plant species and invasive removal in future restoration projects can enhance stream habitat areas and biodiversity within the stream corridor as well as provide ecological benefits.

D. Water Resources

The integrity of the water resources within Euclid Creek depend on a variety of natural and man-induced influences.

Climate & Precipitation

The climate of Cuyahoga and Lake County is characterized by warm summers and cold winters, with average summer temperatures of 70 degrees Fahrenheit and average winter temperatures of 30 degrees Fahrenheit. The average humidity is 60 percent. The average snowfall is 40 inches per year. According to the NOAA Climate Diagnostics Center, precipitation for Cleveland, Ohio, averages 36.6 inches per year. Precipitation is generally well distributed throughout the year, with most occurring between April and September. The amount of precipitation through rain or snowfall has a profound effect on water resource management and the Lake Erie levels along the Watershed's coastal waters.

The Northeast Ohio Regional Sewer District maintained rain gauge administered by USGS on Euclid Creek for four years to provide flow data. This gauge was located at St. Clair Avenue near the lower portion of the creek.

Table 6. Rain Gauge Information

Year	USGS Gage MG/Year	Rain (inches/yr)
1978	8,766.477	32.690
1979	13,010.739	39.840
1984	13,289.467	41.330
2002	7,389.192	36.390

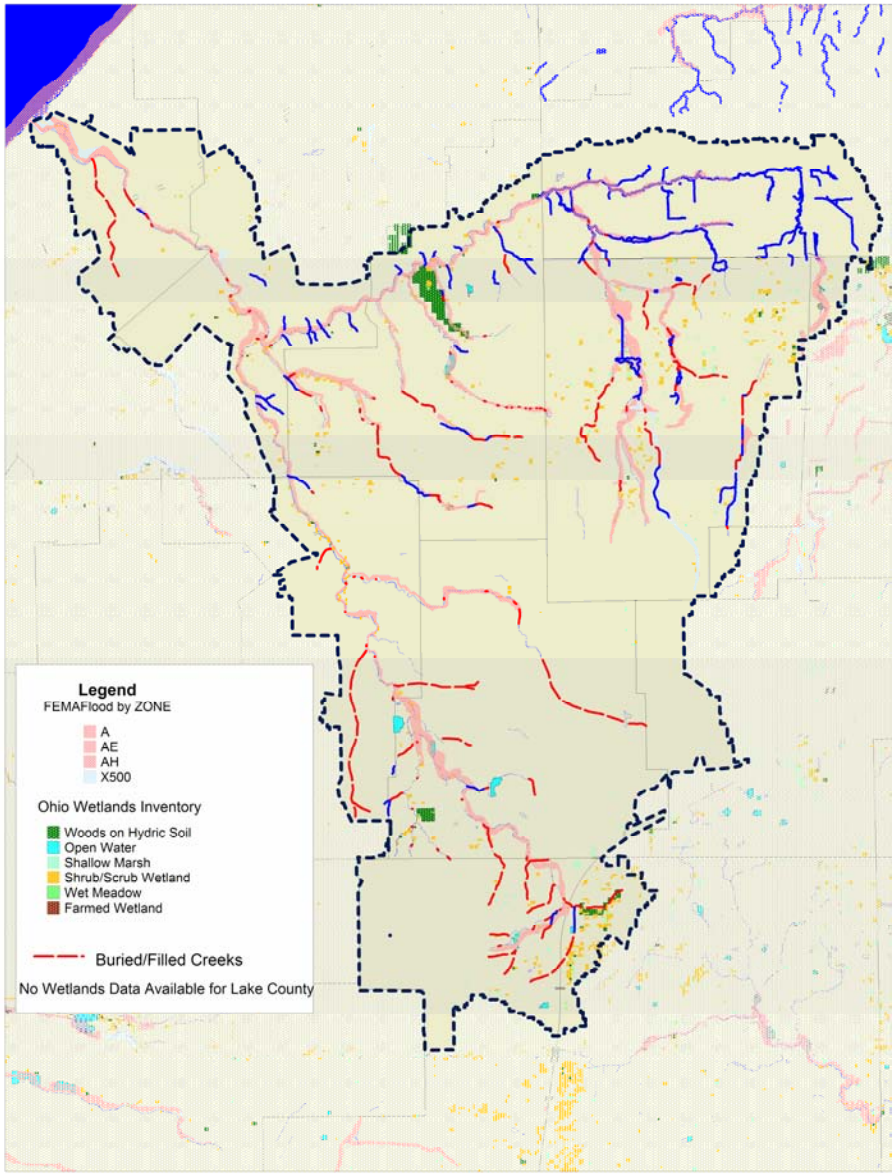
Source: NEORSD

Surface Water

Wetlands

There are limited of amount of wetlands remaining in the watershed due to the immense land development in the last century. However, there are some areas that provide known sites of wetland concentrations. These areas consist of sites in Highland Heights adjacent to the City Park owned by the Mayfield Board of Education, and sites in Lyndhurst near Acacia Country Club and wetlands along the floodplain of the East Branch. However their conditions and quality are unknown. Delineating and understanding their value to water quality will be an essential need in the Watershed Plan action items. These sites continue to be threatened by land development. Developing site design to protect and integrate them into development activities will be needed to balance the protection of natural resources and economics of community sustainability.

Figure 16. Wetlands and Floodplain in Euclid Creek, National Wetland Inventory, FEMA



Streams – Description of Subwatersheds

The Euclid Creek Watershed has two main tributaries associated with it; the main branch and the east branch. The main branch travels 10 miles from the mouth of Lake Erie to the headwaters in Beachwood, South Euclid and Lyndhurst and encompasses 11.5 square miles. The East Branch travels 8.5 miles, draining 12.5 square miles, through Euclid, Richmond Heights and Willoughby Hills and into its headwaters throughout the remainder of the watershed. These two branches reflect very different environments and their conditions.

Main Branch

The main branch travels north-south within the densest land use areas of the watershed as well as the Wildwood State Park and Cleveland Metroparks Euclid Reservation from Lake Erie to the central region of the Beachwood community.

The main branch has been heavily encroached upon by urban development with few remaining areas of floodplain or in-tact streambank to maintain natural flow regime. Due to the geologic conditions and urban nature of the branch, the flows are flashy and prohibit a diverse fish and aquatic insect population to sustain itself within the creek.

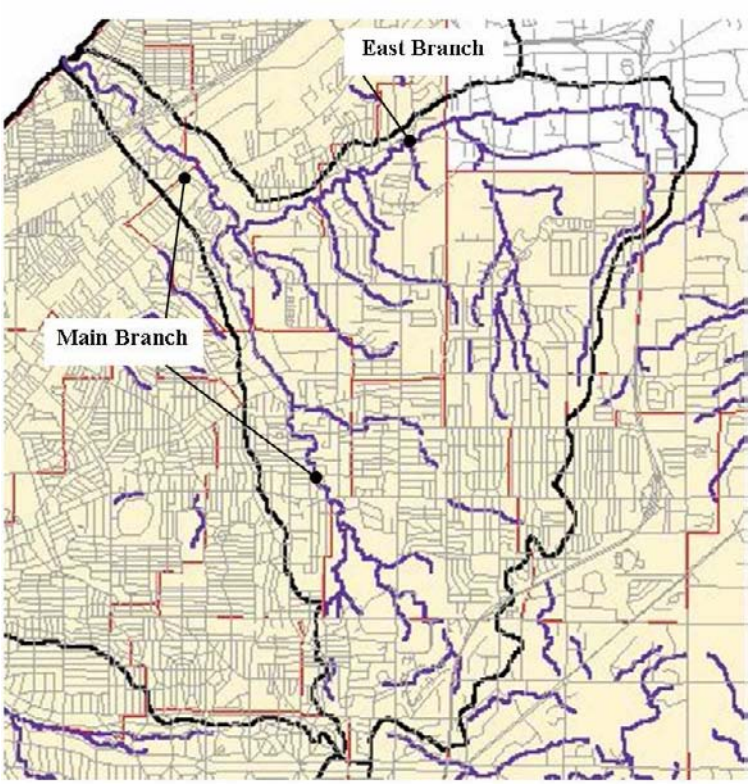


Figure 17. Euclid Creek Branches

East Branch

The East Branch mainly travels east-west along the escarpment through a deep ravine of the suburban communities within the watershed. While the east branch remains in tact, the tributaries and headwaters that drain to it have been and continue to be encroached upon by suburban development.

Description of Sub-watersheds

Due to the relative small size of the watershed, the watershed has been sub-divided into seven smaller sub-watersheds to present their descriptions and examine the conditions. The sub-watersheds were developed as a result of using the Northeast Ohio Regional Sewer District's RIDE Study Draft delineation comprised of drainage areas ranging from 1,400-3,000 acres in size. The purpose of developing the sub-watersheds at this scale is to provide a detail assessment and evaluation to determine site specific recommendations for implementation that can also be supportive of watershed-wide recommendations associated with stewardship activities.

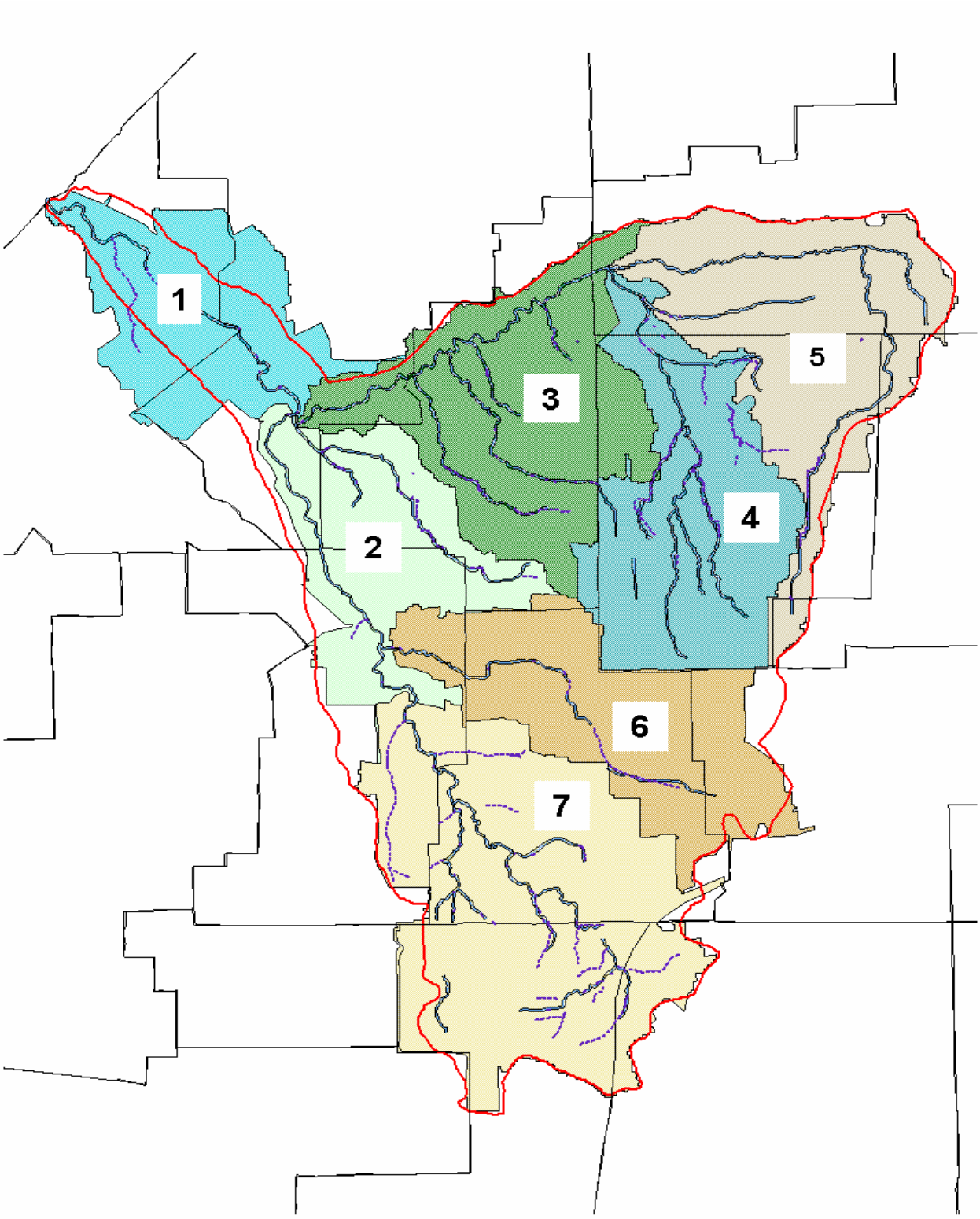


Figure 18. Sub-watersheds.

Subwatershed 1 – Lake Plains in Nottingham

Tributary: Main
Drainage Area: 23 square miles
Stream Length: 3.0 miles
Elevation Change: Top 660' Bottom 570'
Level of Attainment: Non- Attainment
Total Acreage within Subwatershed: 1,530
Acres of Undeveloped Land: 102.66
Percentage of Undeveloped/Vacant Land within Sub-watershed: 6 %
Number of CSO's: 3 (+) (2 along shoreline)
Percentage of Imperviousness: Over 25%
Communities within Subwatershed: Cleveland, Euclid

Description of Conditions:
The Nottingham/Lake Erie subwatershed contains the most highly urbanized areas of the Euclid Creek watershed with it being almost completely developed. The creek enters Lake Erie at Wildwood State Park and traverses through residential, commercial and institutional areas before entering the Cleveland Metroparks Euclid Reservation. The coastal area and lacustuary zone have been highly modified from its original alignment and contains an abundance of invasive vegetation along its streambanks. An oxbow exists where the channel was re-directed in the past where marshlands once stood prior to settlement. South of Lakeshore Boulevard, the creek enters into a concrete channel portion of the creek as part of the U.S. Army Corps of Engineers Flood Control completed in 1985 as a result of increased flooding events in this lower portion of the creek.

Army Corps Flood Control Project History and Current Conditions

Due to increased flooding events in the 1970's, caused by increase of urban development upstream in the headwaters of the watershed, the Army Corps of Engineers developed flood control measures. The measures included the construction of a narrow concrete channel with levees and a new bridge installed at Lake Shore boulevard to allow less restricted flow for the creek.This project was designed to meet the 100?year flood flows predicted within the creek. Since completion, shoaling, which is the accumulation of sediment/debris, has continually been occurring which is reducing the level of protection from flooding events. The shoaling has continued to be identified to be a concern in 1995, 2001 and 2004 during U.S. Army Corps annual inspections. As the recommendations examine the chemical, physical and biological conditions developing restoration alternatives that will meet the flood management concerns within this area will be essential to the sustainability of this reach of Euclid Creek.

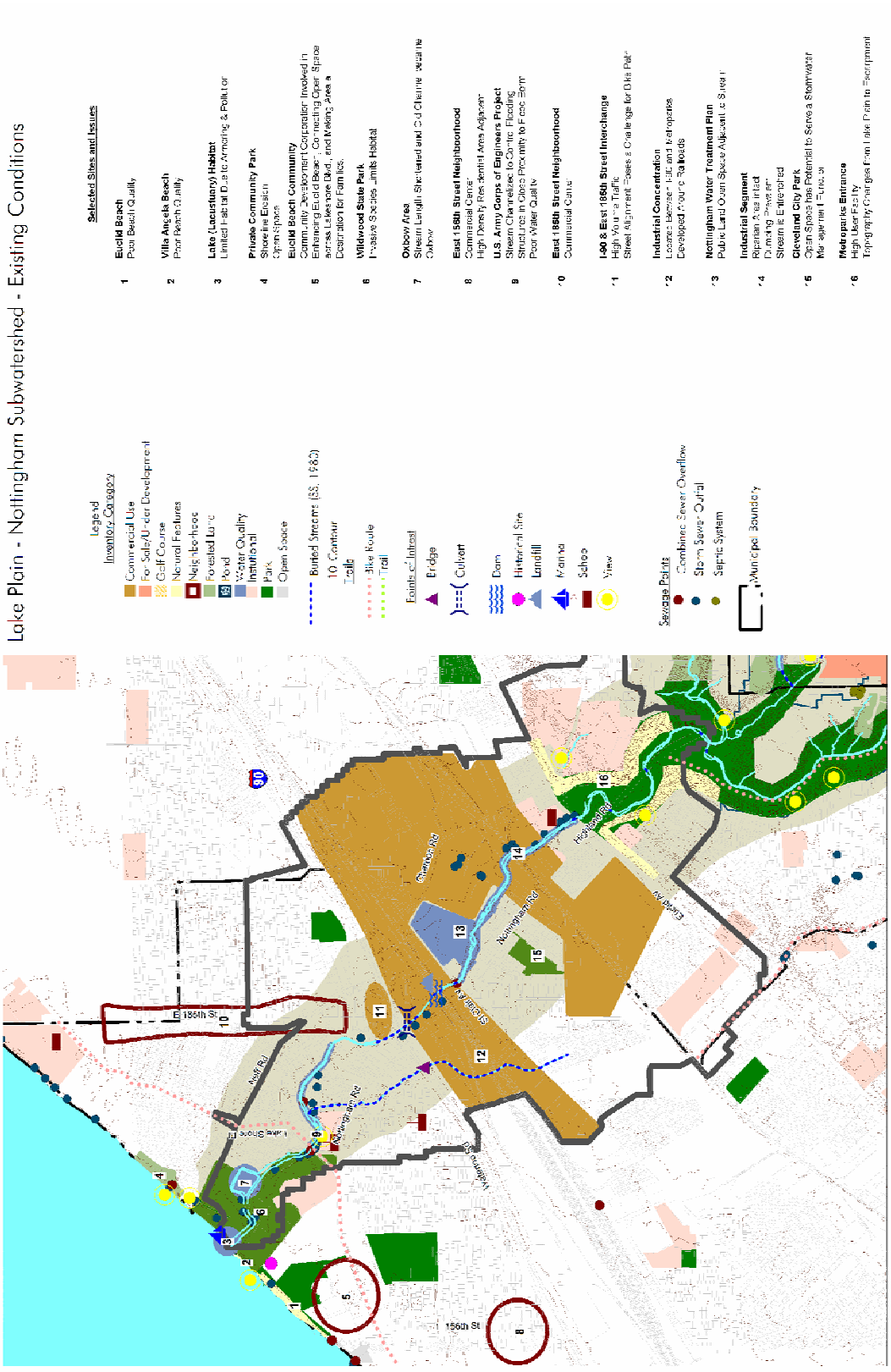


Figure 19. Existing Conditions, Subwatershed 1.

As the creek moves through the tunnel under I-90 the channeling continues to the dam located just below the CSX railroad line. The creek then enters a narrow vegetated riparian zone adjacent to urban land uses, until it reaches the Cleveland Metroparks property. The creek is highly entrenched in this area, but has areas with vegetation and riparian areas. However, debris and dumping over the stream banks are prevalent within this reach. The creek crosses under two railroad bridges and two road bridges. At the railroad bridge between St. Clair and Euclid Avenues, there are indications of scouring of the bridge abutment as a result of the stream alignment and intense flows.

Land Uses:
The Nottingham/Lakeshore reach contains a variety of land uses that reflect its dynamic and multiple uses it provides to the Cities of Cleveland and Euclid. Land uses contain regional and local public parks, industrial areas of warehousing, manufacturing and storage facilities, transportation corridors, single family and multi-family housing, institutional areas and utilities and small neighborhood commercial/retail areas, including the close proximity to the vibrant East 185th Street Commercial Corridor.

Opportunities:
The intense urban environment that this area imposes can provide limitations to restoration, however it also provides opportunities of integrating nature within the urban realm of a community that works with and not against existing uses. The presence of large public property ownership of Wildwood Park, Nottingham Water Plant, local schools, and the Cleveland Metroparks entrance provides an opportunity to re-introduce floodplain functions and stream restoration objectives with existing public agency partners. Also the interest of connecting a bikeway from the Wildwood to Cleveland Metroparks and into the adjacent neighborhoods provides an alternative greenway opportunity that can integrate community development opportunities with stream restoration and greenspace enhancement and preservation. As the urban areas of Cleveland and Euclid develop re-development strategies for their communities, stream restoration and greenway opportunities provide a place to examine the co-existence of these dyanamic resources into one design strategy.

In 2002, the Urban Design Center produced the *St. Clair Revitalization Plan* that provided an assessment of the strengths and challenges of economic development in this region. The extension of greenspace from the Metroparks to the Lake and enhanced waterfront recreation and development were part of the recommendations of the plan. The Watershed Action Plan will allow these previous community goals to move forward and further examine this opportunity.

Subwatershed 2 – Cleveland Metroparks & Adjacent Bluffs

Drainage Area: 10 square miles
Stream Length: 6.8 miles main stem and tributaries
Elevation Change: Top 880' Bottom 660'
Level of Attainment: Non- Attainment
Total Acreage within Subwatershed: 1,597
Acres of Undeveloped Land: 319
Percentage of Undeveloped/Vacant Land: 20%
Percentage of Imperviousness: 11-15% with areas within the Metroparks less then 10%
Communities: Euclid, South Euclid, Richmond Heights

Description of Conditions:
As the coastal lake plains begin to disappear heading inland, one enters the Euclid Creek valley and its high walls of bedrock formed millions of years ago. The Valley encompasses this subwatershed as it travels primarily through the Cleveland Metroparks Euclid Reservation which begins at Euclid Avenue and ends to the south at Anderson Road in South Euclid. This is also where the main branch and east branch of the creek meet as it heads for the Lake. Due to the large amount of protected open space, this subwatershed has not been altered significantly and remains to function naturally. Th Metroparks section does experience flashy flows, erosion and entrenchment.

A small tributary flows near the confluence of the main and east branches. It begins in a deep forested ravine and enters into the older suburban areas of Richmond Heights. The Main Branch in this section is not culverted or dammed . The tributary is culverted under two roads and confined due to the development of homes immediately adjacent to the streambank The Park does have incidences of water quality such as dumping or releases from adjacent developments that pose unsafe water quality during temporary events.

Land Uses
Protected Open Space, dense urban and suburban development, commercial and light industrial uses on the perimeter exist in this subwatershed with the protected open space by Metroparks dominating the area. There are approximately 80 acres of undeveloped land located adjacent to the Metroparks that are being considered for future development. The commercial and light industrial areas in South Euclid along Green road serve the local neighborhoods. Some of the light industrial areas may pose urban runoff concerns for water resource pollution due to their site management practices. The suburban areas have vegetated riparian areas but are entrenched and confined as a result of surrounding development and upstream land use impacts that have influenced flow volumes and intensities.

Opportunities
The proximity and high use of the Cleveland Metroparks Reservation pose great opportunities to link this open space resource to adjacent neighborhoods and to Lake Erie and the Wildwood State Park. Identifying areas to expand park resources to the adjacent lands particularly along the streams can provide conservation and water quality benefits for filtration and flood management for the watershed prior to heading to the last three miles of the creek.

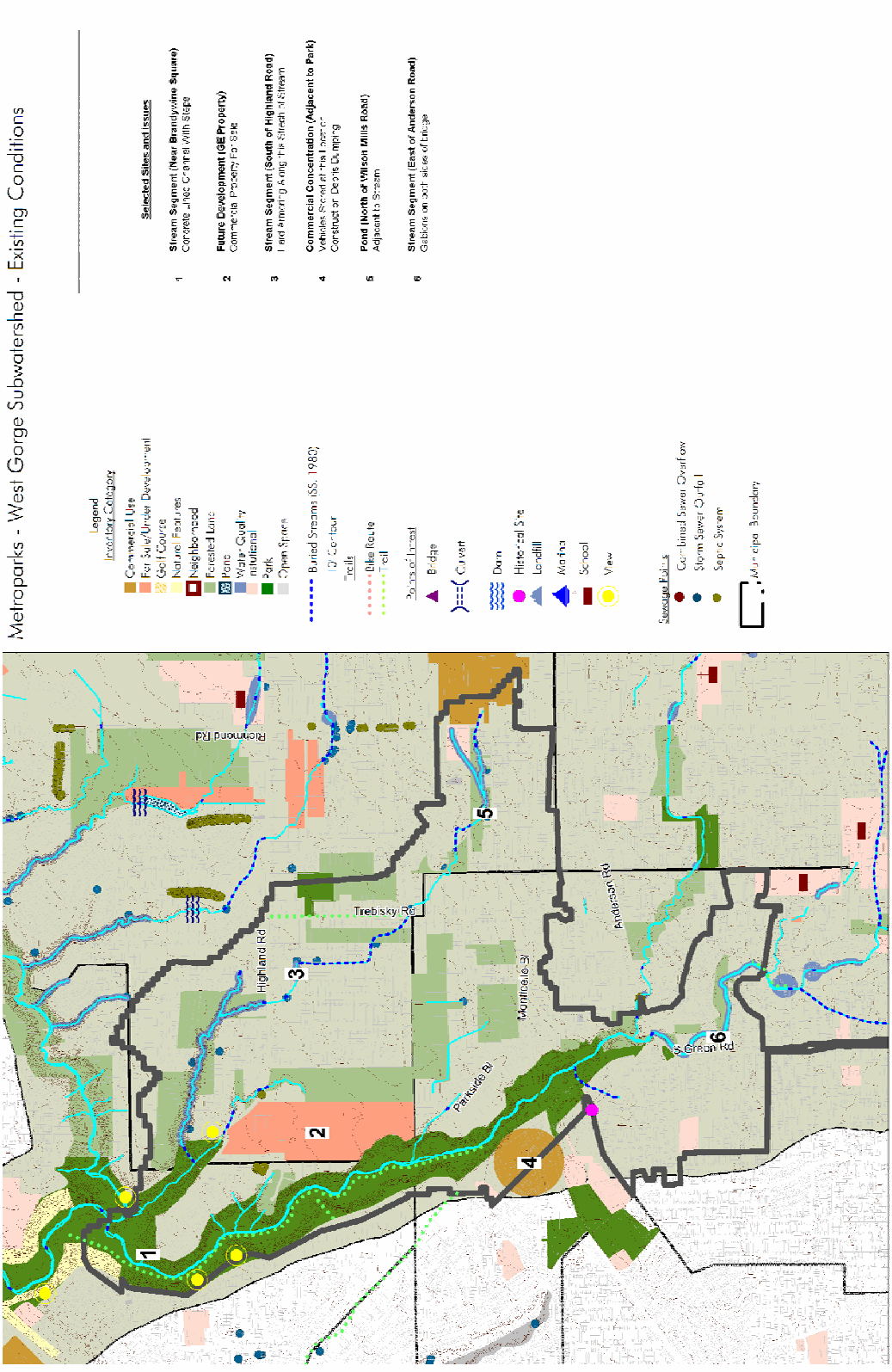


Figure 20. Existing Conditions, Subwatershed 2

Subwatershed 3 – Lower East Branch & Its Tributaries

Tributary: East
Drainage Area: 12.5 square miles
Stream Length: 7.8 miles East Branch and 4 tributaries off East Branch
Elevation Change: Top 960' Bottom 660'
Level of Attainment: Partial- Attainment
Total Acreage within Subwatershed: 2,303
Acres of Undeveloped Land: 540
Percentage of Undeveloped/Vacant Land: 23%
Percentage of Imperviousness: 11-25%
Communities: Richmond Heights, Highland Heights

Description of Conditions:
The East Branch is very much intact with natural riparian areas along their steep hillsides and terrain. There is dumping present from the hilltops off Chardon Road in some areas. The East Branch experiences pollution from failing septic systems, dumping, urban runoff and poor land management practices. The elimination of home septic systems is being conducted in Richmond Heights to reduce the water quality impact of these systems to Euclid Creek.

The tributaries that enter into the East Branch in this subwatershed are located in deep valleys but open up on the top of the plateau. These streams are in varying degrees of physical condition as a result of the development patterns and land forms.

Land Uses:
The area is predominantly suburban residential areas of the later 1960's and 1970's with new development areas emerging. Also the property of the County Airport exists surrounding the tributary areas. Many of the properties along the East Branch are large single lots privately owned. Cuyahoga County and the City of Richmond Heights also own parcels along this corridor. The Mayfair Site just north of Highland Road is an area being considered for use by the Cuyahoga County Airport and contains a headwater stream. The site contains an in-line pond and dam that is in need of restoration to improve its water resources management services.

Opportunities:
The level of existing natural conditions within this sub-watershed pose a protection and conservation opportunity to maintain water resource quality protection and management measures that will benefit the entire watershed. Also, the Mayfair site provides an opportunity for stream restoration and dam removal in working with its future owner and the City of Richmond Heights. Finally working with the County Airport and their Master Plan on best management practices can yield a good partnership to meet their operational and safety requirements and balancing them with the water resource quality needs of its adjacent tributaries.

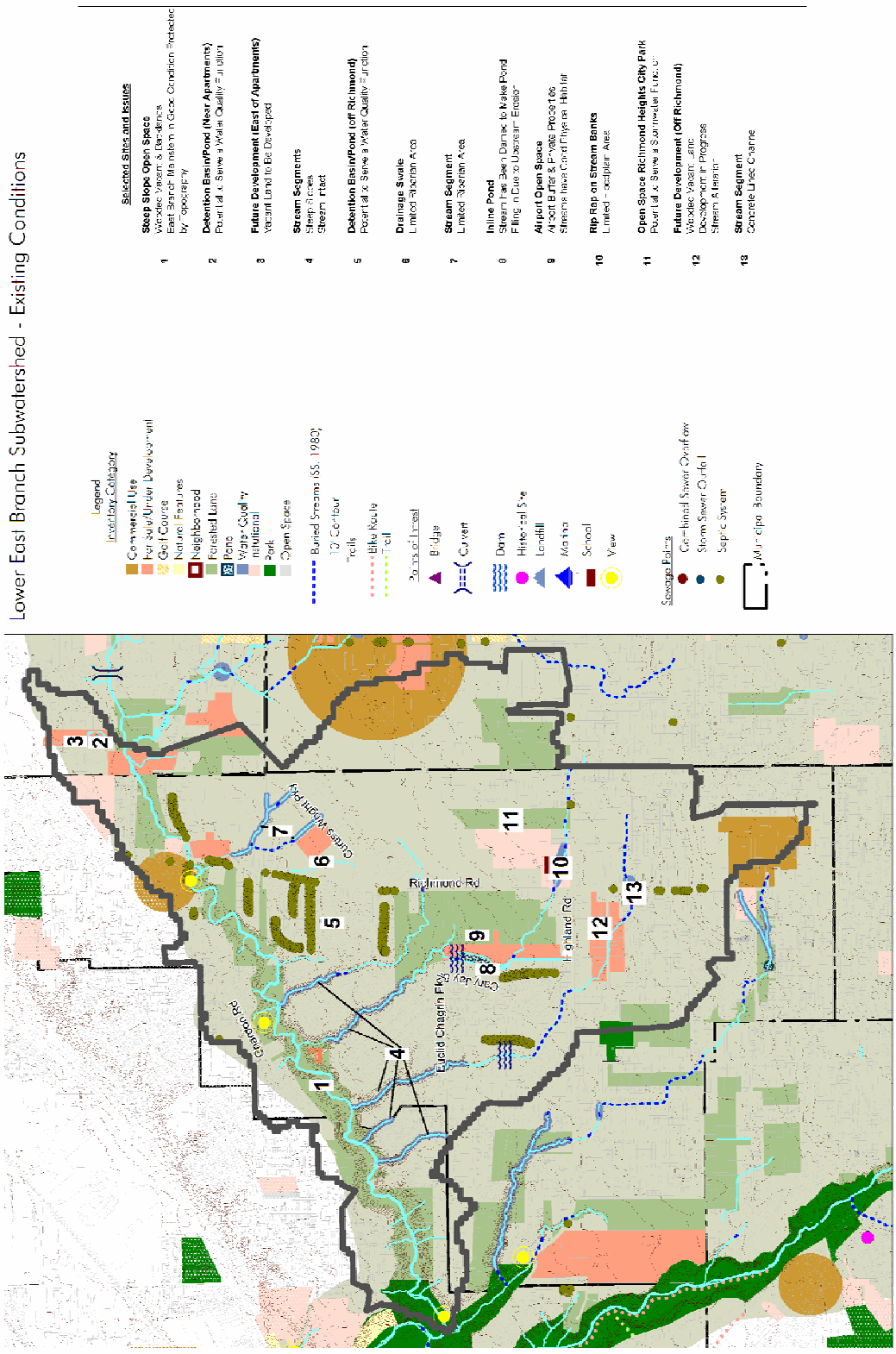


Figure 21. Existing Conditions Subwatershed 3

Subwatershed 4 – Upper East Branch – White/Bishop Plateau

Tributary: East
Drainage Area: 3.2 square miles
Stream Length: 6.3 miles (four tributaries)
Elevation Change: Top 1,020' Bottom 830'
Level of Attainment: Partial- Attainment
Total Acreage within Subwatershed: 2,061
Acres of Undeveloped Land: 367
Percentage of Undeveloped/Vacant Land: 17%
Percentage of Imperviousness: 11-25%
Communities: Willoughby Hills, Highland Heights

Description of Conditions:
This subwatershed contains a number of tributaries to the East Branch located within predominantly suburban development areas of Highland Heights and Willoughby Hills. Many of the streams have been modified as a result of past development but there remains a few areas that contain floodplains, natural channels and wetlands.

Land Use
Single-Family residential housing dominates the landscapes within the sub-watershed built from the early 1970's to the present day. Also small concentrations of light industry along Bishop Road and portions of the Cuyahoga County Airport as well as the Stonewater Golf Course Community are present. There are a number of parcels of land currently being developed and or planned for residential development in the next five years that will continue to impact the watershed's water quality and stream integrity if not planned properly.

Opportunities
The sub-watershed poses a great opportunity to establish partnerships with a variety of audiences in realizing water quality improvements on new and existing developments. Examining how all of these uses work together to accomplish watershed resource goals while maintaining economic growth will be a strategy that can yield beneficial results for all of the stakeholders involved. In addition, identifying conservation approaches for the remaining headwaters and preservation of critical areas should be examined with the local community and their future growth goals.

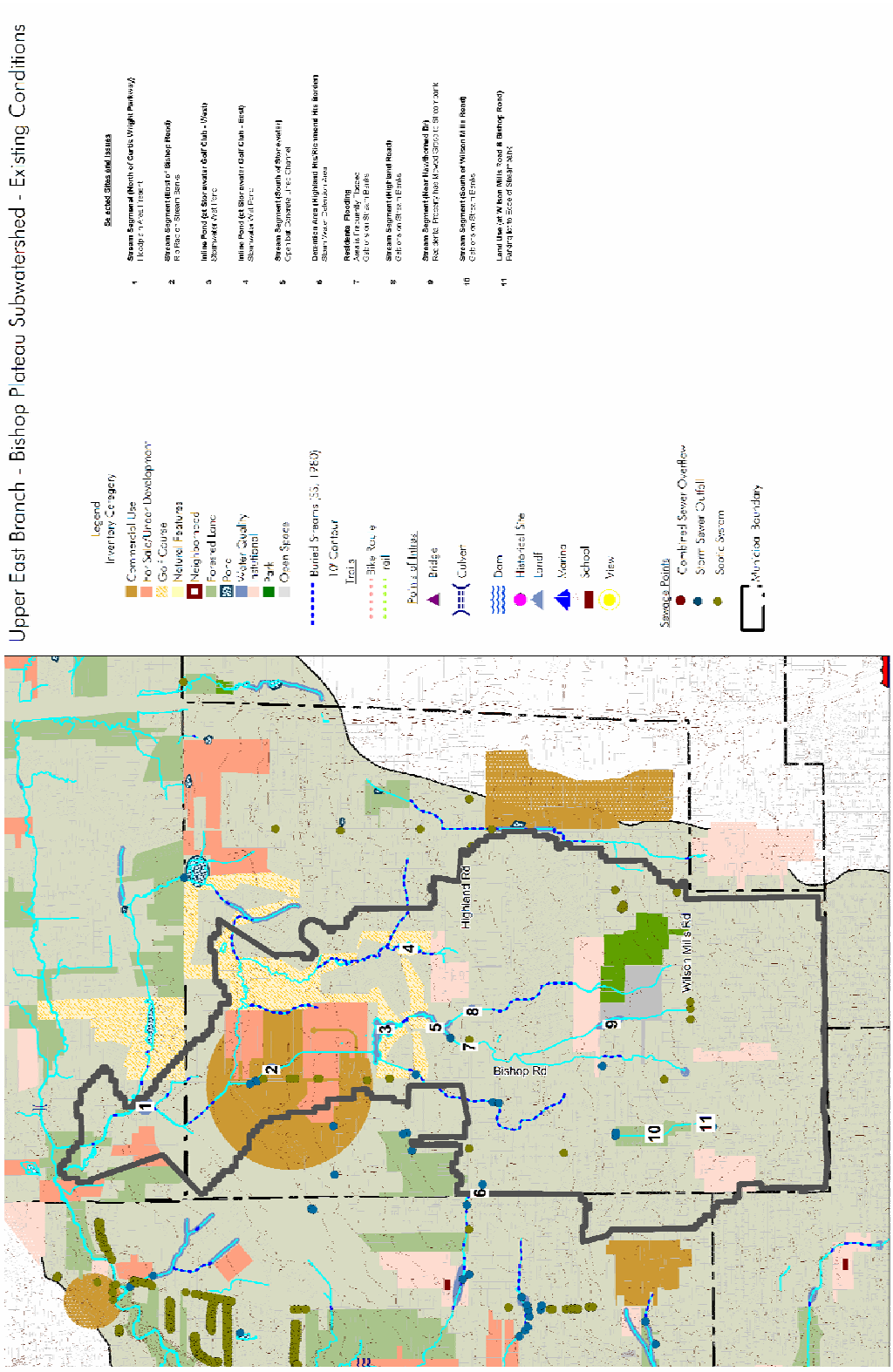


Figure 22. Existing Conditions, Subwatershed 4

Subwatershed 5 – Upper East Branch – Chagrin Plateau

Tributary: East
Drainage Area: 3.5 square miles
Stream Length: 5.3 miles
Elevation Change: Top 1,020' Bottom 830'
Level of Attainment: Partial Attainment
Total Acreage within Subwatershed: 2,261
Acres of Undeveloped Land: 577
Percentage of Undeveloped/Vacant Land: 25%
Percentage of Imperviousness: 10- 20%
Communities: Willoughby Hills, Mayfield Village, Highland Heights

Description of Conditions:
The East Branch completes its journey through the communities within this subwatershed through its remaining headwaters. It has come out of the deep valleys of the lower portion and diminishes in size significantly as it enters the Mayfield Schools complex south of Wilson Mills Road. The channel is largely open until it reaches I-271 where it is culverted and then culverted again heading into Highland Heights. Alteration continues to be prevalent as new development continues to expand within this area of the watershed.

Home Septic Systems have been prevalent in this portion of the watershed, but are planned for elimination through capital improvements within Willoughby Hills over the next three years.

Land Use
This area of the watershed is one of the least densely developed areas of the watershed with lot sizes being closer to one acre in size and little commercial development.
The East Branch traversed through single family developments that range from the 1960's to present day. New residential development is occurring in Highland Heights and Willoughby Hills that may impact the water resources in the future.
In addition to the single family development, I-271 and the Progressive Campus exists where the stream travels as it makes its journey to the deep valley of Lower East Branch.

Opportunities
As new development continues to be planned and constructed in this portion of the watershed, opportunities to introduce sustainable site design practices and its economic benefits would be applicable. Also partnering with existing establishments such as Progressive and ODOT on further stewardship practices on existing sites can yield further examination of community-based stewardship as well as conservation areas with local homeowner associations.

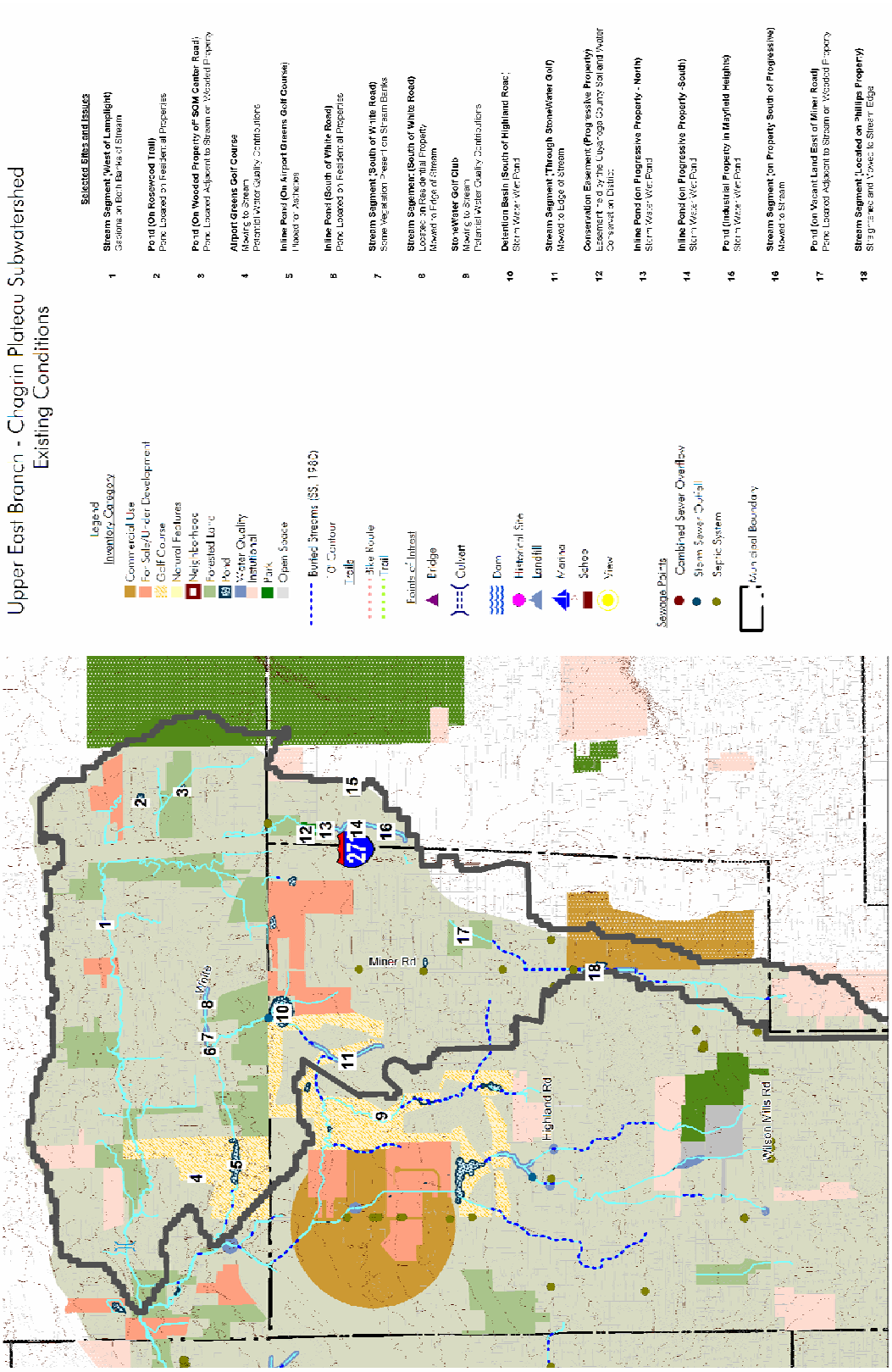


Figure 23. Existing Conditions Subwatershed 5

Subwatershed 6 – Highlands – Anderson & Brainard Road Area

Tributary: Main
Drainage Area: 2.8 square miles
Stream Length: 3.1 miles
Elevation Change: Top 1,090' Bottom 930'
Level of Attainment: Non- Attainment
Total Acreage within Subwatershed: 1,832
Acres of Undeveloped Land: 58
Percentage of Undeveloped/Vacant Land: 3%
Percentage of Imperviousness: Over 25%
Communities: Lyndhurst, Mayfield Heights

Description of Conditions:
This is a larger tributary feeding into the Main Branch near Anderson Road and travels through residential areas to just north of the City of Lyndhurst Municipal complex. The lower portions have been largely buried and culverted with the upper portions being channelized and altered as a result of past development patterns and storm water management needs. The last remaining half mile maintains its original form with meanders and natural stream banks but with erosion areas. There are no septic systems within this reach of the creek and none planned due to the existing sanitary sewer system in place.

Land Use:
Single family residential development built mostly in the 1940's and 1950's dominates the sub-watershed with institutional areas including schools and city parks. The residential areas generally consist of lot sizes of ¼ to ½ acre that create a densely developed landscape. Commercial development where the stream has been buried near Mayfield Road is one of the highest traveled roads in the County. New development areas are less likely to occur here due to its built-out nature but small pockets of development may still occur as well as re-development.

Opportunities:
The stream travels through a City Park and near many instiutional uses that may pose opportunities exploring restoration options within these public lands. Examining stream habitat enhancement opportunities along existing channels in working with property owners can provide this urban stream great benefits to its integrity.

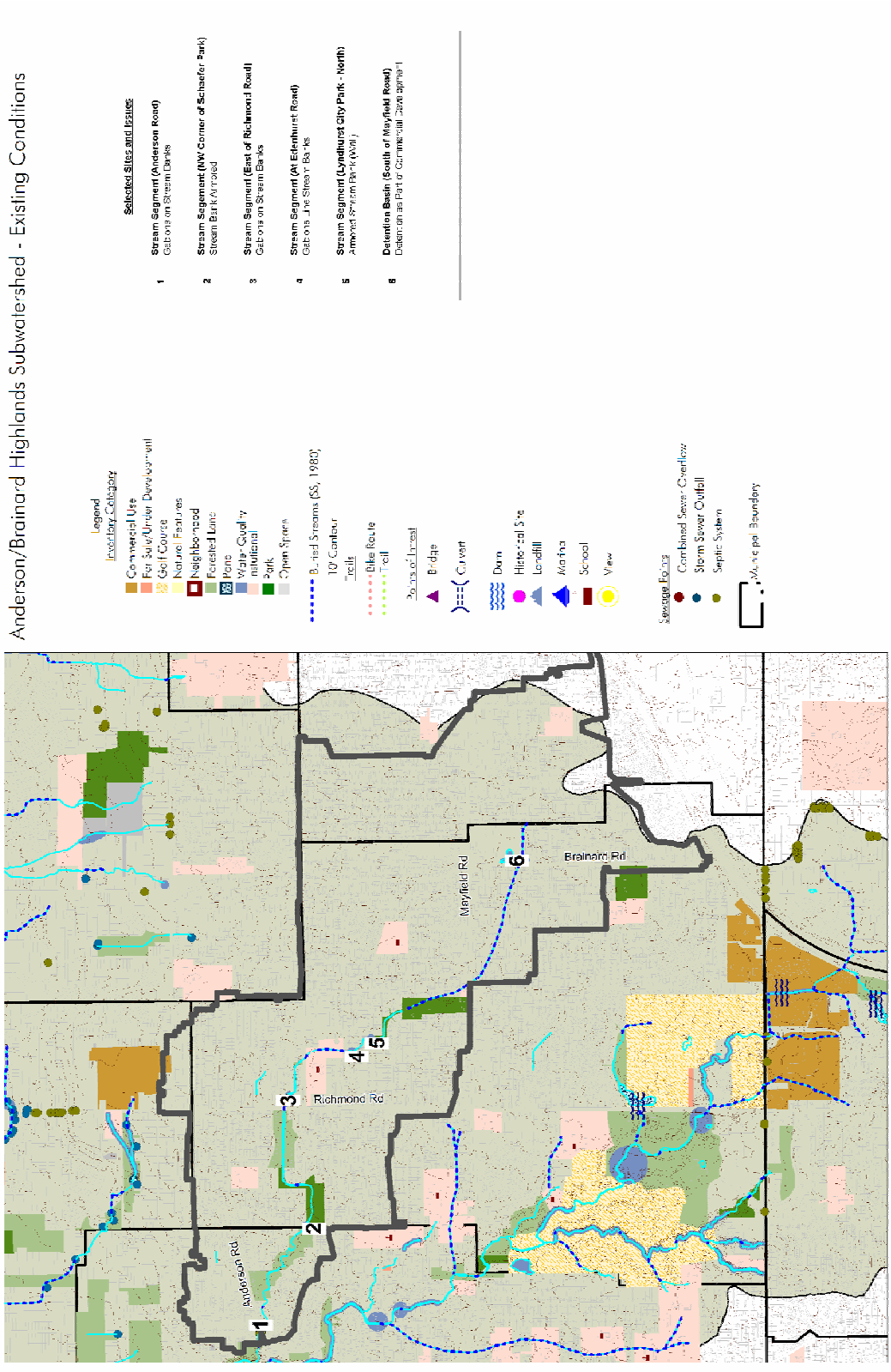


Figure 24. Existing Conditions, Subwatershed 6

Subwatershed 7 – Headwaters! – Cedar & Mayfield Roads

Tributary: Main
Drainage Area: 5.17 square miles
Stream Length: 6 miles
Elevation Change: Top 1,200' Bottom 930'
Level of Attainment: Non- Attainment
Total Acreage within Subwatershed: 3,311
Acres of Undeveloped Land: 234
Percentage of Undeveloped/Vacant Land: 7%
Percentage of Imperviousness: 10-25%
Communities: South Euclid, Lyndhurst, Beachwood

Description:
The Main Branch completes its journey on the south end within its headwaters south of Cedar Road. The headwaters have largely been modified by development patterns in the past while the lower portion of this watershed remains within a riparian corridor as it begins it entrance into the deep valley within the Metroparks. Many areas along the stream have been channelized with gabion systems due to the close proximity of structures to the stream .There are few remaining floodplain areas north of Mayfield Road adjacent from the South Euclid-Lyndhurst Library and smaller areas north of Liberty Road. There are less than 20 septic systems remaining in Beachwood and Pepper Pike and there are currently no plans for a significant increase of new systems within this area.

Land Uses
Although single family residential areas dominate the land use, the subwatershed also has a high concentration of commercial areas present due to its proximity of major thoroughfares of Mayfield and Cedar Roads and I-271. In addition, two golf courses exist within the subwatershed that are managed by private club organizations east and west of Richmond Road and institutional uses along Green Road. New development continues to occur within this area but will likely see a decrease as land becomes less available for development. There are areas including the golf courses and the Cleveland Clinic site where the stream remains in its natural state but where erosion and entrenchment exist.

Opportunities
Retrofitting existing uses and assessing management activities on commercial use pose a great opportunity within this sub-watershed. Collaboration with private property and institutional owners will be key to developing a stewardship program within this section. Restoration of the headwaters will need to be examined through further sampling and monitoring to determine its benefit to the watershed.

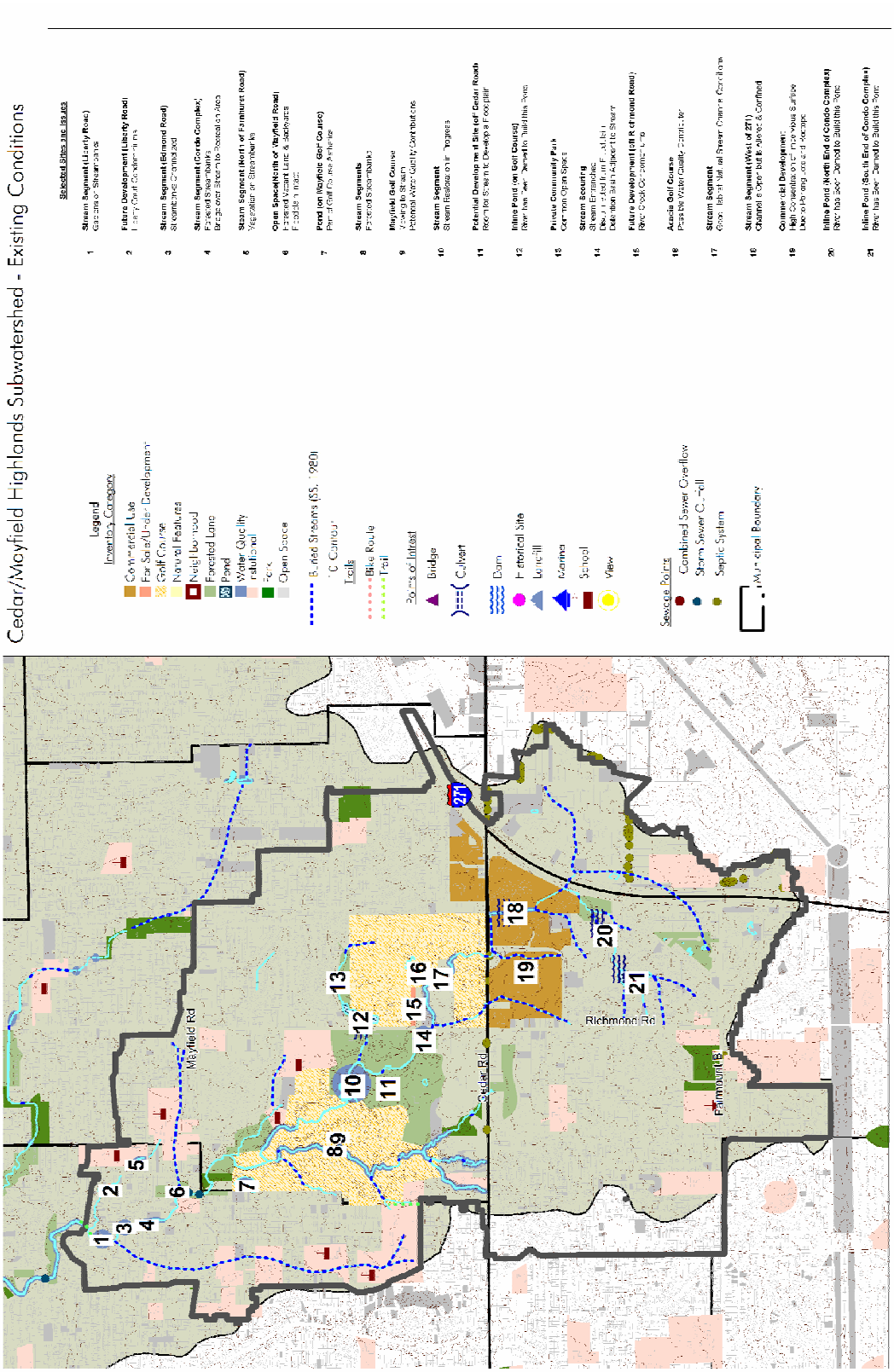


Figure 25. Existing Conditions, Subwatershed

Groundwater Resources

The Euclid Creek Watershed's ground water resources comprise of groundwater developed from primarily two types of deposits. The first shown in orange in Figure 26 is from the Cuyahoga Group or Chagrin, Ohio and Bedford Shales. These are areas in which 3 to 10 gallons per minute aquifer may be encountered less than 30 feet below land surface.

The second area shown in brown in Figure 26 are areas where impermeable Deposits, basically clay overlaying shale or shaley sandstone provide a very poor area for even minimal domestic supplies. These are areas where less than 3 gallons per minute of ground water may be developed. (ODNR).

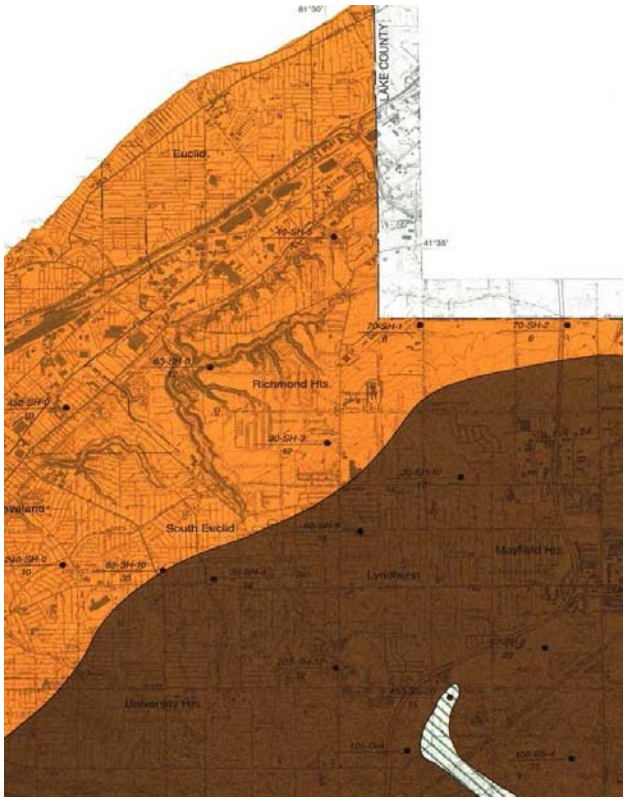


Figure 26. Ground Water Resources Cuyahoga County, ODNR

Ground Water – Wells

There are currently 15 private wells according to Cuyahoga County Auditor 2004 data within the watershed. These wells are largely a result from the historical uses of the area prior to the installation of municipal water service systems. The use of the wells have not been determined. Due to the presence of an existing municipal water system within all of the Euclid Creek communities, the use of wells are highly unlikely for drinking water. However, every precaution should be made to ensure protection of the watershed's groundwater system and determine the extent of their current use.

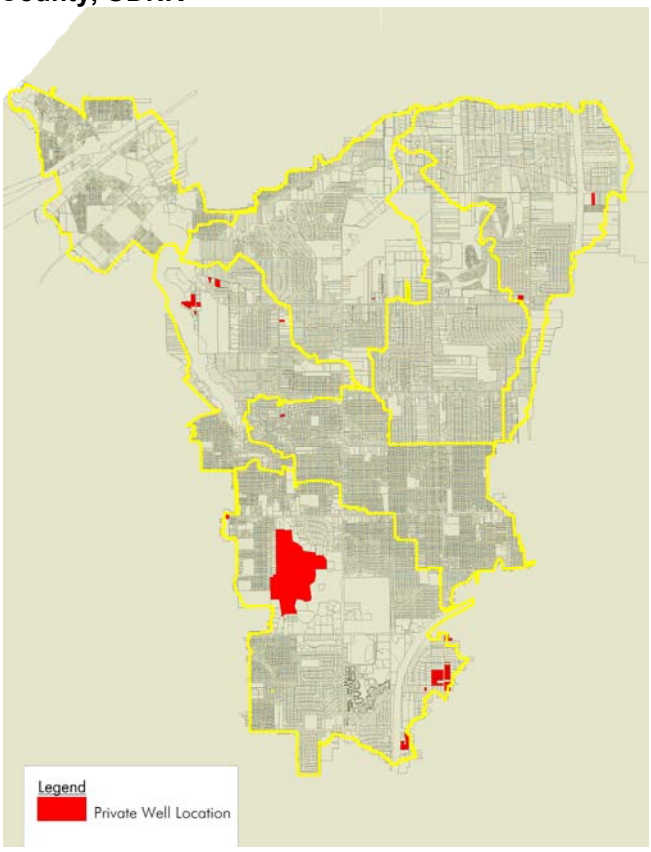


Figure 27, Private Well Locations

Groundwater Pollution Potential

The Ohio Department of Natural Resources has developed groundwater pollution potential maps (DRASTIC) for counties throughout the state to evaluate aquifers vulnerability to contamination. The DRASTIC Map area for Euclid Creek is found in Figure 28 and the level of high or low potential of ground water pollution.

The Euclid Creek watershed has areas in the coastal plain and headwaters areas with high pollution potential. The use of this map will assist local watershed efforts and communities on future land use and water resource use decisions.

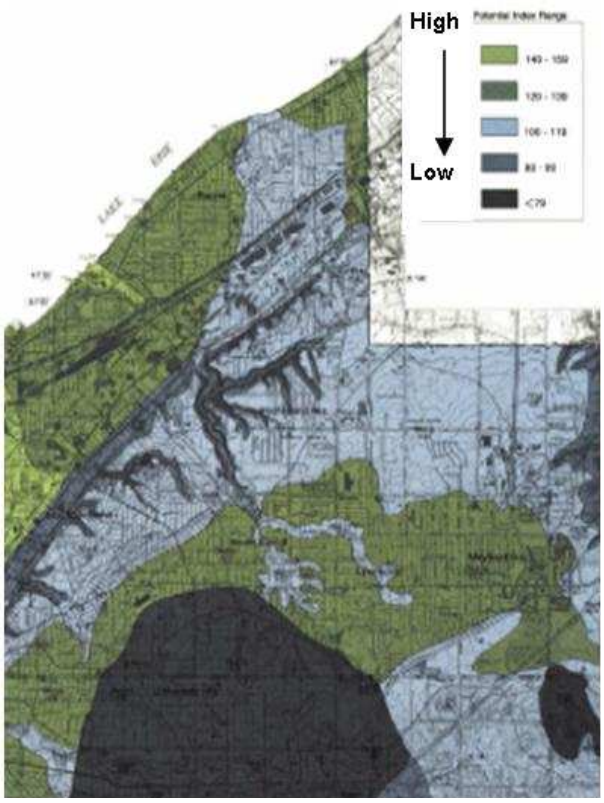


Figure 28. Groundwater Pollution Potential,

Source Water Protection Plan

A Drinking Water Source Assessment for the City of Cleveland was prepared by Ohio EPA in December, 2003. The Euclid Creek Watershed is part of the Nottingham Plant and Baldwin Plant Service Areas. Each of these facilities provide service to generally 300,000 people. These facilities are part of the City of Cleveland Division of Water community public water system. The Nottingham Plant is located within the Euclid Creek Watershed. The water treatment system obtains its water from the Lake Erie via four water treatment plans in which Nottingham is one. The Nottingham Plant has a design treatment capacity of 92 million gallons per day (MGD). As the assessment outlines, " Due to the distance of Cleveland's supply intakes from the shore (approximately 2.5-4.5 miles), the potential threats identified in the watersheds nearest to the supply intakes are considered low. The potential pollution threats within the Euclid Creek watershed that may affect Lake Erie water quality include home sewage disposal systems, air contaminant deposition, combined sewer overflows, and runoff from residential and urban areas. As the Euclid Creek Action Plan establishes recommendations, improvements to these relevant issues related to Source Water Protection and supply intake locations will be taken into account.

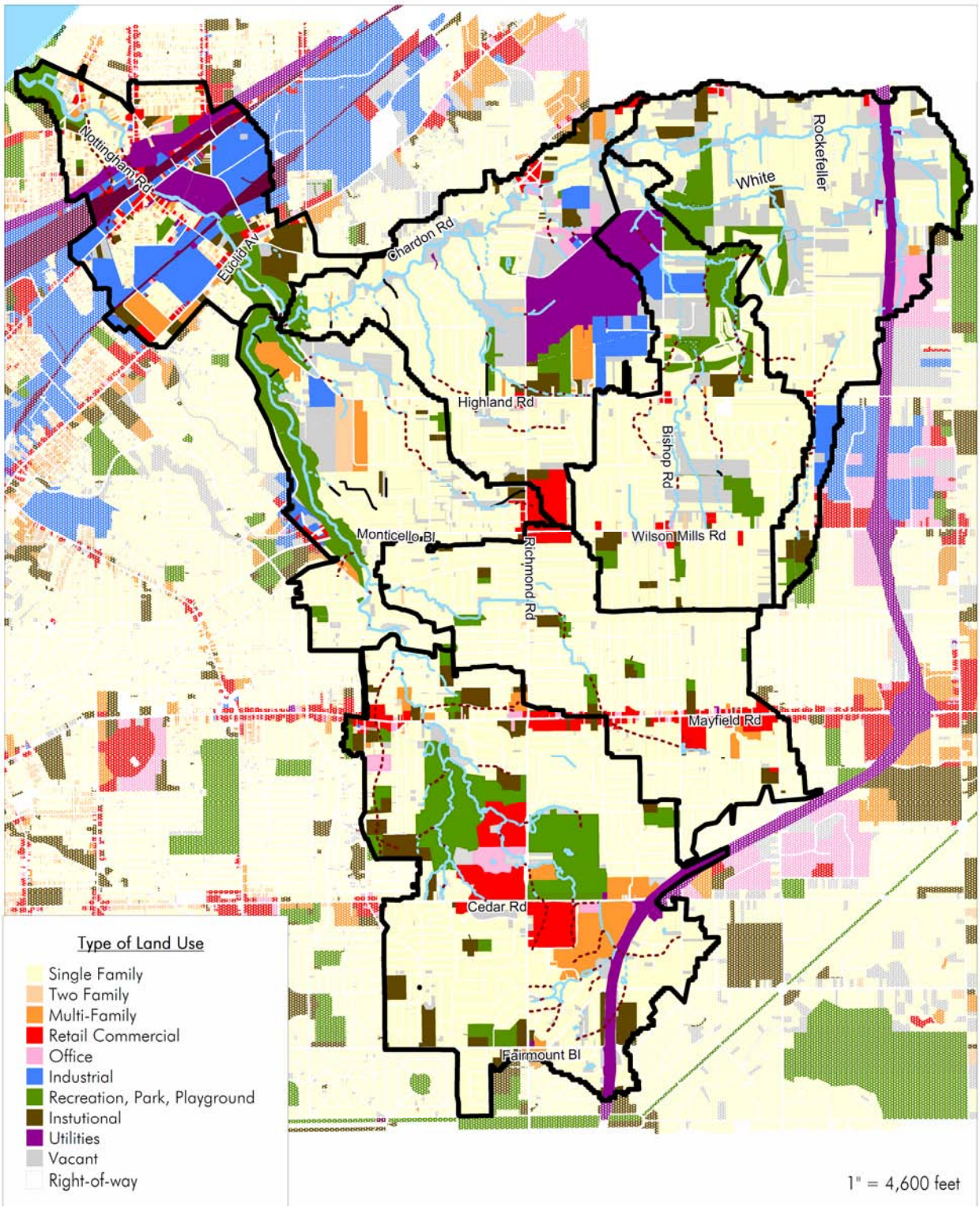


Figure 29. Land Use. Cuyahoga County Planning Commission, 2004

Land Use

The Euclid Creek watershed is unique to the majority of Ohio watersheds in that is does not contain agricultural lands as part of its land use coverage and is over 80% developed. The land use component of the watershed inventory is one of the most presented later in this report. Most often, water quality impairments are not addressed from a land use perspective. In Euclid Creek, land use will be the main tool that can restore or prohibit the water resources in the future. This examination of the variety of land uses and their impacts on the watershed currently are outlined in this section.

Table 7. Land Use Acreage Distribution in Euclid Creek

Land Use	Acres	Percent of Watershed
Commercial Office/Retail	649.90	4%
Residential Single Family	7,114.60	47.6%
Residential Multi-Family	441.11	2%
Industrial	539.30	3%
Institutional	635.822	4%
Undeveloped Land	2,199.034	14%
Protected Open Space	1403.08	9.3%
Utilities/Highways/Roads/ROW	1,904.84	12.7%

Source: Cuyahoga County Planning Commission, 2005

Description of Land Use Types within Euclid Creek

Each type of land use type can exemplify different landscapes and land development patterns based upon the physical, economic and political climate of a region. For these reasons and to better understand how best to apply implementation measures to Euclid Creek, further examination of land uses are presented.

Commercial Office/Retail

The Commercial office/retail facilities provide a variety of services in all shapes and sizes to the watershed residents and the northeast Ohio region. These commercial properties cover a total of 648 acres or 4% of the watershed land coverage. There are many large corporate office facilities that contain campus like settings around the watershed as well as smaller office facilities adjacent to commercial or industrial areas of the watershed. The main concentrations of commercial facilities are along the main road corridors of the watershed. The retail areas consist largely of strip retail along the main road corridors of the watershed. In addition, the watershed is home to three large regional shopping centers.

Shopping Malls, Offices and Parking Lots

Euclid Creek is home to three regional shopping malls and many commercial corridors. The Beachwood Mall, Legacy Village and Richmond Mall contain over 165 acres of nearly 95% impervious cover for their facilities located in the headwaters of the watershed. Facilities like these have had an adverse affect to the health of Euclid Creek including increased volume and duration of flows during storm events, loss of infiltration capacity and decreased removal of pollutants prior to entering the stream corridor. As this area continues to be a vibrant place to live and work, these facilities will continue to be successful. Determining the balance of providing shopping services to the region and providing the services for storm water management and water quality improvements through ecosystem management will need to be assessed in creative solutions and partnerships.

Residential Areas

The watershed is predominantly covered by single family residential land with small areas of multi-family high rise complexes. The density of residential areas vary from less than ¼ acre lots to one acre and range in age from early 1900's to present day.

Table 8. Density of residential properties – number of properties

Density	Number of Properties
Less than ¼ acre lots	11,131
Between ¼ and ½ acre lots	7,045
Between ½ and 1.0 acre lots	1,883

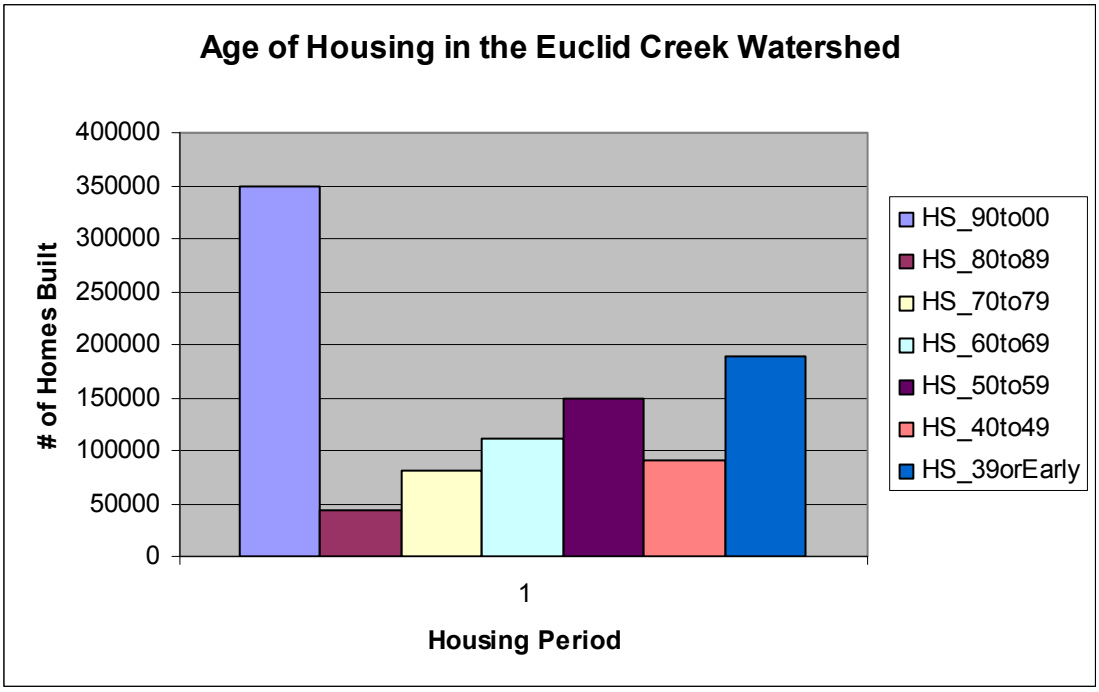


Figure 30. Age of Housing

Table 9. Age of housing/development patterns

Range	#
pre 1920	615
1920 to 1949	5530
1950 to 1969	12278
1970 to 1989	2406
1990 to present	1612
No data	4284
Total	26725

The multi-family residential areas consist of some large high-rise facilities (facilities having greater than four floors) in Beachwood and Richmond Heights. Additional smaller complexes throughout the watershed are present.

New Development Trends

Expected Residential and Commercial Development
Many communities are developing infill lands with cluster housing or townhouse style residential areas. These provide a denser residential area to the aging baby boomer population that tends to not want the maintenance or use of a large yard. Additionally, on the remaining large tracts of land, single family residential and office parks will likely be the development activities to occur on these remaining lands. Finally, due to the existing urban fabric of the watershed, redevelopment will likely be occurring on underutilized properties or areas of key importance for economic progress. The redevelopment patterns are likely to involve a wide variety of uses including, retail-commercial, office, residential and light industrial.

Undeveloped Land
There are presently 2,184 acres of undeveloped or forested land remaining within the watershed. This comprises of 15% of the total land area of the watershed. Hence, many of these areas will likely be developed watershed in the next 10 years. Many of these remaining lands are currently being offered for sale for development. The development will likely be cluster or single family residential or office/commercial properties.
These newly developed properties may provide additional impacts to the Creek such as increase pollutant loads from runoff and additional impervious cover and filling of streams or wetlands.

Redeveloped Land
The consolidation of schools and areas that become blighted or underutlized over time as well as large home sites from the historic land patterns pose redevelopment areas that may occur within the watershed. As the final areas of available land are developed within the watershed, redeveloped areas will continue to be examined within the communities as economic development opportunities are explored to sustain economic progress. Restoration opportunities and sustainable site design principles can provide additional economic development benefits to these developments through marketing and collaboration with the Cities and the development community.

Expected Road, Highway, Bridge Construction
As a result of the watershed being close to being fully built out, the planning and construction of new roads or highways will be minimal. The roads that may be constructed in the future will be part of new residential and or commercial development in the upper reaches of the watershed. According to the ODOT 10 year Program Plan, 2004, and the Municipalities Capital Improvement Plans 2004, there are no new major roads being sited within the watershed.

The Euclid Creek Watershed Technical Committee 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.

According to the Cuyahoga County Engineer Capital Improvement Plan 2005-2010 and the ODOT 10 year program, there are no bridge replacements or rehabilitation projects scheduled in the Euclid Creek Watershed.

Impervious Cover

Euclid Creek is one of the most densely populated and developed watersheds along the Ohio Lake Erie coastline. With this development as indicated by the land use comes impervious surfaces. In Euclid Creek, impervious surfaces include, rooftops, parking lots and lawn areas. These lawn areas can only hold a limited amount of water to infiltrate as a result of its compaction and infiltration capacity.

According to the Center for Watershed Protection studies, there is direct correlation of impervious cover and water quality and is presented as follows:

Sensitive Streams 0-10% : These streams are of high quality and are typified by stable channels, excellent habitat structure and diverse communities of both fish and aquatic insects. These streams do not experience frequent flooding and other hydrologic changes that accompany urbanization.

Impacted Streams 11-25%: Streams in this category show clear signs of degradation due to watershed urbanization. The elevated storm flows begin to alter stream geometry and erosion and channel widening. Stream biodiversity declines to fair levels with most sensitive fish and aquatic insects disappearing from the stream.

Non-Supporting Streams Over 25%: Streams in this category can no longer support a diverse stream community and serve as a conduit to convey stormwater flows. The stream channel becomes highly unstable and experience severe downcutting and erosion. The biological quality is generally poor and is dominated by pollution tolerant insects and fish.

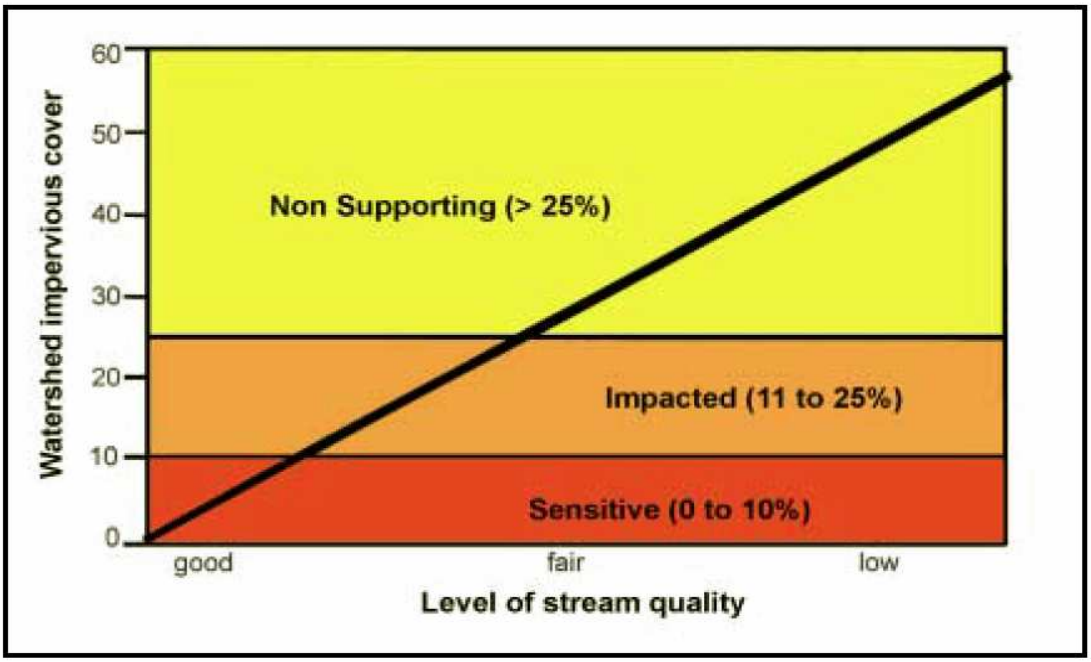


Figure 3: The Impervious Cover Model

Figure 31. Impervious Cover and Stream Quality. Center for Watershed Protection.

The Northeast Ohio Regional Sewer District's RIDE Study Draft of 2004, provided an assessment of impervious cover within Euclid Creek. As a result of the Sewer District's work, an assessment of impervious cover has been developed by the 50 drainage areas they determined. As the Center of Watershed Protection states, a watershed's quality can be inherently linked to the percentage of impervious cover.

Out of the 50 sub-drainage areas NEORSD developed, 10 are considered 0-10% Sensitive Streams, 15 are considered 11-25% Impacted Streams and 25 are considered Non-supporting streams with some areas over 60% impervious. This information reflects the magnitude of stress Euclid Creek is experiencing from the presence of impervious surfaces.

Understanding the areas of high or low impervious cover within the watershed, can establish areas to promote protection or infiltration to reverse or restrict the increase of impervious cover that impacts water quality of the Creek.

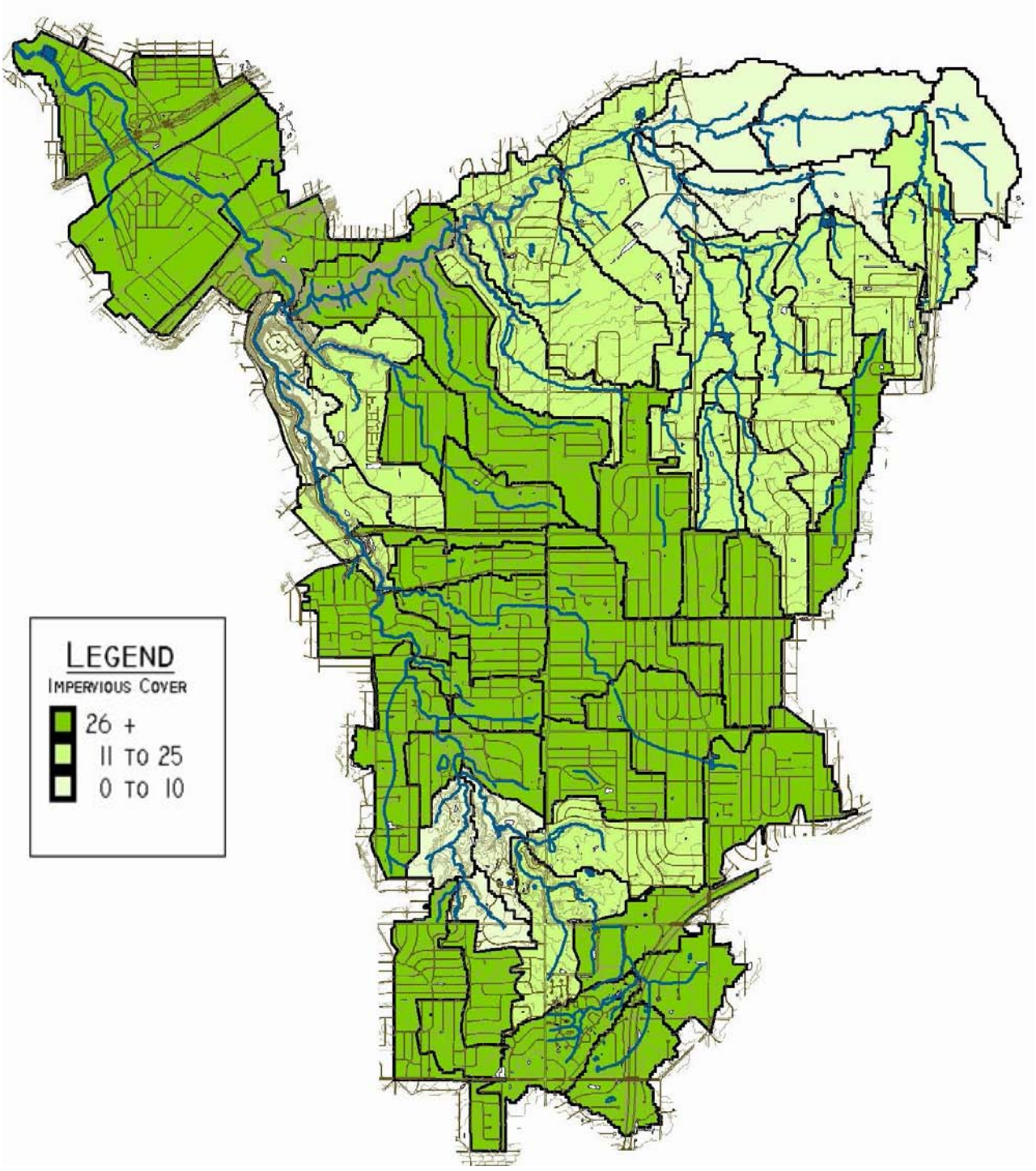


Figure 32. Impervious Cover in Euclid Creek.
Data from NEORSD 2004 RIDE Study Draft

Home Sewage Treatment Systems

Since the Euclid Creek Watershed particularly in the southern and eastern portions was rural at one time, the presence of home sewage treatment systems exist. These systems are typically 40-50 years old in the suburban communities of Richmond Heights, Willoughby Hills and Pepper Pike. Due to the age and lack of maintenance of these systems, they are failing to provide percolation and storage needed to sustain their intended function and hence are releasing septic outflows to Euclid Creek. These pollutants prohibit the Creek's use for recreational purposes due to human health risks.

As of 2004, there were approximately 433 home septic systems in the watershed. However, many of these communities have been or are currently making infrastructure improvements through their Capital Improvement programs to tie the sewage treatment systems into the sanitary sewer system. The City of Richmond Heights, with the most systems remaining is currently eliminating systems through the sanitary sewer line extension project and will be eliminating all of their septic systems by the end of 2006 with this project. Pepper Pike is also slated to remove all septic systems by end of 2005 within the Euclid Creek Watershed.

Table 10.Current Septic Systems in Euclid Creek

Community	# of Septic Systems
Beachwood	1
Euclid	4
Highland Heights	26
Lyndhurst	3
Mayfield Village	1
Mayfield Heights	0
Pepper Pike	59
Richmond Heights	335
South Euclid	3
Willoughby Hills	1

Sources: Cuyahoga County Board of Health, Lake County Health Department, Local Municipalities, Cuyahoga County Planning Commission, 2004

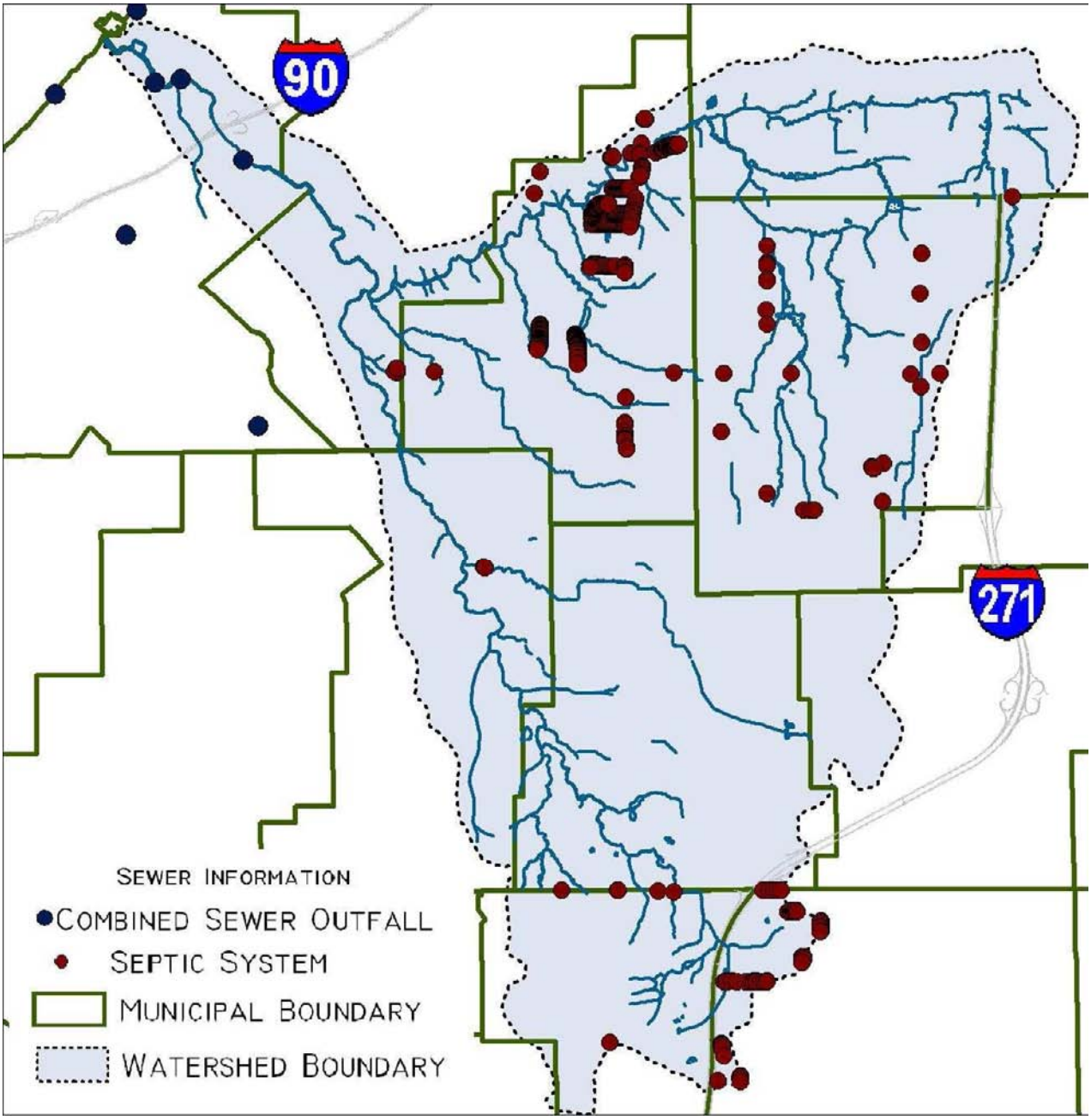


Figure 33. Existing Septics and CSO's, NEORSD, Cuyahoga Board of Health

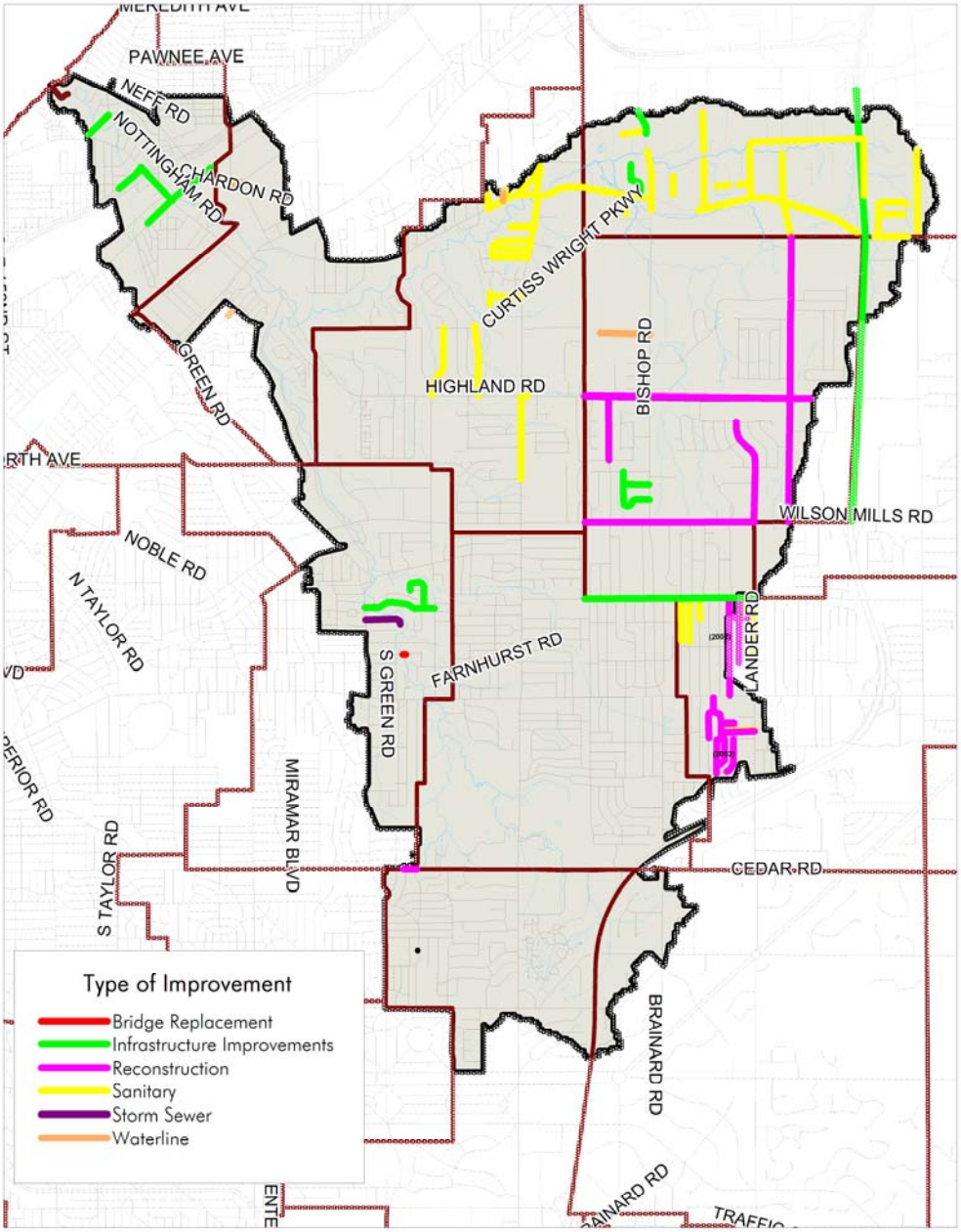


Figure 34. Capital Improvement Plans in Euclid Creek Watershed Communities
Cuyahoga County Planning Commission, Capital Improvement Plans, 2004, Local Communities.

Wastewater Treatment Plants and Pump Stations

There are no remaining wastewater treatment plants within Euclid Creek as a result of the elimination of the Lake County Pleasant Hills in 2004, Scottish Highlands and Cuyahoga County Richmond Park in 2000. A pump station exists for the combined sewer overflows north of Lakeshore Boulevard and continues to overflow annually. This pump station will be part of the NEORSD's CSO Facilities Control Plan implementation.

Golf Courses

The watershed is home to four golf courses encompassing nearly 670 acres of land and located on the south and east sides of the watershed within the headwaters. As these spaces provide open space to the community and outdoor recreation, historical management and maintenance practices can limit water quality conditions. Limiting factors include mowing the edge of the stream bed without a riparian setback, overuse of nitrogen fertilizers and neglect of sustainable storm water management principles. Understanding the management and maintenance programs of the Euclid Creek golf courses will assist with enhanced facilities for the community and improved water quality objectives for the watershed.

Table 11. Golf Courses in Euclid Creek

Golf Course Name	Acres	Community
Mayfield Country Club	211	Lyndhurst
Acacia Country Club	176	Lyndhurst
County Airport Greens	106	Willoughby Hills/Highland Heights
Stonewater Golf Course	178	Highland Heights

Industry

The Lower Euclid Creek contains a number of larger industrial facilities and is flanked by the railroad lines traveling through Cleveland from New York to Chicago and the western United States and part of adjacent to the Collinwood Area. This has been a major center for manufacturing since the 1940's. Industries in this area include manufacturing, distribution and warehousing businesses. Although rail use for transportation of goods has significantly decreased over the years, the proximity to these highly used rail lines will continue to position this area for industrial and manufacturing activity.

In addition, smaller concentrations of warehousing and distribution centers are located along Bishop Road in Highland Heights and along GreenRoad in South Euclid.

While industrial facilities today do not impact the water resources as they once did thirty years ago, examining their maintenance and operations as well as their environmental quality management systems under the ISO 14000 certification program can further enhance the watershed's resources and its economic competitiveness.

What is ISO 14001 Certification?

ISO 14001 is an internationally accepted specification for an Environmental Management System (EMS). It specifies requirements for establishing an environmental policy, determining environmental aspects & impacts of products/activities/services, planning environmental objectives and measurable targets, implementation & operation of programs to meet objectives & targets, checking & corrective action, and management review.

What are the benefits of having an ISO 14001 EMS?

Some of the most commonly cited benefits of an ISO 14001 EMS are:

- Improved perception of the key environmental issues by their employees and a better (greener) public image of the organization.
- An increase in the efficiency and use of energy and raw materials (less waste)
- Improved ability to meet compliance with environmental regulations
- Dependence on a system rather than just the experience and capabilities of an individual to manage the environmental function of an organization.

http://www.iso14000.com/

Other major facilities

The Euclid Creek watershed is also home to larger office and commercial facilities that serve the region in a variety of ways. Some of these sites include the Cleveland Clinic Property in Lyndhurst and the Progressive Campus in Mayfield Village. Many well-established companies reside within the watershed due to its proximity of the highway system and the high quality of life amenities provided by the Euclid Creek communities.

Institutional Areas

There are a variety of areas and properties that are owned by public or institutional entities. These institutional properties include but not limited to:

Municipal Owned Properties

Five of the eleven municipalities within the Euclid Creek Watershed have their local City Halls and municipal centers within the watershed. These facilities vary with size but are all located on a major thoroughfare within the watershed. In addition the municipalities hold property for their service and maintenance needs that they provide to their residents. Partnering with municipalities on their properties for watershed stewardship projects can create great places to demonstrate to the watershed residents how restoration can occur within a built environment.

Local City Parks

Within the Watershed, there are nine local municipal parks totaling 141 acres of protected land. However, many of these established greenspaces consist of active recreation facilities with natural greenspace buffers. These sites will be evaluated as potential sites for storm water management and water quality filtration areas within their subwatersheds.

Table 12. City Parks

City Park	Community	Acres
Beachwood Municipal	Beachwood	12.4
Highland Heights Municipal	Highland Heights	42.0
Brainard	Lyndhurst	12.7
Mayfield Road	Lyndhurst	3.7
Lyndhurst Municipal	Lyndhurst	17.4
R.J.Taylor	Cleveland	7.4

Trebisky	Richmond Heights	10
Richmond Heights Municipal	Richmond Heights	22
Schaeffer Park	Lyndhurst	10.7
Schaeffer Park Extension	Lyndhurst	2.77

Board of Education Properties

There are five school districts within the watershed. Many of these districts have facilities adjacent to the creek or headwaters. Using these connections for environmental education and meeting science curriculum standards for schools pose an opportunity to promote stream stewardship and advance science curriculum needs to local districts.

Table 13. Euclid Creek School Districts

School District	Total Acreage	Enrollment 2004-05
South Euclid – Lyndhurst	130.96	4,583
Mayfield	79	4,334
Euclid	17.8	6,420
Richmond Heights	30.38	1,119
Beachwood	16.2	1,596

Source: Cuyahoga County Planning Commission and Ohio Department of Education Fall Enrollment Data 1993-2004. Euclid, Beachwood and Mayfield Enrollments include facilities outside of the watershed.

Forest

As described in the landscape description of the watershed, the area is part of the mixed forest reflective of the Lake/Plains Eco-region. Due to the urbanized nature of the watershed, there are few remaining areas of forest that remain and many that remain are available for sale for development purposes. These areas are largely fragmented throughout the watershed, with the exception of the areas that run along or adjacent to the East Branch and Main Branch. Prioritizing protection or conservation development along these adjacent lands will enhance these existing corridors and conserve these remaining forested areas that will benefit the communities related to storm water management and retention, air pollution and retention of valuable plant and animal species of the watershed.

Agriculture

There are no agricultural uses within the geographical boundaries of the watershed. The watershed does contain a number of commercial nurseries with none of them encompassing greater than 10 acres. There are a small of amount of areas that contain recreational horse uses in the Highland Heights and Willoughby Hills communities but no properties greater than ten acres.

Ponds or Lakes

There are no large ponds or lakes within the Euclid Creek Watershed. The ponds and lakes that do exist consist of detention ponds or lakes that were installed as part of the storm water management needs of on site facilities and properties. There are three in-

line ponds that exist that are filling in with sediment and may pose maintenance problems in the longer term.

Non-forested wetland

It is not known if non-forested wetlands are present within the watershed. However, due to the urban development, the likelihood of large areas of non-forested wetland are not likely. Examination of wetlands location and delineation can provide substantial information regarding the presence of non-forested wetlands in the watershed and will be continued to be examined and delineated as part of the watershed plan implementation activities.

Protected Lands

The Euclid Creek watershed is fortunate to be the location where public lands from a variety of levels of government exist. These include the major protected lands of the Cleveland Metroparks Euclid Creek Reservation and the Ohio Department of Natural Resources. A total of 544 acres is currently protected for conservation within the watershed.

Cleveland Metroparks Euclid Creek Reservation

The Euclid Creek Reservation comprises of 345 acres within the communities of Euclid, South Euclid and Richmond Heights and extends along the banks of Euclid Creek approximately three miles. The reservation is located along the northern end of the main branch of the creek and where the East Branch confluences with the main branch. Due to its proximity within a highly urbanized area, the Reservation is one of the most visited parks within the Metropark System.

Visitor Occasions (driving through the parkway trips)
Yr 2002 2,004,356
Yr 2003 2,077,139

Visitor Recreation Visits (use of facilities)
Yr 2002 1,053,577
Yr 2003 1,377,219
Source: Cleveland Metroparks

As the Metroparks 2000 Concept Value Plan states:

"Euclid Creek Reservation's primary resource is the creek and the narrow gorge through which it flows. Its steep sloping sides rise in some places, 100 feet or more above the bed of the creek, creating dramatic views of exposed geologic formations and Lake Erie. While the narrow gorge makes Euclid Creek Reservation unique and provides views, it also limits the opportunity for providing facilities to meet user demand. The reservation experiences heavy picnicking use, with weekend summer use exceeding capacity. Extreme congestion, parking along road berms and compaction of soil in popularly used areas are obvious symptoms of over-use."

As Metroparks continues to implement it recommendations four main areas provided an interest in a stronger partnership with Euclid Creek efforts.

1) land acquisitions of adjacent lands – significant non-park natural resources.
2) Meadow area for floodplain/water quality filtration needs
3) Trail Connections to adjacent areas such as Glenridge, Wildwood and Richmond Hts.
4) Interpretation of Water Resources & the Watershed.

ODNR – Wildwood/Euclid Beach

The Ohio Department of Natural Resources manages the Lakefront State Park which comprises of five regional parks along the coastline of northeast Ohio. Wildwood, Euclid Beach and Villa Angela Beach is part of this system in which Euclid Creek travels through and empties to Lake Erie at. The two parks cover 185 acres in the City of Cleveland, and create one of 22 public access areas to the Lake Erie.

The park facilities contain the following:

Euclid Beach Park Facilities include: (ODNR)

- 650-foot swimming beach with shaded picnic areas and a scenic observation pier.
- The picnic area above the beach has a pavilion that can accommodate groups up to 50 people.

Villa Angela Facilities include**:**

- Scenic boardwalk
- Fitness trail
- Bathhouse
- Wheelchair accessible fishing pier and 900-foot swimming beach. A variety of plant species and scenic overlooks can be found here. A bridge connects this area to the adjacent Wildwood area.

Wildwood Facilities include:

- Six-ramp boat launch
- Picnic area with a picnic shelter that can accommodate groups up to 50 people.
- Beach concession
- Access to the summer walleye fishery in the central basin of Lake Erie, Wildwood has two lengthy rock breakwalls to accommodate shore anglers.
- Visitation to the parks in 2003 was 635,157 for Wildwood and 277,485 for Euclid
- Beach.

The programming provided through the ODNR Park office creates opportunities for people to participate in recreational and educational activities at the mouth of Euclid Creek. The Park provides a variety of programming that include canoeing, moonlight hikes, nature discovery programs for youth and adults, family fun nights and participation in the Coastweeks events.

Wildwood serves as the northern anchor Euclid Creek and its confluence to Lake Erie. It provides a great opportunity to enhance coastal resources and the recreation and interpretation activities to communicate both stream and coastal processes.

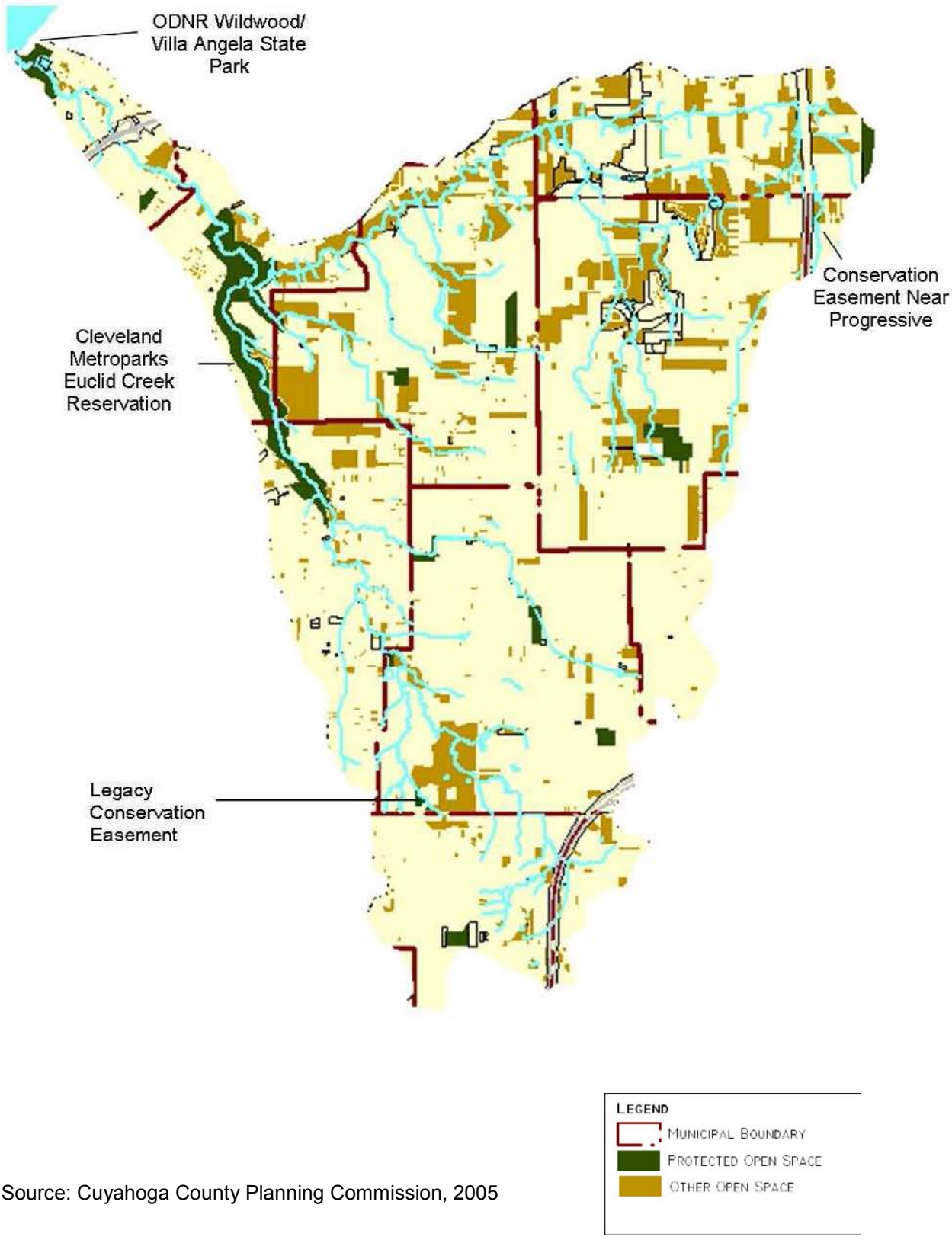
Marina

The Wildwood marina serves the region with an active docking area, bait shop, charter boats and a private yacht club. These services have been part of the Euclid Creek mouth for over fifty years at some capacity. A charter boat titled the Linda Mae continues to provide fishing and tour charter services from Wildwood.

Conservation Easements

The Euclid Creek Watershed currently contains two conservation easements administered by the Cuyahoga Soil & Water Conservation District. The easements are both located within the headwaters of the creek in Lyndhurst and Mayfield Village with a total of 13.8 acres. These easements provide additional buffering to the headwaters of Euclid Creek and should be maintained and expanded if feasible to protect the creek's water resources.

Figure 35. Current Protected and Unprotected Open Space



Source: Cuyahoga County Planning Commission, 2005

Other Public Lands - Unprotected

Cuyahoga County Airport

The Cuyahoga County Airport, administered by Cuyahoga County, located in the East Branch watershed of Euclid Creek is the largest land owner within the watershed containing approximately 640 acres of land. The Airport serves as a reliever to Cleveland Hopkins International Airport and provides service for 70,000 flights per year. In addition to the Airport services it provides to the region, the land also includes a public golf course and land developed for office buildings and undeveloped land.

The Airport currently is in the process of developing a Master Plan for the future needs and development of Airport lands in conjunction with meeting new FAA standards on extended runway areas. There are six headwater streams that travel through, under or adjacent to the Airport. The management and maintenance of the Airport can have a major impact to the health of those streams in the future. It will be important to work with Cuyahoga County in developing the Master Plan to meet the aviation and safety objectives of the airport and take into consideration the environmental impacts of its surrounding water resources.

Other Educational Institutional Establishments

Outside of the public school institutions, the Watershed boasts many private educational facilities with many adjacent to the creek and its headwaters. These institutions include the Notre Dame College(53 acres), Hawken School, Regina High School and nearby Villa Angela High School. In addition many smaller private schools exist throughout the watershed that serve students from kindergarten to eighth grade.

In addition schools such as Collinwood High School, Beachwood Schools and Cuyahoga Community College – East Campus, and John Carroll University have established staff with environmental interests in promoting and advancing stewardship education within their programs.

Working with private and public educational institutions at all levels of learning can increase the stewardship of the future generations within the watershed and support these establishments learning needs to meet curriculum standards.

Nottingham Water Plant

The Nottingham Water Plant commissioned by the City of Cleveland is located in Cleveland along the main branch of Euclid Creek. The site contains approximately 65 acres of land serving its intake and output needs for source water facilities. Since 1951, this facility has maintained and served the Euclid Creek Watershed communities for their water needs.

Utilities/Transportation Corridors

Two major regional highways bypass through Euclid Creek Watershed. I-90 travels over the creek on the north end at river mile 1.26. This section of the creek is culverted at a length of 960 feet. The second highway is I-270 that travels on the southeast end of the headwaters of the watershed and has three headwater streams culverted under it. These transportation corridors are essential to regional and national transportation

patterns. However, evaluating infrastructure improvements to their sustained service may provide opportunities to offer a healthy bypass system for Euclid Creek waters.

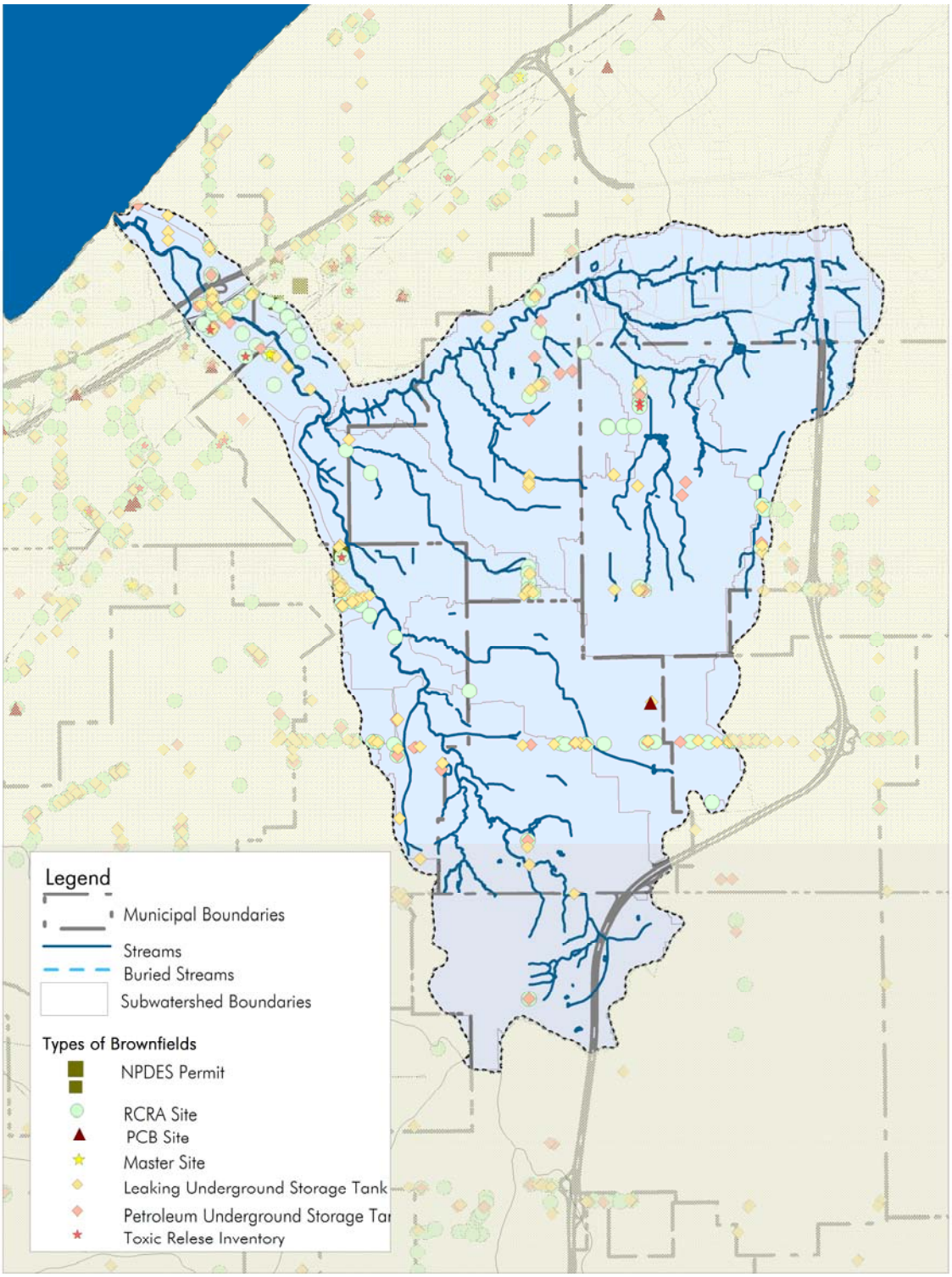
According to the NEORSD RIDE Study Draft, there are currently 73 culverts and/or bridges that Euclid Creek waterways cross under throughout the watershed that are associated with a street, highway or railroad. These bridges and culverts are in varying condition and in need of repair or replacement.

Additionally, the watershed contains many roadways with traffic counts exceeding 40,000 a day at their intersections. These roadways serve the communities as well as serve as direct links to downtown Cleveland and are an important part of the watershed economic viability. As with the major highways, infrastructure improvements in the future for these roadways, may provide restoration opportunities to improved water resources for daylighting or open bridge versus culverts for Euclid Creek.

Brownfields/Regulated Sites

The map shown in figure 30 outlines the location of regulated sites within the watershed that include RCRA, Underground Storage Tanks, and information from the Toxic Release Inventory. These sites are currently regulated and inspected by Ohio EPA. While no specific water quality impacts of these sites have been identified, these sites should continue to be monitored to ensure their safety and no cause of pollution to Euclid Creek's water resources. In addition, these sites can provide redevelopment opportunities for the communities which can also allow infill conservation activities and best management practices introduced within developed areas of the watershed.

Figure 36. Brownfield/Regulated Sites



Source: Ohio EPA, Cuyahoga County Planning Commission

Cultural Resources

The history of Euclid Creek exemplifies the settlement patterns associated with Watershed conditions today as well as provides a glimpse in the community prosperity Euclid Creek experienced in the early years of settlement.

Most of the watershed lies in old Euclid Township, created as the largest Connecticut Western Reserve survey unit in 1796 and was completely platted in June, 1797 and settlement began forthwith. Pioneers build grist and sawmills on the creek's numerous high gradient headwater branches. By 1840, the sizable estuary at the mouth, served as an important Great Lakes boatyard and localized fishing port. These early activities foreshadowed substantial manufacturing during the early twentieth century.

To examine the historical progression of development in the watershed, a landscape approach is presented within five periods. In addition, more detailed information regarding timeline events and places are included in Appendix F.

Euclid Creek Historical Landscapes

Water & Wind, 1796-1851. In September 1796, Moses Cleaveland completed the initial Connecticut Western Reserve survey. It was a troubled month as most of the field crew threatened not to return in 1797. To solve the labor dispute, Cleaveland create a very large township just east of capital settlement (Cleveland) The 41 "protestors" bought the township and dedicated it and its major watercourse to Euclid, the classical geometer.

Three features drew settlers to Euclid Creek. First the waterfalls on the main and headwater branches provided numerous mill sites for processing wood and grain. Second, the Cleveland-Buffalo Road crossed Euclid Creek at a deep chasm. Businesses catering to arrested travelers thus grew at Euclid Creek village. Third, with its lake access, the Euclid Creek estuary saw the earliest industrial development. By 1820, clay was being imported to establish a stoneware kiln and, by 1840, a significant boatyard was launching schooners of up to 400 tons.

Steam and Rails, 1852-1894. In 1852, the CP&A RR gave Cleveland rail links with Chicago and New York City. Euclid Creek bluestone became a prime export, and the watershed's tempered climate produced exportable table fruit and wine. These labor-intensive industries attracted a wave of northern European immigrants. Some immigrants were quite innovative and successful. For example, German Louis F. Harms established the first winery in 1868.

After the Civil Water, the CP& A gave wealthy Clevelanders a means to seek summer refuge along Lake Erie. In addition, the first significant advance in road transport came as today's Euclid Avenue and Mayfield Road were "planked" during the 1870's.

Electrification, 1890-1919. Interurban railroads helped transform a relatively rural Euclid township into a number of trendy eastern suburbs. The watershed became the realm of both exclusive private estates and middle class resorts, the latter including the famed Euclid Beach amusement park.

Electrification also brought manufacturing and burgeoning population to Euclid Creek. Nottingham Village seceded from Euclid Township in 1899.

Early Automobiles, 1920-1962. By the mid 1920s, the old Indian trails constituted an extensive road system. And in putting in scores of residential streets, the watershed's new municipalities completed a truly dense transportation network. The stage was set for rapid development.

Amidst the rush to create municipalities out of old Township I in the late 1910s, the Cleveland Metropolitan Park Board purchased the west branch gorge lands to create the Euclid Creek Reservation.

The late 1940s, brought thousands of postwar bungalows to the watershed, while the 1950s brought expansion of ranch house subdivisions.

Interstate Exurbia, 1963-2005. By 1960, local industrial production had peaked and the region began a slow but steady decline in building. Ironically, industrial decline coincided with the arrival of the Interstate Highway System. I-90/Ohio Route 2 (1963) and I-271 (1965), the two major highways within the watershed, quickly drew development to the watershed's east and south fringes. By the late 1990s, the last rural tracts in eastern Cuyahoga and western Lake counties had been fully built-out.

Beyond housing, building in the new cities concentrated toward retail consumption. In 1966, Richmond Mall in Richmond Heights was built. In the 1970's, Beachwood Place and LaPlace Mall and retail center rose in Beachwood. And most recently, Legacy Village was built in 2003 on the former Bolton Estate as Northeast Ohio's first "lifestyle center".

This progression of development demonstrates how quickly patterns evolved in Euclid Creek and great experiences that have occurred across the landscape over the past 100 years.

Recreational Resources

In addition to the recreational services of the Cleveland Metroparks, ODNR State Parks and local City Parks, the Cuyahoga County Planning Commission is working with the Watershed Planning process to identify additional greenspace and recreational resources to enhance or create within the watershed. These efforts include developing a trail network to connect existing parks, cultural resources and neighborhoods as well as creating bikeway and scenic byways linkages with other regional and state resources such as the Lake Erie Circle Tour, the Lakefront Trail Corridor and the Cuyahoga County Greenspace Plan.

Combining these recreational aspects with the water quality needs of the watershed can

provide dual benefits to the quality of life of the residents in the watershed as well as improve the ecology of the places that surround them. The Cuyahoga County Planning Commission is developing the Euclid Creek Greenspace Vision presently and will be ready for distribution in the summer of 2005.

Draft Trail/Route Recommendations for Euclid Creek Watershed - Summary

Connecting Euclid Creek with the Region

- Use the Cuyahoga County Planning Commission's Greenspace Plan as a framework; a series of loops and spokes serving all parts of the County with Downtown Cleveland as its center.
- Develop the First Ring Loop which would connect the communities in the Euclid Creek watershed to Lake Erie and the Lakefront Bikeway route. This loop would also offer the potential for linking Euclid Creek communities to the Towpath Trail and the Cuyahoga Valley via Mill Creek to the south.
- Encourage the establishment of a greenway between the Euclid Creek Reservation and Wildwood State Park in order to connect the Euclid Creek communities to Lake Erie.
- Connect Euclid Creek to the Chagrin Valley. This has been envisioned since the first Metroparks' master plain in 1916. Despite urbanized development patterns, a connection can be made through a formal bike route between the North Chagrin Reservation and Euclid Creek. There are several opportunities to provide locations for scenic views as well as interpretive displays along this route.
- Use the right-of-way of Shaker Boulevard for the construction of a trail, following the City of Beachwood's example. This could be part of a connection to University Circle and the Chagrin Valley.
- Undertake complementary projects that would enhance the trail experience such as improving the aesthetic appearance (walls and lighting) of bridges crossing Euclid Creek on streets such as Lakeshore Boulevard, Euclid Avenue, Monticello Boulevard and Mayfield Road.

Connections within the Watershed

- *Quarry Rail Loop* – Develop a trail along the vacated quarry rail corridor to serve residents of surrounding neighborhoods and create an opportunity to highlight the import role of the quarries in watershed history.
- *West Branch Connector & East Branch Loop* – Establish trails/ routes that would connect parks, schools, civic centers of the various communities within the watershed. Take advantage of existing paths, trails, and bike routes. These connections offer the opportunity to highlight many places through out the watershed. For example: institutions, resorts and estates such as Blossom House, rare plant species at Highland Heights Park as well as the original forests of Cuyahoga County, and major county facilities such as the Cuyahoga County Airport.

Local Connections

- *Beachwood Place Spur* – Make Beachwood Place a more pedestrian and bike friendly area. Specifically make a connection between retail areas and adjacent residential units to the east and south. Some examples could include: renovating areas of the creek as amenities with walkways, sitting/viewing spots, etc., redesign portions of Beachwood Place to reduce impacts on stormwater flow, revitalize underused portion of residential property to east of mall.
- *Lyndhurst Spur* – Make a connection between Lyndhurst municipal complex to Legacy Village and Brush High School. Some examples of improvement could include: a walking path along the creek tributary on municipal property, signage, tree planting, etc. along the route.
- *South Euclid Connector* – Develop a walking/biking route serving the center of South Euclid, including the South Euclid/Lyndhurst Branch Library and the South Euclid Historical Society. Some example of improvements could include: paths along route to access ball fields, highlighting of stream restoration at Public Library, etc.

These recommendations will continue to be reviewed by the Euclid Creek communities for consideration and community support to identify projects for implementation in tandem with watershed action plan implementation recommendations.

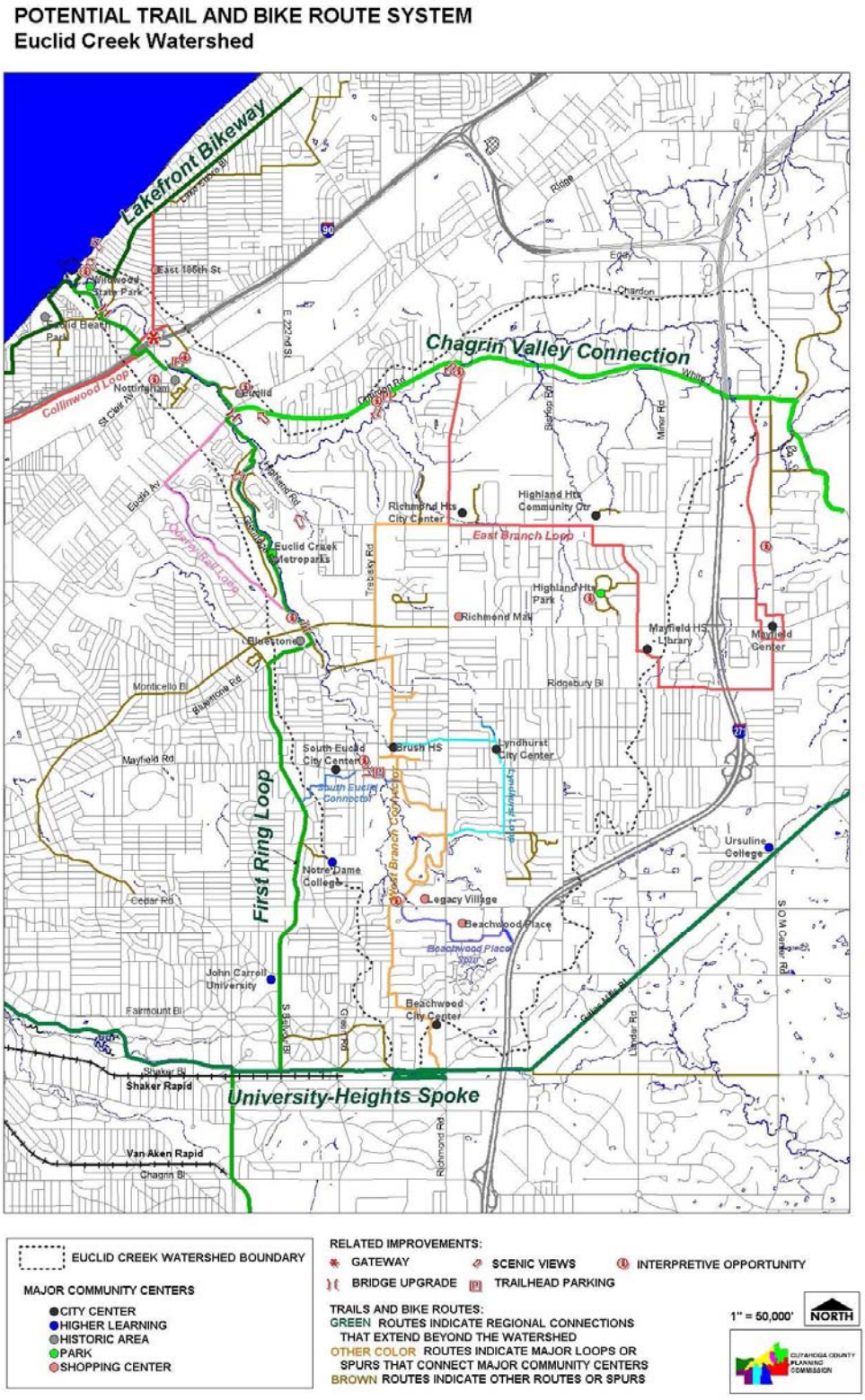
Previous and Complimentary Efforts in the Watershed

The Euclid Creek Watershed has been relatively new within evaluation of watersheds compared to other well established groups such as the Chagrin River or Maumee River. However, due to the support of various regional agencies over the years, Euclid Creek has been part of numerous water resource evaluation studies for Ohio EPA, Northeast Ohio Regional Sewer District , Cuyahoga County Board of Health, Cuyahoga Soil and Water Conservation District and NOACA.

The Watershed was part of the initial pilot project with NOACA and Cuyahoga SWCD to evaluate Phase II implementation in 2001 that resulted in the formation of the existing Euclid Creek Watershed Council.

The implementation of these studies, within the watershed, have been minimal. Most of the implementation projects in the watershed in the past have been for stream stabilization related to flood control and streambank stabilization, not necessarily for water quality improvement. This plan will provide the information collected over the years on water quality a direction to guide water quality improvements and implementation activities for the future.

Figure 37. DRAFT Trail Concept Recommendations



E. Physical Attributes of Streams and Floodplain Areas

Early Settlement Conditions

Euclid Creek typical to streams in this region, historically meandered its way to Lake Erie through the plateaus and deep ravines of the landscape. Also, the creek presented numerous headwater streams feeding into the Main and East Branches of the creek.

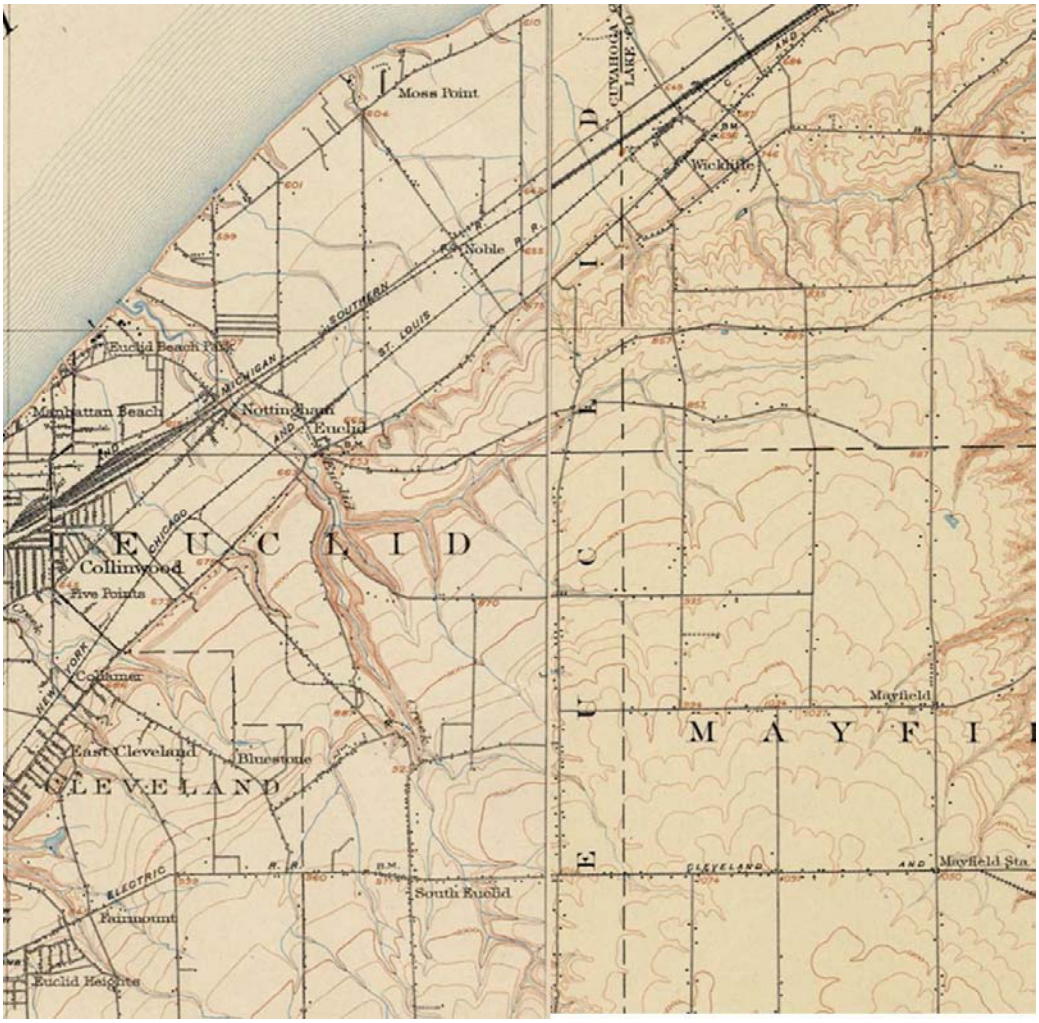


Figure 38. Euclid Creek Pre-Settlement, U.S.Geological Survey , 1903

Channel & Floodplain Condition

The channel and floodplain conditions of Euclid Creek have been highly modified as a result of development patterns the past four decades. Channel modifications include the use of gabions, culverting, concrete channeling and other hard armoring materials. Of the 40 plus miles of stream in Euclid Creek, 10.4 miles are culverted or buried with 30.1 miles remaining as an open channel. (NEORSD Draft RIDE Study, 2004). These modifications have been used in the past to provide stream stabilization and flood protection to adjacent residents as a result of flooding and storm water management problems in the past in association with urban development.

Table 14. Summary of Physical Attributes of Euclid Creek and its tributaries

Water Body Segment	Length in miles	# of miles with permanent protection	# of miles never modified/natural channel	# of miles modified channel
Main Branch				
Sub-watershed 1	3.0	1.3	0.83	2.17
Subwatershed 2	6.8	2.53	5.25	1.55
Subwatershed 6	3.1	0	0.40	2.70
Subwatershed 7	6	0.7	3.8	2.2
East Branch				
Subwatershed 3	3.1	0.3	1.8	1.3
Subwatershed 4	6.3	0	2.58	3.8
Subwatershed 5	5.3	0.10	2.55	2.75

* These are approximate measurements based upon aerial photography , base map information and preliminary field surveys and are subject to change as more detailed assessment is performed.

Number of miles of Forested Natural Riparian Corridor

A full assessment of natural riparian corridor has not been conducted for Euclid Creek. For the purpose of this study, a general evaluation was conducted for the Main Branch stem and the East Branch main stem. Due to the urban nature of the watershed, the evaluation assessed the natural corridor using three distance parameters from streambank of water body on both sides: 1) 10-25', 2) 25-75' and 3) Over 75'. The urban nature of the watershed will require the flexibility of assessing the value of the varying widths of the forested stream corridors to maximize these natural areas on a watershed-wide basis. This assessment was conducted using aerial photos from 2003 and baseline stream layers. The 75' threshold was based on riparian corridor setback parameters set by regional model ordinances for this size of watershed.

Table 15. Forested Natural Riparian Corridor (in miles)

Water Body	10-25'	25-75'	>75'
Main Branch (main stem) From Lake Erie coastline to Mayfield Road	1.4	2.12	3.10
East Branch (main stem) From confluence of main branch to I-271	1.29	1.11	2.4

Dams

The Euclid Creek watershed has six dams of varying size located throughout the watershed. The most prevalent is located in the lower section of the creek near St. Clair Avenue in Cleveland just below the CSX Railroad tracks. The dam called the St. Clair spillway was installed in the 1960's as part of the construction of I-90 just north of it. Currently the dam restricts fish migration from Lake Erie to make its way upstream within Euclid Creek and prohibits habitat enhancement of the biology within and adjacent to the stream. The dam is approximately 9-10 feet in height and is made of concrete. There are no records of the dam serving as an encasement for utilities.

Additional dams are at the following locations: within the Euclid Creek Metroparks Reservation under the Highland Road bridge, south of Cedar Road in Beachwood ,in Richmond Heights at the old Mayfair Swim club site, west of Dumbarton Road north of Highland Road, private property north of White Road and pond impoundments in Beachwood and Richmond Heights.

The dams restrict the movement of fish and aquatic resources that can lead to an increased vitality to Euclid Creek's health.

These dams, particular in the lower reaches of the watershed, need to be assessed further to identify ownership, feasibility of removal, removal benefits, restoration alternatives, costs and benefits to the community.

Table 16. Dams

Dam Location	City	Height	> than 50 acre feet in capacity	Stream Feet Impoundment
CSX Railroad/North of St.Clair (this is a spillway structure)	Cleveland	Approx 9-10ft	No	0 feet
Cleveland Metroparks East Branch	Euclid	8ft	No	200 feet
Mayfair Club	Richmond Heights	NA	No	NA
David Myers Parkway	Beachwood	3 – 4ft	No	NA
Dumbarton	Richmond Heights	12-14ft	No	NA
White Road	Willoughby Hills	NA	No	NA

NA: Not Available

St. Clair Spillway

East Branch Metroparks Dam

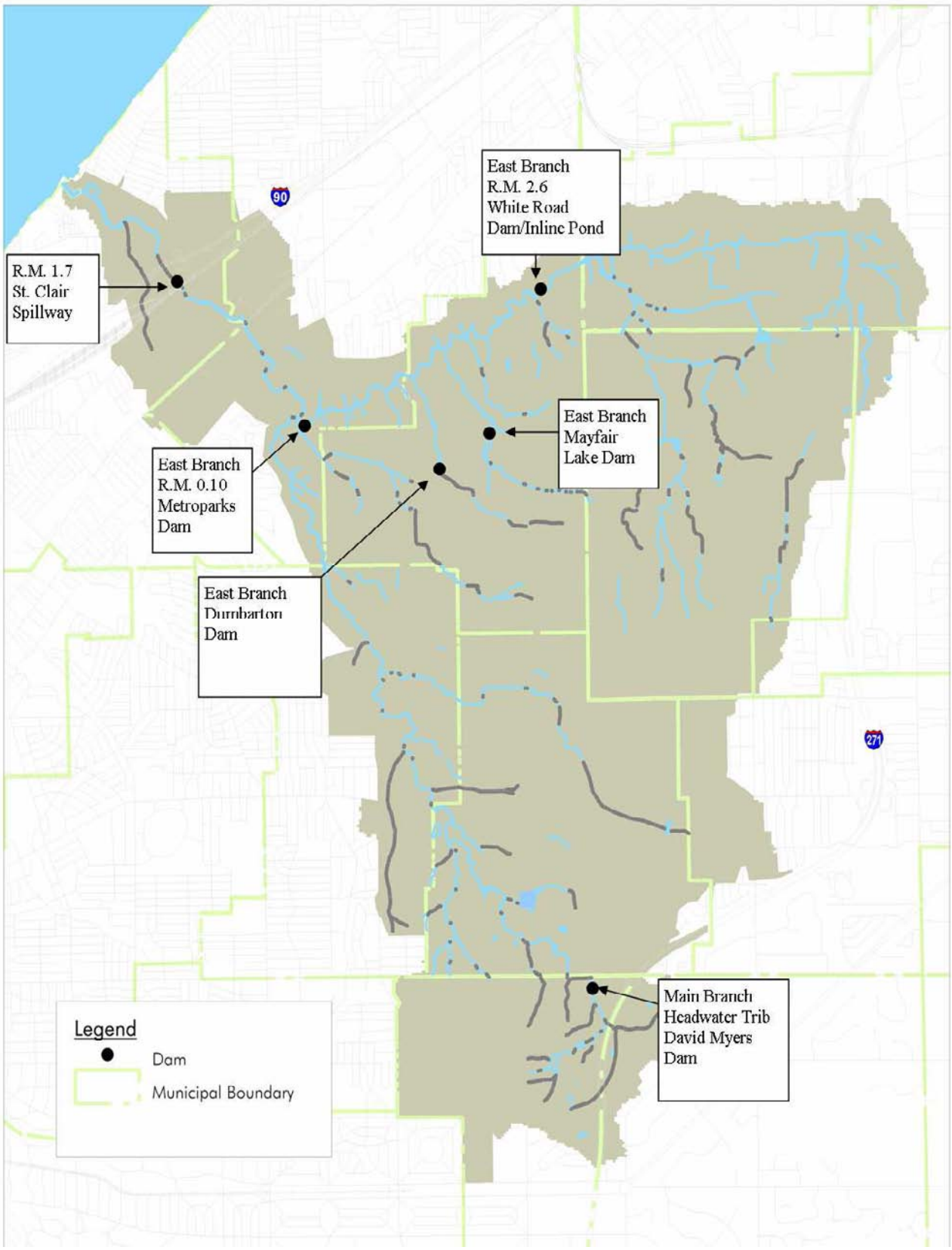


Figure 39. Dam Locations in Euclid Creek Watershed

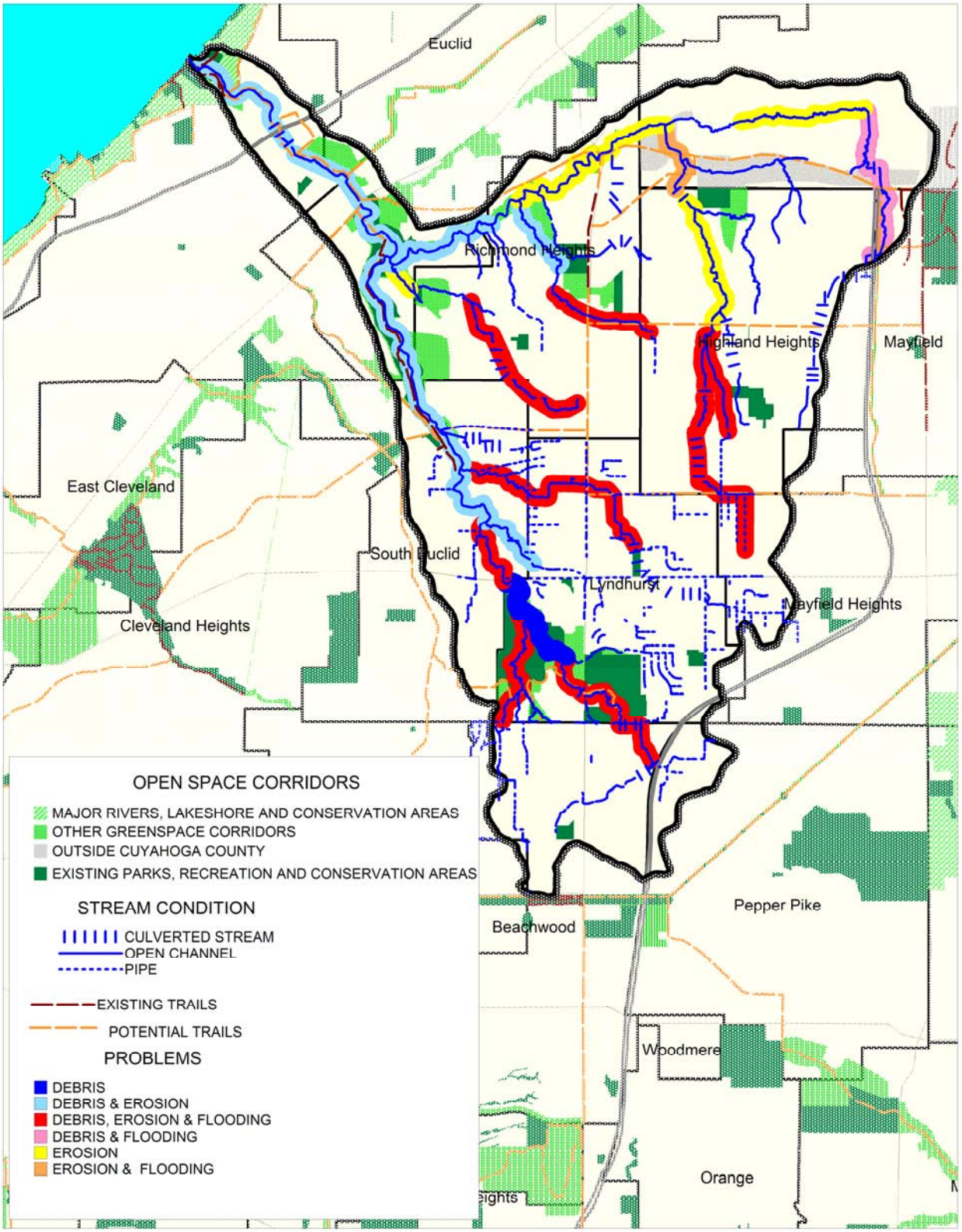


Figure 40. Erosion Areas
Source: NEORSD Draft RIDE Study, 2004, Cuyahoga County Planning Commission

Channelization

Due to the urban nature and historic land patterns, channelization is prevalent throughout the Euclid Creek watershed. The Creek and its branches contain over 4.7 miles(NEORSD) channelized of the total 43 miles. Channelization within the watershed occurs in a variety of forms that include use of gabions, concrete armoring, straightening and confinement of waterway and culverting. Channelized portions of stream increase the natural flow of the stream especially during high storm events. This also prevents the stream channel to utilize adjacent floodplains if they exist or alternative land uses to provide additional filtration services for pollution as the water moves downstream.

These areas have been identified on the sub-watershed plan recommendations to assess their condition for restoration and alternative recommendations for future channelization projects and flood control needs.

Eroding Banks

The Northeast Ohio Regional Sewer District through their RIDE Study survey conducted in 2003, identified eight areas and 16 miles of stream within the Euclid Creek watershed demonstrating various severities of erosion as shown in Figure 40. The erosion areas are a result of increased volumes and flow due to the urban nature of the stream and the natural occurrence of erosion in the headwaters area of the watershed.

As part of the NEORSD RIDE Study an assessment of erosion in Euclid Creek was developed based upon field observations, the findings of a hydrologic/hydraulic evaluation and criteria for erosion potential that was developed for the RIDE Draft Study. The NEORSD developed evaluation criteria for erosion potential through establishing low, medium and high erosion potential rankings based upon three conditions: 1) field observation, 2) percent flow area exceeding bankfull area and 3) velocity exceeding erosive velocity of channel.

Table 17. Summary of Erosion along the Euclid Creek Watershed Modeled Drainage System by the Northeast Ohio Regional Sewer District

Observed Erosion:
From communities: 8 sites
From Field:
High Erosion – 1 site
Medium Erosion – 7 sites
Exposed Utilities – 2 sites

Erosive Velocity
High: 8.8 miles (22.8%)
Medium: 3.9 miles (16.8%)

Out-of-Bank Conditions
High: 15.9 mi (38.6%)
Medium: 0.6 mi (1.7%)

Overall Severity
Severe: 10.0 mi (25.8%)
Moderate: 6.1 mi (15.8%

Source: NEORSD,
DRAFT RIDE Study, 2004

As part of the Subwatershed Plan recommendations, these erosion areas will be identified for stabilization priorities and best management practices needed to fit the conditions of Euclid Creek for the future prevention of erosion areas and part of the habitat enhancement evaluation.

Detention Ponds/Basins

The urban development of the watershed has created approximately ten (10) detention basins within the watershed to provide stormwater volume control for onsite runoff from development sites. Currently, these basins do not provide water quality services to their sites nor the watershed.

As development or redevelopment continues to occur and the maintenance of existing basins, retrofitting and developing water quality detention basins can greatly benefit the watershed communities in meeting water quality standards and providing aesthetically enhanced areas for habitat conditions.

In addition, there are at least seven but not more than 15 ponds on private property serving historic aesthetic purposes. Some of these ponds were placed in-line with the stream. Due to their age, many have begun to fill with sediment and will require additional maintenance and evaluation on their functionality in relationship to public health and water quality.

Floodplain Connectivity

As a result of the urbanization of the watershed, few areas of floodplain remain intact. These are typically located in the protected lands of the Metroparks, other public lands, and the East Branch main stem.

Entrenched miles

Entrenchment is the degree of flood flow confinement. It is the ratio between the width of the flood prone area to the width of the bankfull channel. Basically entrenchment means this bankfull discharge cannot occur. This prevents the stream and its adjacent floodplain to work in tandem of each other to provide the following services: flooding to decrease the velocity in the channel, filtration of pollutants to improve water quality with streambank vegetation, and recharging of groundwater.

Although measurement of entrenchment within Euclid Creek has not been conducted, field observation indicate entrenchment is a prevalent condition throughout the watershed as a result of the increased erosive velocity of flows.

The ratio of the streambank height to bankfull stage is considered the bank height ratio. The following #'s have been determined to measure entrenchment conditions.
1.0 to 1.1 Stable Stream
1.1 to 1.3 Slightly Incised
1.3 to 1.5 Moderately Incised
1.5 or greater Deeply Incised

These measurements should be taken at riffle locations. Through the Qualitative Habitat Evaluation Index (QHEI) assessment recommended in the Watershed Action Implementation recommendations, determination of entrenchment conditions will be part of the assessment activities.

F. Water Resource Quality

The Euclid Creek TMDL process by the Ohio EPA was conducted concurrently and in cooperation with the Watershed Action Plan process. The information provided in this section was compiled through this cooperation and the TMDL development process. As a result, the information presented in this section is supported and can be referenced for additional detailed information within the Euclid Creek TMDL document, currently in the review and public comment process.

Use Designation and Attainment Status

In the Euclid Creek watershed, the aquatic life use designations that apply to various segments are Warmwater Habitat (WWH) and Limited Resource Water (LRW). Waters designated as WWH. As determined by these designations and the water quality standards associated with them attainment levels are identified by Ohio EPA. Based upon these standards, Euclid Creek does not meet attainment within its main branch and is in partial attainment of these standards within the East Branch.

Another type of use in the water quality standards is for recreational purposes. The recreational use for the majority of the Euclid Creek watershed is Primary Contact Recreation (PCR).

Table 18. Use Designation

Water Body Segment	Aquatic Life	Water Supply	Recreation
Main Branch	WWH, LRW	AWS, IWS	PCR
East Branch	WWH, LRW	AWS, IWS	PCR, SCR

Secondary Contact Recreation has been identified in an unnamed tributary of the East Branch by Ohio EPA.

Euclid Creek was most recently surveyed by Ohio EPA in 2000. Additional surveys were conducted in 1989. Additional water quality studies have been conducted in the stream by the Northeast Ohio Regional Sewer District (bacteriological, biological, chemical, and habitat), the Cuyahoga County Board of Health (bacteriological, biological, chemical, and habitat) and Cleveland Metro Parks (Headwater Habitat)

Miles of Attainment

There are currently zero (0) miles within Euclid Creek that are in full attainment of the State's water quality standards. The East Branch is in partial attainment.

The monitoring historically conducted and the sampling sites for Euclid Creek have been concentrated in the lower reaches of the creek with the exception of one at Mayfield Road along the Main Branch.

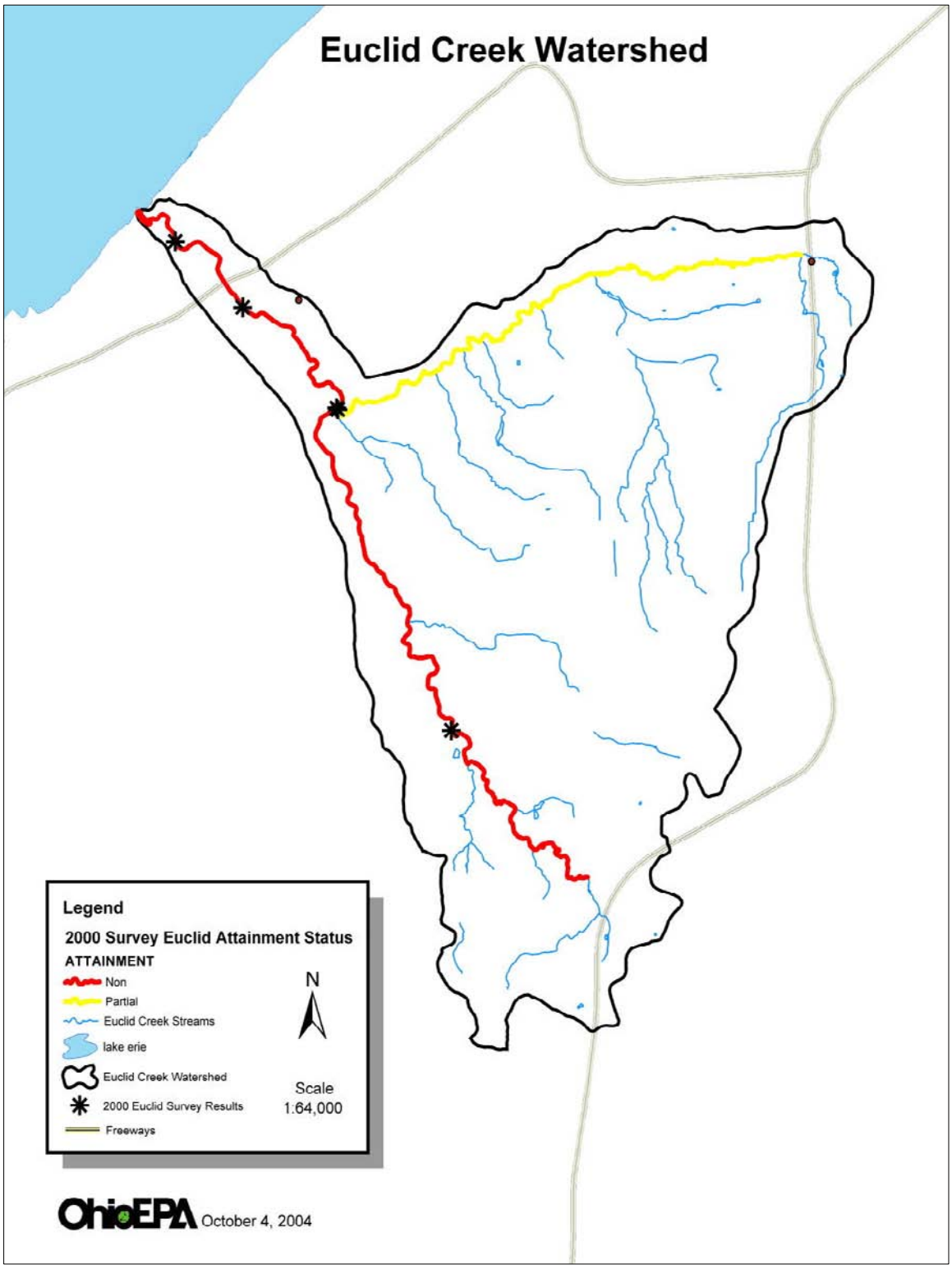


Figure 41. Attainment Status

Table 19. Summary of the 2004 303(d) listed segments included in this TMDL report

Waterbody Segment Description [Identification Number]	303 (d) Status [1] 2004	Major causes 303(d)	TMDL in this report?[3]	Sources (Significance of Impairment)
Lake Erie tributaries (East of Cuyahoga River to West of Grand River); excluding Chagrin River 04110003 010				
Lake Erie tributaries (East of Cuyahoga River to West of Grand River); excluding Chagrin River [OH 90 16]	Y	Organic Enrichment/ D.O. Flow Alteration	Y	Combined Sewer Overflow Urban Runoff/Storm Sewers

[1] The 2004 303(d) list was based on data collected in 2000.

[2] The impairment rank is Ohio EPA's prioritization of the various impaired subwatersheds; refer to Ohio EPA's 2004 303(d) list available at: http://www.epa.state.oh.us/dsw/tmdl/303dnotc.html for more information.

[3] ! TMDL numbers are included for total phosphorus and sediment. Low D.O. and altered habitat are not load based causes of impairment. Allocations for factors affecting instream D.O. (TP, NH_3,$cBOD_5$, D.O., shading) and habitat (components of the QHEI scores) are included and are considered to be a parallel concept to a 'TMDL' for load-based parameters.

Checkmarks indicate inclusion in this report. For example: a checkmark next to organic enrichment means that the specific impairment is directly addressed in this TMDL.

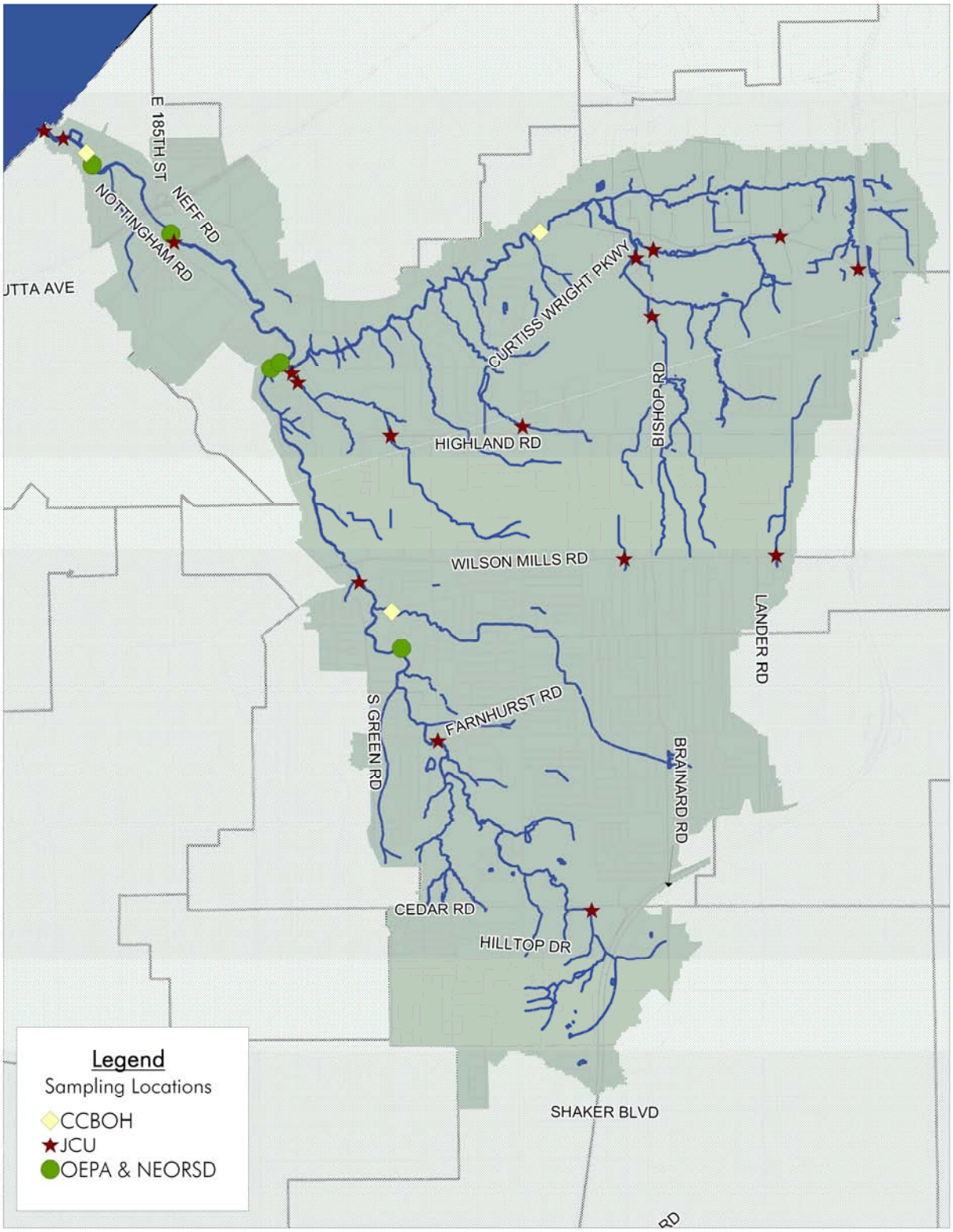


Figure 42. Euclid Creek Sampling Locations 2000-2004

CCBOH- Cuyahoga Board of Health, JCU – John Carroll University
OEPA – Ohio Environmental Protection Agency, NEORSD – Northeast Ohio Regional Sewer District

Summary of Euclid Creek TMDL

In concert with the Watershed Action Plan process, a TMDL was developed for Euclid Creek. The TMDL utilizes the sampling conducted in 2000 for the creek to determine the constraints to meeting federal and state water quality standards. The TMDL uses sampling conducted by Ohio EPA, NEORSD, Cuyahoga County Board of Health and John Carroll University to examine the conditions and determine causes and sources of the limited water quality within Euclid Creek. The following information is provided by the TMDL Draft Plan and Ohio EPA.

Chemistry

Chemistry analysis conducted in Euclid Creek indicate a watershed moderately influenced by human activities. Chemistry data has been collected by Ohio EPA and the Northeast Ohio Regional Sewer District from 1989 – 2003 on an annual basis with some additional sampling conducted from 1977 to 1981. Sampling has occurred consistently at four common sites along the creek.

Trends observed in water quality parameters from 1977 through 2003 document water quality improvements and reductions in a number of these parameters. Some of this is due to the elimination of illegal and illicit discharges from industrial sources. A number of sewage treatment plants have also been eliminated by connection to larger regional facilities, removing their pollutant loads from the Euclid Creek Watershed.

Pathogens

Bacteria

Fecal coliform violations have been detected at sites in the Euclid Creek areas most recently in 1997 at St. Clair Road. Water Quality standards also include narrative criteria indicating that all waters are to be “free from public health nuisances associated with raw or poorly treated sewage.” At this time Euclid Creek is meeting the water quality standard for recreational use.

Euclid Creek has historically experienced numerous violations of the bacterial water quality standards. Causes of this included unsewered areas, numerous small wastewater treatment plants (since eliminated), combine sewer overflows, and frequent sewer breaks or other maintenance issues. Recent bacteria concentrations at the five sites historically sampled indicate that bacteria levels have decreased to where they meet the water quality standard. Samples collected by the Cuyahoga County Board of Health have been more extensive in nature and indicate that there are still problems in many of the smaller tributaries in the watershed. Current efforts are occurring which will bring sanitary sewers into these areas and eliminate septic system discharges.

Nutrients

Data collected in Euclid Creek by Ohio EPA in 2000 indicate that phosphorous remains as an impairment to the watershed that do not meet water quality standards.

Phosphorous

Data collected for phosphorous indicate a decrease in concentration from 1977 to present. Much of this is due to better sewer systems and elimination of wastewater treatment plant discharges. Phosphorous continues to be detected at levels which are above concentrations associated with aquatic system impacts. Concentrations were highest at the East Branch site. A target level of 0.07 mg/l has been established. Using

the target level, 66% of the sites sampled in 2000 were above the target. Of the sites sampled by NEORSD in 2002 and 2003, 30% were above the target level.

Dissolved Oxygen
The D.O. criteria for the Warmwater Habitat segments is a 5.0mg/l average over a 24 hour period and a 4.0 mg/l minimum. Sampling conducted in 2000 by Ohio EPA and by NEORSD in 2000, 2002, 2003 indicate that dissolved oxygen criteria are consistently met. The presence of CSO's and septic tanks within the watershed most likely contributed to this listing in the 303(d) report. Dissolved oxygen was not addressed in the Euclid Creek Draft TMDL.

Suspended Solids/Turbidity
Habitat loss has been identified as a cause of impairment in the Euclid Creek. OAC 3745 1-04(A) states that all waters of the state shall be free from suspended solids and other substances that enter the waters as a result of human activity and that will settle to form objectionable sludge deposits, or that will adversely effect aquatic life. However, no statewide numeric criteria have been developed specifically for sediment or TSS.

The Euclid Creek Draft TMDL has established targets for habitat characteristics in Euclid Creek and presented in Table 20.

Sediment Chemistry
No sediment chemistry sampling has occurred for Euclid Creek by Ohio EPA or other agency at this time and is not planned for the future currently.

Biological
Both fish and aquatic macroinvertebrate communities show signs of impairment in the sampling conducted by Ohio EPA and NEORSD.

Fish
Fish communities exhibit low diversity and a high percent composition of tolerant species.Top carnivores are also generally absent from sampling sites, a sign of disturbed systems. Darters and sculpins are also absent in Euclid Creek, they can be normally found in healthy streams. Fish IBI scores range from 24 to 32 within the basin, all are below the applicable biocriteria standard. The modified index of well being (Miwb), used to evaluate functional stability of the fish community, also show scores below applicable standards. Euclid Creek is considered a headwater stream (<20 mi2 drainage area) for most of its watershed. The MIwb is not utilized for headwater streams.

It should be noted that the number of species collected downstream of a dam located on the mainstem near St. Clair Avenue, was consistently greater than the number of species located above the dam.

Macroinvertebrates
While the fish communities remain impaired, macroinvertebrate communities show signs of potential attainment. The lower two sitess on Euclid Creek (RM 0.7 and RM 1.8) are meeting the water quality standard of 34 (Invertebrate Community Index, ICI). The Lake Shore Boulevard site had a score of 32 which is considered a nonsignificant departure from the water quality standard of 34. The Mayfield Road site, when sampled by NEORSD, in 1998, had an ICI of 36.

Samples tend to be dominated by tolerant groups such as oligochetes and midges and contain low numbers of the more sensitive mayfly, caddisfly, and stonefly (EPT) taxa

Table 20. Euclid Creek Biological Attainment Table (2000 Ohio EPA Data)

River Mile					Attainment	
Fish/Invert.	**IBI**	**MIwb[a]**	**ICIb**	**QHEI**	**Status**	**Comment**
Euclid Creek (19-041)						
			WWH Use Designation (Existing)			
$^{7.1H}$/7.1	32*	na	F*	55.5	**NON**	At SR 322 (Mayfield Road)
3.3^{H}/3.7	28*	na	F*	53.0	**NON**	At Euclid Park Blvd.
1.6^{w}/1.8	24*	5.7*	40	70.0	**NON**	St. Clair Ave.
0.7^{w}/0.7	24*	7.2*	32^{ns}	68.0	**NON**	Lake Shore Blvd.
East Branch Euclid Creek (19-056)						
			WWH Use Designation (Existing)			
0.2^{H}/0.1	30*	na	MG^{ns}	58.0	PARTIAL	At mouth

Ecoregion Biocriteria: Erie/Ontario Lake Plain (EOLP)

INDEX - Site Type	WWH	EWH	MWH[c]
IBI - Headwaters	40	50	24
IBI - Wading	38	50	24
IBI - Boat 40	48	24	
Mod. Iwb - Wading	7.9	9.4	6.2
Mod. Iwb - Boat	8.7	9.6	5.8
ICI 34	46	22	

* Indicates significant departure from applicable biocriteria (>4 IBI or ICI units, or >0.5 MIwb units). Underlined scores are in the Poor or Very Poor range.
ns Nonsignificant departure from biocriteria (≤4 IBI or ICI units, or ≤0.5 MIwb units).
a The Modified Index of Well-being is not applicable (na) to headwater site types (<20 sq. mi.).
b A qualitative narrative evaluation based on best professional judgement and sampling attributes such as community composition, EPT taxa richness, and total taxa richness are used when quantitative macroinvertebrate data are not available to derive an ICI score (F-fair, MG-marginally good)
c Modified Warmwater Habitat criteria for channel modified habitats.
H Headwater site type
W Wading method

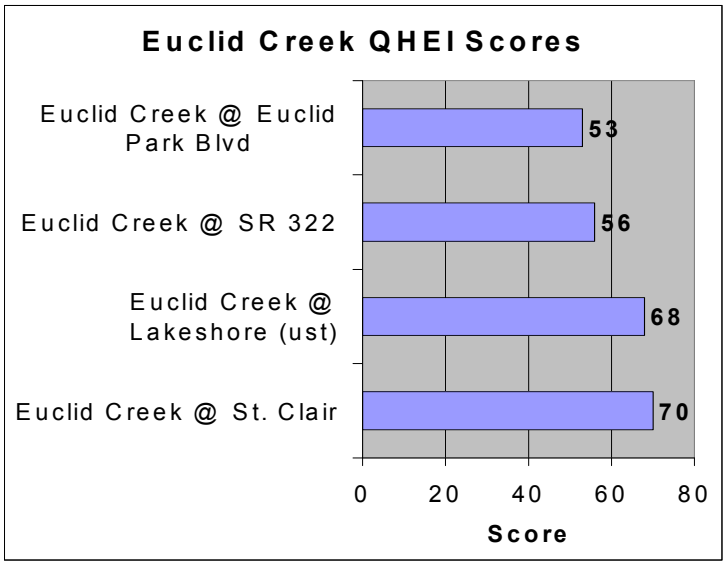
QHEI

Sampling to assess the QHEI was last conducted in 2000 by Ohio EPA as indicated by Figure 43. Deviations from habitat goals are those QHEI values less than 60 for Warm Water Habitat streams. Sections of Euclid Creek have had habitat impacts associated with dredging, bank hardening, and culverting. Also the extent QHEI sampling in Euclid Creek has been limited to fully determine the habitat impacts on the system in Euclid Creek and assess its restoration needs.

The QHEI is a quantitative composite of six physical habitat variables uses to 'score' a stream's habitat. The variables are: substrate, instream cover, riparian characteristics,

channel characteristics, pool/riffle quality, and gradient and drainage area. The variables can be used to assess and evaluate a stream's aquatic habitat and determine which of the six habitat components need to be improved to reach the QHEI target score. The substrate variable incorporates sediment quality and quantity and therefore, provides a numeric target for sedimentation. (Ohio EPA, Euclid Creek Draft TMDL, pg 18)

Figure 43. Euclid Creek QHEI.



Point Sources

Combined Sewer Overflows

There are three combined sewer overflows (CSO) located in the lower reaches of the creek in the City of Cleveland. These outfalls are managed by the Northeast Ohio Regional Sewer District (NEORSD). There are an additional two CSO's on the Lake Erie shoreline adjacent to the mouth of the Creek. These outfalls are a large contributor to pollution on the beaches and the lower reaches of Euclid Creek and limit the resource protection and recreational use of the coastal areas. These CSO's overflow on an average of almost 50 times each year due to excessive use and the inability to provide service during rainfall events.

Table 21. CSO's in Euclid Creek and Adjacent Shoreline

NEORSD CSO Reference No.	Drainage Area (Acres)	Population	Total Vol (MG)/per year	# Overflows per year	Projected # Overflows with Improvements	Projected Volume (MG)
239			21.07	39	0	0.00
209	150	1,100	70.65	50	1	0.04
210	440	3,800	43	43	3	16.77
206			161.12	63	3	20.66
207			0	0	0	

Source: NEORSD, 2004

The NEORSD has developed a CSO Phase II Facilities Plan that outlines the strategy to reduce or remove the CSO's contribution to pollution sources. The CSO facilities plan for Euclid recommends a significant reduction in the number of overflows from an average of fifty to three times a year.

The NEORSD has completed a 25% Design Phase for developing the Euclid Creek tunnel that would be constructed to remediate these CSO's. The NEORSD is awaiting Ohio EPA approval to proceed on these design and construction activities. The expected timeline for the Euclid Creek CSO reduction work is estimated within 10 years.

Reported Spills

The Ohio EPA has documented 26 reported spills in the watershed since 2001 within eight of the eleven communities within the watershed. This list is included in Appendix J.

Permitted discharges – NPDES

The Euclid Creek watershed has three registered NPDES sites. These sites are permitted an allotted amount of point source discharge to Euclid Creek.

Table 22. NPDES Sites

Permitted Sites	City
Glastic Corporation	Cleveland
General Electric	Euclid
Nottingham Filtration Plant	Cleveland
CSX Locomotive Servicing via Lake Erie	Cleveland

Ohio EPA, USEPA

Nonpoint Sources

As an urban watershed, urban runoff and non-point pollution sources are prevalent as demonstrated by the water quality sampling conducted over the years for Euclid Creek by the various agency resources.

Phase II Storm water Activities.

All of the Euclid Creek watershed communities are directed under the MS4 permit and Phase II requirements established by the USEPA in 2003. Each watershed community submitted to Ohio EPA a Stormwater Management Plan outlining how they were going to meet the six minimum measure requirements. Currently, all of the components outlined in these plans have not been fully examined, enforced and implemented. A review of the status of the communities will need to be examined fully as part of the implemention of the Watershed Action Plan to determine areas that the community storm water management plans can assist in meeting the Plan's goals.

<u>Current Phase II Stormwater permits within Watershed (OEPA)</u>

A listing of current Phase II Stormwater permits issued within Euclid Creek is included in Appendix K of this report.

Wetlands Quality

Due to the urban development of Euclid Creek, many wetlands have been and continue to be eliminated. The mapping of wetlands is not comprehensive and is largely provided by sources such as the Wetlands Inventory Map.

The lack of delineation and understanding of the condition of Euclid Creek wetlands prevents opportunities for alternative development scenarios in new development areas surrounding wetlands, mitigation opportunities within the watershed and protection measures for priority wetland areas. The Cuyahoga Soil & Water Conservation District is currently conducting wetland inventory for Cuyahoga County and is expected to be complete by end of 2006.

Headwaters Quality

Due to the size of Euclid Creek, its headwaters are its lifeline for sustaining its health. There are nearly 100 headwater streams within the watershed feeding into the East and Main branches throughout the region. Despite the urbanization of the watershed, many of these headwaters still remain in various conditions.

There are three classes of primary headwater streams: Class I, Class II and Class III. A Class III stream supports a cool water biologic community and are the highest quality stream. A Class II stream supports perennial or intermittent warm water biologic communities and do not have demanding habitat requirements. A Class I stream is one with an ephemeral, or seasonal flow. This class supports warm water biologic communities but is often dry for long periods of time. The Cleveland Metroparks conducted a headwater habitat survey of over 100 segments in the watershed. This information awaiting publication for use in evaluating restoration and protection priorities.

The Cuyahoga County Board of Health performed HHEI (headwater habitat evaluation index in 2003 on 7 primary headwater streams located within the watershed. 6 of these streams were classified as Class III streams and one as a Class II stream.

The Lake SWCD conducts stream habitat evaluations within Willoughby Hills on a regular basis. This information will continue to utilized in evaluating headwater stream quality within the Lake County portion of the Euclid Creek watershed.

Table 23. Cuyahoga County Board of Health 2003 HHEI Results

Location	Class of Primary Headwater Stream
Richmond Hts Police Dept	III
Acacia Country Club	III
Highland Hts Community Park	III
1820 Stonelake Drive	III
Pet Cemetery on Wilson Mills Road	III
Richmond Hts Community Park	III
Jacob Saperstein Campus Hebrew Academy	II

The Cleveland Metroparks has completed a Headwaters Habitat Assessment study of over 80 headwater stream segments throughout the watershed in the Summer of 2004. Preliminary assessment outlines recorded biological and stream characteristics in approximately 80 primary headwater streams within the Euclid Creek watershed. About one-third of all stream segments were characterized by stream habitat that should have supported cold water macroinvertebrate communities. However, only about one-tenth of the streams contained those high quality macroinvertebrate communities. This may indicate that water condition (e.g., flow regime, pollution) is impacting stream life. As this data is further assessed and prioritized, it will provide a foundation for future restoration projects within the watershed's headwaters.

Groundwater Quality
There are currently no monitoring wells for groundwater quality and no studies found to date on any sites.

Dredging and Disposal at Euclid Creek Harbor

The Wildwood Marina and the access channel immediately adjacent to Euclid Creek is dredged as permitted by the U.S. Army Corps of Engineers and managed by the Ohio Department of Natural Resources on a regular basis. The purpose of the dredging is to maintain safe access for boaters to and from the marina. The dredging most recently was conducted in 2000 and 2003 of sandy sediment being removed to an approximate bottom elevation of 563. 5 IGLD within the access channel of the marina harbor. The material dredged from the channel has a high concentration of sand and the dredge material in both 2000 and 2003 was relocated just to the east of the marina basin in the littoral area.

Additionally, during the 2003 project, about 70 cubic yards of material was dredged from the eastwardly launch ramp area. This material was not suitable for near shore relocation and was relocation to the nearby upland site within the oxbow area within the park.

IV. Watershed Impairments

The impairments within the watershed have been identified through the Ohio EPA TMDL planning process, field assessments within the Watershed Action Plan process, assessment of the beneficial uses administered by the Great Lakes Water Quality Agreement, and through community input. These impairments and sources are outlined in this section. The problem statement and priority watershed areas have has been derived from these identified impairments.

A. TMDL Summary

The following conclusions have been developed by Ohio EPA's Euclid Creek TMDL Draft, May, 2005. The TMDL Draft is currently in the review process for local, state and federal endorsement.

Bacteria
Discharges from septic tanks, combined sewer overflows and urban runoff contribute bacteria to the watershed.

Phosphorus
Current data indicate that phosphorous in the stream is above target goals. In OhioEPA's 2000 watershed survey, 66 percent of the samples were above the target level. In 2002 and 2003, 30 percent of the samples collected by the Northeast Ohio Regional Sewer District were above the target.

Table 24 - Nutrient Targets

Target Concentrations for Phosphorus		
Erie-Ontario Lake Plain		Phosphorus Concentration (mg/l)
Headwaters	<20 mi^2	0.05
Wadable	>20 mi^2 <200 mi^2	0.07
Small Rivers	>200 mi2 <1000 mi^2	0.12
Target Concentrations for Nitrate-Nitrite		
Erie-Ontario Lake Plain		Nitrate-Nitrite Concentration (mg/l) (75^{th} % value)
Headwaters	<20 mi^2	1.0
Wadable	>20 mi^2 <200 mi^2	1.05
Small Rivers	>200 mi2 <1000 mi^2	1.42

Aquatic Life
Euclid Creek currently does not meet the Ohio EPA's standards for aquatic life. Fish populations appear to be more impacted than the macroinvertebrates

B. TMDL Pollutant Loading

As part of the Euclid Creek TMDL process, a pollutant load reduction model was developed using the water quality data resources, flow data from the USGS, and land use from the Cuyahoga County Planning Commission

Type of Model and Justification of Use
The Ohio EPA utilized the Spreadsheet Tool for Estimating Pollutant Load (STEPL) as its model for Euclid Creek. The Ohio EPA used this model to demonstrate load reductions using different BMP's at a subwatershed level, the absence of sewage treatment plants within the watershed and phosphorous being the major contributor to chemical water quality limitations. Reductions in phosphorous will be achieved by septic tank elimination and BMP's both which are addressed by STEPL.

Model Results and Recommendations to Guide Implementation Actions
The Ohio EPA has assembled a Phosphorous Total Maximum Daily Load for Euclid Creek as shown in Table 10 . Utilizing the STEPL model and a daily median groundwater component using USGS flow gage data at St. Clair Road the total maximum daily load for phosphorous in Euclid Creek was allocated for a reduction of 3,448 lbs of phosphorous per year to reach the target concentrations outlined in Table 25.

This model will guide the determination of best management practices and the watershed plan recommendations in both location and type of measure within the watershed to maximize the reduction of phosphorous for the entire watershed. A strategy to use the appropriate best management practices will be developed in 2006 with the Watershed Council and its Technical Committee.

Table 25 - Phosphorus TMDL

Phosphorus TMDL for Euclid Creek				
TMDL (lb/year)	WLA (lb/year)	LA (lb/year)		MOS (lb/year)
		STEPL	HYSEP	
5545.13	730.58	8034.5	404.5	554.51
Reductions needed to achieve Phosphorus TMDL				
TMDL (with MOS)	WLA (lb/year)	LA (lb/year)		WLA note: zero load reduction needed due to elimination of discharge
4990.62	0	3448.38		

C. Cuyahoga RAP AOC Beneficial Use Impairments Delisting

As part of the Great Lakes Water Quality Agreement established in 1985, the International Joint Commission designated Areas of Concern throughout the Great Lakes to river basins with the most severe impaired conditions. Euclid Creek is part of the Cuyahoga River AOC established in 1988? and the development of its Remedial Action Plan to irmprove its resources. Under the GLWQA, thirteen delisting targets were commissioned to measure improvements to these AOC's and determine the progress of the RAP's activities in which are called beneficial use impairments. These impairments established by the International Joint Commission are as follows:

- Restrictions on Fish Consumption
- Restrictions on Wildlife Consumption
- Tainting of Fish and Wildlife Flavor
- Degradation of Fish Populations
- Degradation of Wildlife Populations
- Fish Tumors or Other Deformities
- Bird or Animal Deformities or Reproductive Problems
- Degradation of Benthos
- Restrictions on Dredging
- Eutrophication or Undesirable Algae
- Beach Closings (Recreational Contact)
- Public Access and Recreation Impairments
- Degradation of Aesthetics
- Degradation of Phytoplankton Populations
- Degradation of Zooplankton Populations
- Loss of Fish Habitat
- Loss of Wildlife Habitat

The Ohio EPA and the Cuyahoga River RAP are in the process of developing a Stage 2 Watershed Restoration Plan to 1) report the status on individual tributaries and Cuyahoga AOC segments, 2) provide specific measurable targets to measure RAP progress for delisting, 3) identify actions underway, proposed or needed to achieve restoration and delisting, and 4) identify monitoring strategies and needs. The Ohio EPA is spearheading a work group to develop a Delisting Target Document for the Cuyahoga AOC. Euclid Creek has developed an examination of the status of these impairments as part of its Watershed Planning process to determine the status and needs to determine beneficial use conditions within Euclid Creek. This evaluation will be further examined with the Ohio EPA Delisting Work Group for the remainder of 2005 and will be incorporated in the Cuyahoga RAP document.

BUI 1: Restrictions on Fish and Wildlife Consumption

State of Ohio Delisting Target:

No fish and/or wildlife consumption advisories have been issued by the Ohio Department of Health that can be attributed to sources within the AOC.

Current Applicability/Conditions in Euclid Creek

Fish Consumption
Euclid Creek has been part of the Lake Erie Fish Consumption Advisory limits imposed by the Ohio Department of Health since 2003 as part of the statewide advisories of one meal per week.

The lower two miles of Euclid Creek and its nearshore areas are highly used for recreational fishing. However, the majority of fish caught are received via Lake Erie and not part of the Euclid Creek system. The fish that reside in Euclid Creek are relatively small and not of the species typically consumed, hence the risk of consumption is low. The level of this comparison is not currently available. The Cuyahoga County Board of Health conducted a CREEL survey in 2004 along the Cuyahoga County Lake Erie shoreline which included Wildwood Park to examine the consumption practices of the fishing community. The 2004 survey indicated only 3% of the total people surveyed used the fishing for subsistence consumption along the shoreline.

The current data available to determine the consumption risks related to Euclid Creek fish can not validate the levels of risks. The data collected by Ohio EPA in 2000 found no levels of lead or PCB's within the waters in Euclid Creek which serve as potential indicators of fish contaminant sources. An evaluation of contaminated sediments particularly in the Wildwood Park area has not been conducted. These sediments need study to further determine if they are contributing to fish contamination and if any possible contamination is from Euclid Creek. Also, there have been no fish tissue data developed for Euclid Creek to determine if Euclid Creek fish tissue exceed PCB, lead or mercury levels from the creek.

Wildlife Consumption
The Euclid Creek Metropark Reservation and the ODNR Wildwood State Park do not have deer management program for their facilities, hence, culling or consumption of deer through these agencies programs are not conducted. Due to the urban nature of the watershed, additional culling of deer by residents has minimal probability.

Level of Impairment: Not Impaired/Unknown

BUI 2: Tainting of Fish and Wildlife Flavor
Current WQS data collected from Euclid Creek over the past five years indicates no significant presence of phenolics that would cause tainting to fish and wildlife. Due to the absence of wildlife consumption, the wildlife flavor is not applicable.

There has not been a survey of reporting conducted by Euclid Creek Watershed wildlife officials of tainting incidences. This may be conducted through Ohio EPA's Delisting Work Group.

Impairment: Not Impaired/Unknown

BUI 3: Degradation of Fish and Wildlife Populations

Fish Populations
Euclid Creek is considered in non-attainment as a water body draining to Lake Erie. The current IBI and MIwb scores for Euclid Creek do not meet ecoregional biological criteria

of 40 IBI and 7.9 MIwb respectively. The data collected since 1998 does not demonstrate any improvements in scores from then to the present.

There has not been a biological indice assessment of the lacustuary and nearshore reaches conducted within and immediately adjacent to Euclid Creek and therefore this plan can not determine its biological conditions and its impacts on fish and wildlife populations within Euclid Creek.

Level of Impairment: Impaired

Wildlife Populations
The presence of sentinel species that include resproducing populations of great blue heron, mink, bald eagle osprey and river otter are not fully determined or identified for the watershed. Great blue heron do exist throughout the watershed as a result of sightings during field surveying in 2004. Mink has been sighted at Wildwood Park in years past, but not in 2004.

The Kirtland Bird Club has conducted a bird survey that will help identify bird populations within the watershed and will assist in evaluating this impairment further for the watershed.

Additional resources to examine the level of impairment will be through Cleveland Metroparks and OhioDNR.

Level of Impairment: Impaired

BUI 4: Fish Tumors or Other Deformities
The Ohio EPA water quality sampling results in 2000 indicate one of four sites that exceed the 0.5% DELT levels in fish. This sampling site is at River Mile 0.7 on the lower reach of the main stem along Euclid Creek.

The Euclid Creek does not have the presence of PAH's in its water quality sampling results over the past five years. Historical data will be presented in the final Draft report.

Level of Impairment: In Recovery

BUI 5: Bird or Animal Deformities or Reproductive Problems
There is currently no established information available to determine the presence of bird or animal deformities within the Euclid Creek Watershed.

Level of Impairment: Unknown

BUI 6: Degradation of Benthos
The ICI results for Euclid Creek form Ohio EPA 2000 sampling results currently exceed warm water habitat ICI value standards of 34 in one location at river mile 1.6 determined a score of 40 for ICI. The site at river mile 0.7 determined a score of 32.

In addition, the presence of invasive invertebrates species such as zebra mussels in the lacustuary and nearshore areas of Euclid Creek is unknown.

Level of Impairment: Impaired/Unknown

BUI 7: Dredging
Currently, there is no dredging activity being conducted within Euclid Creek. However, the Wildwood Marina and the access channel immediately adjacent to Euclid Creek is dredged as permitted by the U.S. Army Corps of Engineers and managed by the Ohio Department of Natural Resources on a regular basis. The purpose of the dredging is to maintain safe access for boaters to and from the marina. The dredging most recently was conducted in 2000 and 2003 of sandy sediment being removed to an approximate bottom elevation of 563. 5 IGLD within the access channel of the marina harbor. The material dredged from the channel has a high concentration of sand and the dredge material in both 2000 and 2003 was relocated just to the east of the marina basin in the littoral area.

Additionally, during the 2003 project, about 70 cubic yards of material was dredged from the eastwardly launch ramp area. This material was not suitable for near shore relocation and was relocation to the nearby upland site within the oxbow area within the park.

In addition to the marina dredging, future dam removal will require sampling of sediments to examine the disposal options required and identify potential impairments.

Level of Impairment: Unknown.

BUI 8: Eutrophication or Undesirable Algae

The Euclid Creek sampling conducted in 2000 meets the dissolved oxygen parameters of the WQS criteria of greater than 5 mg/l. Hence, dissolved oxygen is not a concern within the watershed. Also, the 2000 sampling by Ohio EPA presents the BOD less than 2 within the watershed that provides an additional indicator that eutrophication is not an impairment.

However, the sampling has been highly concentrated in the lower portions of the watershed. Field Surveys have sited some concentrated areas with algae within the stream. Further determination of algae types and their significance to the impairment of the watershed is recommended. In addition, a survey of the CSO's and storm water outfalls has not been conducted to further evaluate eutrophication in the watershed and determine potential sources if concentrations are found.

Level of Impairment: In Recovery

BUI 9: Restrictions on Drinking Water Consumption or Taste and Odor Problems
The Euclid Creek watershed communities receive their drinking water from Lake Erie through the City of Cleveland Water system. The Ohio EPA published the Source Water Assessment Report in 2004 and establishes the risks level to be low as a result of the intake location and conditions of the system.

Although, there is a presence of ground water wells in the watershed from historic use prior to urbanization, these wells are not being utilized for drinking water purposes.

Level of Impairment: Not Impaired

BUI 10: Beach Closings (Recreational Contact)
The Ohio 2004 Integrated Water Quality Monitoring and Assessment Report outlines the historical data on beach closings associated with E. coli exceeding 126 over a geometric mean of 5 consecutive samples within a 30 day period. The data was collected for the past five years from 1999 -2003. The Villa Angela and Euclid beaches adjacent to the mouth of Euclid Creek were reported in the 2004 Integrated Report as beaches ranking one and three respectively among the twenty-two public beaches monitored with the most closings due to poor water quality standards. Sources of pollution may include the existing CSO's, the Easterly Wasterwater Treatment Plant nearby and illicit discharges from Euclid Creek. The exact sources of impairment have yet to be determined and are currently being examined with the USGS/NEORSDStudy Work Group.

Table 26. Days closed/Days available to be open

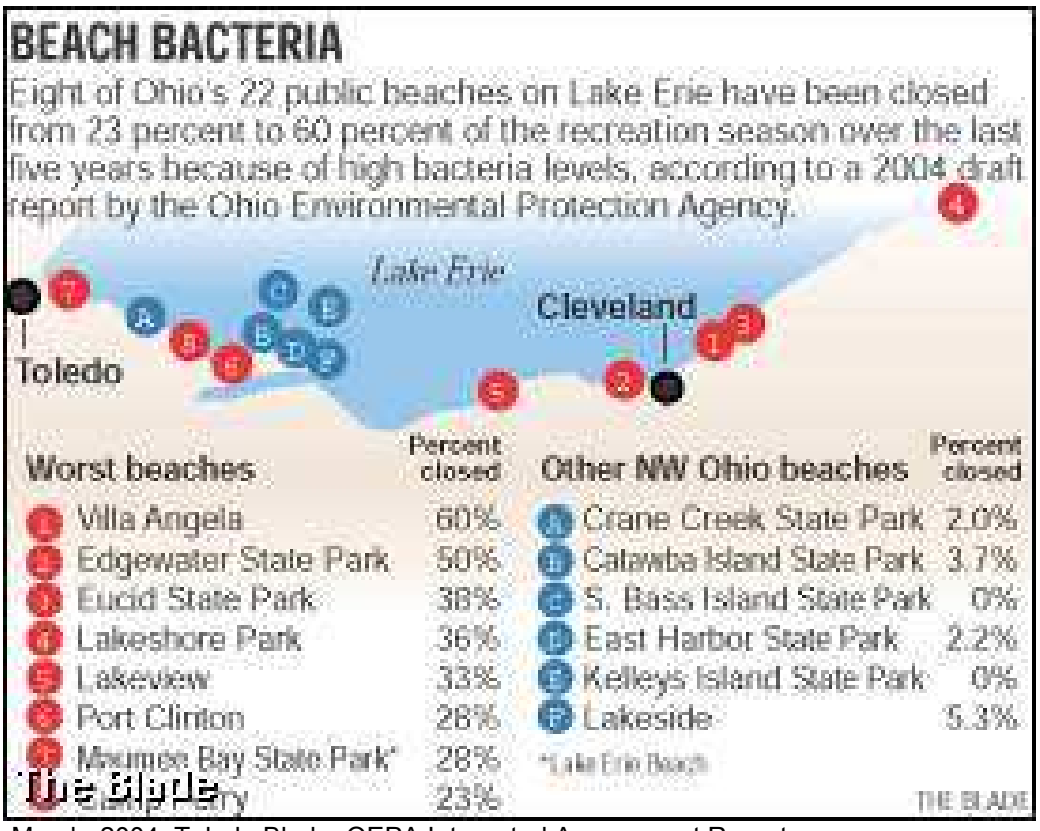
Beach	1999	2000	2001	2002	2003	All year %
Villa Angela	35/98	69/105	55/105	73/106	78/106	310/520 (60%)
Euclid Beach	65/127	30/104	36/98	34/85	31/98	196/512 (38%)

The results from the data collected show a decrease in improvement at the Villa Angela Beach over the five years and a small increase of improvement at the Euclid Beach.

Partial body contact standards are met due to the fecal and *e coli* do not exceed the required standards within Euclid Creek. (Need to determine that is ok for partial or secondary contact.)

Level of Impairment: Impaired

Figure 44: Ranking of Public Beach Closings,



.March, 2004, Toledo Blade, OEPA Integrated Assessment Report

BUI 11: Degradation of Aesthetics
Although not documented, Euclid Creek continues to experience algae and odor nuisances as a result of illicit discharges. In association with the presence of "free froms" as designated in the OAC section 3745-1-04, Euclid Creek does continue experience the presences of substances, nuisances and debris associated with this definition.

The extent of impairment is unknown but is recognized as improved due to the continued elimination of home septic systems and the reduction of illicit discharges from industrial uses over the last twenty years.

Level of Impairment: In Recovery.

BUI 12: Added Costs to Agriculture or Industry
There are no agricultural uses within Euclid Creek. There are industrial uses in the lower Euclid Creek. It is unknown their use of water for their facilities. However, the water received is from the Nottingham Water Plan and meets the source water requirements for use to these facilities.

Level of Impairment: Not applicable

BUI 13: Degradation of Phytoplankton and Zooplankton Populations
Euclid Creek does contain a small lacustuary region from the Lakeshore Boulevard bridge to the Lake that may have the potential for phytoplankton and zooplankton populations to exist if restored. The present conditions of this lacustuary region is unknown. More study is needed to assess restoration options and define the re-introduction of these populations within the lacusturary and nearshore region of Euclid Creek.

Level of Impairment: Not Known

BUI14: Loss of Fish and Wildlife Habitat
The current QHEI in Euclid Creek meets the target score of 60 in two locations in the Ohio EPA 2000 sampling survey. These locations are located along the main stem in the lower reaches and at the mouth of the East Branch. The areas not meeting attainment are located in the southern portions of the main stem. These scores have not improved from previous sampling conducted by the Northeast Ohio Regional Sewer District in 1998.

The Cleveland Metroparks has conducted HHEI assessment for over 80 stream segments of the watershed's headwater streams in 2004. Once this information becomes available, it will provide detailed information on levels of impairment and recommendations for targeted restoration and protection measures as a result.

The nearshore and lacustuary area have not been evaluated to determine its impairment status for habitat loss or absence.

Level of Impairment: Impaired/In Recovery

D. Coastal Non-Point Pollution Control Limitations

In association with meeting the State of Ohio Coastal Non-Point Pollution Control plan, the Watershed Action Planning process has evaluated the conditions of Euclid Creek to determine the applicability and current limitations of the Coastal Control Plan management measures and secondly, to determine what implementation actions will best fit these limitations to meet those measures. This assessment and determination of action is outlined in the Implementation chapter of this report.

E. Problem Statement

Based upon the impairments identified in Euclid Creek, the following problem statements have been developed to guide goals and implementation activities for the watershed.

1. Remaining phosphorus nutrient loads result from remaining septic systems, CSO's and urbanization.
2. Flash flows as a result of bedrock substrate and upstream urbanization increase erosion and entrenchment rates.
3. Low fish populations and diversity, hydrologic modifications, channel alterations, and loss of stream and wetland areas decrease stream conditions.
4. Development activities and practices accelerate erosion/sedimentation, loss of habitat and increase of impervious cover that limits water quality attainment.
5. Discharges from CSO's and remaining septic systems contribute to water quality limits.

Linking Sources and Causes in Euclid Creek

As the Euclid Creek TMDL and the Ohio EPA 303(d) list have outlined, the following linkages can begin to be made in developing solution strategies.

Table 27: Sources and Causes

Source	Causes
Phosphorous Loads exceed water quality limits	CSO's Septic Systems Urban Runoff
Bacteria Counts reported continue to be elevated during rain events.	CSO's Aging Infrastructure Septic Systems
Habitat Reduced fish and macroinvertebrate populations and diversity. Reduced physical habitat acreage along riparian areas.	Dams in Lower Section of Watershed. Decreased forest cover along riparian corridors Increased flows due to increase impervious cover, development patterns. Other hydrologic modifications.
Acceleration of erosion, sedimentation, entrenchment and volume throughout the watershed.	Development patterns resulting in increased impervious covers, loss of water storage and infiltration capacity. Loss of forest cover and riparian buffers to stabilize streambanks.

Phosphorous Load StepL Model and Land Use Allocation

The Step L Model was utilized as part of the Euclid Creek TMDL to identify the load reduction needs for Euclid Creek at 3448 lbs/yr. The Step L model developed by Ohio EPA for the TMDL outlines the loads based upon land use types within seven sub-watersheds. Table __ outlines these existing loads with no bmp's in place. Table __ outlines a generalized application of 20% of bmps to the watershed such as bioretention areas in the watershed and resulting load reductions.

While this is presents a generalized application of best management practices to reduce phosphorous loads, it presents the opportunity that best management practices can play to improve water quality in the watershed. The recommendations in the ***Implementation Chapter*** of this document provide an integrated approach to addressing the sources and causes of Euclid Creek.

Table 28. Total Nutrient Loads by Sub-Watershed

1. Total load by subwatershed(s)

Watershed	N Load (no BMP)	P Load (no BMP)	BOD Load (no BMP)	Sediment Load (no BMP)	N Reduction	P Reduction	BOD Reduction	Sediment Reduction	N Load (with BMP)	P Load (with BMP)	BOD (with BMP)	Sediment Load (with BMP)	%N Reduction
	lb/year	lb/year	lb/year	t/year	lb/year	lb/year	lb/year	t/year	lb/year	lb/year	lb/year	t/year	%
W1	8516.7	852.2	28616.5	136.0	0.0	0.0	0.0	0.0	8516.7	852.2	28616.5	136.0	0.0
W2	5680.2	701.3	20631.2	90.8	0.0	0.0	0.0	0.0	5680.2	701.3	20631.2	90.8	0.0
W3	13206.8	1769.9	46167.8	188.6	0.0	0.0	0.0	0.0	13206.8	1769.9	46167.8	188.6	0.0
W4	8363.2	979.1	29589.6	127.5	0.0	0.0	0.0	0.0	8363.2	979.1	29589.6	127.5	0.0
W5	9351.5	1111.3	33285.8	150.7	0.0	0.0	0.0	0.0	9351.5	1111.3	33285.8	150.7	0.0
W6	6411.0	852.8	27274.9	76.0	0.0	0.0	0.0	0.0	6411.0	852.8	27274.9	76.0	0.0
W7	16647.1	2009.9	65815.3	226.5	0.0	0.0	0.0	0.0	16647.1	2009.9	65815.3	226.5	0.0
Total	68176.6	8276.5	251381.2	996.0	0.0	0.0	0.0	0.0	68176.6	8276.5	251381.2	996.0	0.0

Table 29. Total Nutrient Load Reductions with BMP's by Sub-Watershed

1. Total load by subwatershed(s)

Watershed	N Load (no BMP)	P Load (no BMP)	BOD Load (no BMP)	Sediment Load (no BMP)	N Reduction	P Reduction	BOD Reduction	Sediment Reduction	N Load (with BMP)	P Load (with BMP)	BOD (with BMP)	Sediment Load (with BMP)	%N Reduction
	lb/year	lb/year	lb/year	t/year	lb/year	lb/year	lb/year	t/year	lb/year	lb/year	lb/year	t/year	%
W1	8516.7	852.2	28616.5	136.0	942.9	159.1	0.0	0.0	7573.8	693.0	28616.5	136.0	11.1
W2	5680.2	701.3	20631.2	90.8	2938.6	507.6	0.0	0.0	2741.6	193.7	20631.2	90.8	51.7
W3	13206.8	1769.9	46167.8	188.6	7011.0	1026.7	0.0	0.0	6195.8	743.2	46167.8	188.6	53.1
W4	8363.2	979.1	29589.6	127.5	4663.3	746.5	0.0	0.0	3699.8	232.6	29589.6	127.5	55.8
W5	9351.5	1111.3	33285.8	150.7	5000.5	814.0	0.0	0.0	4351.0	297.3	33285.8	150.7	53.5
W6	6411.0	852.8	27274.9	76.0	3843.9	661.4	0.0	0.0	2567.1	191.4	27274.9	76.0	60.0
W7	16647.1	2009.9	65815.3	226.5	10242.6	1598.0	0.0	0.0	6404.6	411.9	65815.3	226.5	61.5
Total	68176.6	8276.5	251381.2	996.0	34642.8	5513.3	0.0	0.0	33533.7	2763.2	251381.2	996.0	50.8

Source: OhioEPA Euclid Creek TMDL, 2005

V. Watershed Restoration and Protection Goals

A. Mission Statement

A mission statement has been developed as a result of this planning process to serve as a foundation of the Euclid Creek plan and its implementation.

Protect and restore Euclid Creek and its Lake Erie shoreline; to sustain its water resources and enhance the quality of life for the future.

B. Goals:

1. Restore and sustain hydrologic function of creek and its water resource elements.
2. Reduce urban impacts onto stream functions and water quality.
3. Restore physical and biological habitat of stream corridor and watershed land cover.
4. Reduce and prevent illicit discharges in the watershed.
5. Restore the beneficial uses of Euclid Creek.

C. Priority Areas of the Watershed to Target Restoration & Protection Goals

Due to the size of the watershed and extent of impairments present within the watershed, the entire watershed has been prioritized to some extent. To guide recommendations and implementation efforts, the following priority areas have been identified.

1. Headwaters. The headwaters along the main and east branches of the watershed continue to be eliminated, filled, degraded as a result of development patterns. The headwaters have a significant impact on water quality and watershed sustainability.

2. Main Branch and East Branch. The main branch from north of Cedar Road to Lake Erie is not fully protected to maintain riparian and floodplain services. Also due to its bedrock substrate and its lack of infiltration due to urbanization, the creek experiences flashy flows and increased erosion and accelerated entrenchment of the stream banks contributing to an unstable system.

3. The Lower Reach. Habitat quality is limited and negatively influences biological communities. This can lead to fish community impairments in the upper reaches of the creek.

Prioritization of Actions through Public Input

As part of the public participation process, a public meeting held in October 2004, provided participants to prioritize issues and actions for the watershed based on the inventory findings. The results of this exercise outlined the following priority actions.

1. **Education**
2. **Protection of Stream Corridors**
3. **Restoration of Habitat**
4. **Improved Land Management to sustain water resources.**

These priorities are reflected in the implementation recommendations for the watershed.

VII. Implementation

Introduction

Implementation of the goals and priorities identified within the watershed, have been developed on a watershed scale due to Euclid Creek's small size and the presence of the Euclid Creek Watershed Council that provides a vehicle of municipal collaboration at this scale. The implementation activities are outlined based upon the following priority actions to meet the goals and impairment objectives identified within the watershed.

Targets to meet water quality standards:

- QHEI Score of 60 for 100% of the stream miles.
- Phosphorus load reductions of 3,448 lbs. per year.
- Full attainment of Ohio EPA biological water quality standards.

Priority Actions:

1. Land Management & Uses – Overlay Approach

a. Protection of Critical Natural Resources
b. Restoration of habitat and stream corridors
c. Sustainable development/redevelopment
d. Best Management Practices in existing developed areas.

2. Prevention/reduction of illicit discharges

3. Stewardship through education.

4. Site Specific Recommendations – Site Projects

To realize how to institute the recommended actions on the ground in the watershed, preliminary sites have been identified to apply the recommendations where feasible. This provides a linkage between watershed scale water quality improvement needs to site scale applications. While many sites applicability to the recommendations still need to be determined, these sites sets for the an initial evaluation of applicability for implementation.

Programmatic Recommendations

Many of the recommendations under priority actions 1 through 3 presents a strategy to improve water quality in the watershed. Due to the location of Euclid Creek, its need to demonstrate these recommendations associated with other state and federal programs that include Delisting within the Area of Concern and the Coastal Non-point Pollution Prevention Program can be evaluated. This initial evaluation and recommendation is provided in this section.

5. **Restoration of Beneficial Uses**
6. **Implementation of Coastal Non-point Pollution Control Measures**

Priority Action 1: Land Management & Uses Recommendations

Problem Statement:

Due to the urban nature of the watershed and its continuing growth for development and redevelopment, land use management has put stress on how Euclid Creek maintains its integrity as a healthy water body and meet the state's water quality standards.
Site design, development and management on new and existing development as well as the absence of conservation guidance will continue to impose stress on the system and restrict the Creek from restoring itself and meeting the chemical, biological and physical water quality standards of the State.

Goals: To establish a watershed based planning tool to guide development, protection and restoration activities for Euclid Creek for the future on a comprehensive scale across multi-jurisdictional boundaries while maintaining local control and designation of community land uses and zoning districts. To accomplish this, four defined categories can be applied to the land use and management practices to guide future development and stewardship activities.

- **Obtain full attainment status.**
- **QHEI Scores of 60 on 100% of stream miles.**
- **IBI Target met for 100% of stream miles.**
- **Phosphorous load reductions of 3448.41 lbs per year**

A Land Use Approach for future sustainability of Euclid Creek

As the land development of the Euclid Creek watershed has impaired the water body the last 50 years, the restoration and protection approach must also be based upon the land use for the future. The overall concept of the Euclid Creek plan is a land based strategy to protect, restore and manage its water resources while maintaining and enhancing its economic viability. The land use approach is a comprehensive way to address the various goals and impairments of the watershed with valid criteria.

Objectives & Categories for Application within the Watershed

- **Protect** critical natural resources that are essential to maintaining and protecting water quality and to meet state standards.

- **Restore** degraded and damaged areas of the watershed to restore the beneficial uses of the creek and watershed.

- **Develop and redevelop** with sustainable design practices to balance economic progress and water quality attainment criteria.

- Provide **Best Management Practices** to restore the watershed's viability and enhance stewardship activities.

Protection Areas

Protection areas are the areas defined as critical natural resources that are essential to sustain the services of Euclid Creek and its associated habitats. The recommended areas are delineated mainly along the stream corridors of the waterways within the watershed. Protection Areas will provide additional areas for the stream to maintain its functions for pollution filtration, habitat maintenance, reduction of temperature and other functions.

Restoration Areas

Restoration Areas are the locations within the watershed where the stream is highly modified or damaged and in need of rehabilitation to improve the quality of the stream and the watershed that drains upstream and downstream to it as well as the hydrologic functions of the stream. Restoration areas also will examine stream habitat enhancements based upon additional surveys, assessments and community support. These areas were identified through field survey determination, public meeting input and assistance from the technical and plan committees.

Future Development/Redevelopment Areas

Economic development is an essential aspect to the watershed communities. Areas that have been designated to be likely developed or redeveloped in the next five years will contribute to changes in the water quality of Euclid Creek. How much they contribute can be controlled by sustainable development practices. These areas have been identified through meetings with local community development officials and survey of watershed for other “For Sale” properties outside of the critical resource areas.

Best Management Practices of Existing Development Areas

Practices can be applied to areas within the watershed that will likely remain developed over the next ten years or more. Appropriate best management practices help to limit pollution, minimize flooding, maximize permeability of land cover, and allow natural restoration within the watershed to occur to improve water quality of the watershed.

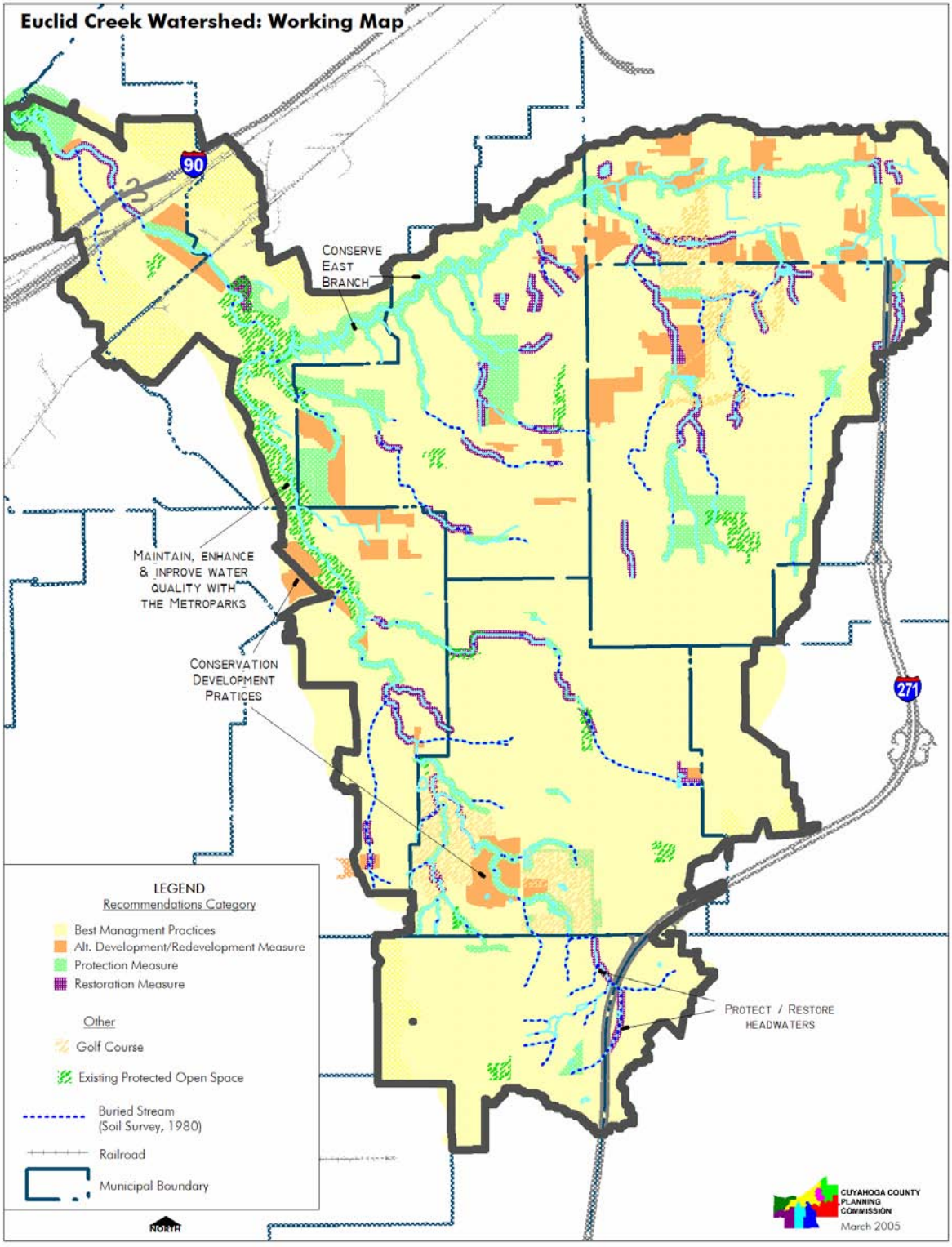


Figure 45. Euclid Creek Watershed Recommendation

1.1 Protection of Habitat ***Land Use Development & Management Recommendations***

Problem Statement*:* Habitat throughout the watershed continues to be diminished from land development activities and ownership practices. Streambank disturbance through mitigation, armoring or development have diminished biological scores within the watershed for both IBI scores and macroinvertebrates. The reduction in habitat along the stream corridors has also reduced the QHEI scores in the watershed,

Goal: Protect remaining forested stream corridors permanently to reduce further impact to the watershed's habitat in preventing further habitat degradation within the watershed. This protection measure will include existing protected lands such as the Euclid Creek Metroparks and ODNR State Park. The goal is to contain 2% of land cover as protected land within the watershed. Maintaining riparian area functionality has been documented to stabilize stream banks, shade streams and remove pollutants. While it has been shown that urban riparian buffers are limited in removing pollutants, they can assist in increasing and protecting the riparian functionality and serve as a median between impervious areas and the stream. Establishing connectivity of the stream corridors will further enhance the probability of increase of fish and macroinvertebrate populations as well as their diversity.

Task Description	Watershed Area	Activities for Implementation	Responsible Parties/ Partners	Time Frame	Cost/Funding Resources	Indicators of Success
Conservation Easements Establish Conservation Easements along the stream corridors of the watershed with an emphasis of protection on the main branch and east branch main corridors. .	East Branch and tributaries, Main Branch main stem and its tributaries.	a. Introduce and promote easement options to private property owners, municipalities and developers. b. Develop criteria to evaluate easement priority areas. C. Identify priority parcels to introduce easements on an annual basis through the approval of the Watershed Council. d. Contact priority area property owners on easement program. e. Establish funding for	Private Property Owners, Cuyahoga SWCD, NRCS, Western Land Conservancy All communities.	Start: 2006 Ongoing	Costs: $300,000 (stewardship fee $1,000/acre) Property Owners Cuyahoga SWCD Local Land Trusts	- Number of materials sent to property owners on easement opportunities. (100 property owners) - Number of acres established as a conservation easement. -Obtain easements on five properties by 2008. (25 acres) - Target 300 acres for protection through a conservation easement program.

Task Description	Watershed Area	Activities for Implementation	Responsible Parties/ Partners	Time Frame	Cost/Funding Resources	Indicators of Success
		Cuyahoga SWCD to hold easements in perpetuity to maintain appropriate monitoring.			State and Federal Grants to assist with Stewardship Fees and monitoring.	
Land Acquisition Purchase land within the competitive market and the market value of the land. Land acquisition will focus on key areas of biological significance and critical resource protection.	Potential Areas to examine land acquisition opportunities 1. Highland Heights Natural Area.(25 acres) 2. Areas adjacent to Cleveland Metroparks. 3. Areas of category III wetlands.	Identify priority properties with Cities and FOEC. Work with TPL and others to proceed. Determine long-term ownership. Determine long-term use and access.	Trust for Public Land Friends of Euclid Creek All Communities Cuyahoga SWCD Cleveland Metroparks	Start – 2006 -Ongoing	Costs: $1 million Clean Ohio Fund ODNR Coastal Management Other State and Federal Land Acquisition Grants Cleveland Metroparks	Number of acres acquired. Goal of 30 acres within five years.
Riparian & Wetland Setbacks Establish local control of riparian protection areas during the	Establish setbacks that provide protection on 75' on each side of the	a. Provide communities introduction/guidance on appropriate models and choices on those models. Introduce NOACA Model Ordinance for	Cuyahoga SWCD/Watershed Coordinator Euclid Creek Technical	Start – May, 2005 Completion - 2008	In-kind of local communities	- Number of communities adopting ordinances. Goal of adoption within 9 communities

Task Description	Watershed Area	Activities for Implementation	Responsible Parties/ Partners	Time Frame	Cost/Funding Resources	Indicators of Success
development and design review process within local community decision-making.	main corridors, Main Branch and East Branch and 25' on each side of the headwater streams or watersheds draining less than ½ square mile. Also, establish setbacks on Category II and III wetlands identified by Ohio EPA.	consideration. b. Work with communities in developing ordinance Work with Cities to introduce ordinance to City Council c. Approval of City Council d. Assist Cities with implementation of ordinances.	Committee Local Community Law Directors City Councils			within the watershed. - Number of riparian miles/wetland acres under protected under ordinance. Goal is 100% of stream and wetland corridors protected within the watershed.
Greenspace Expansion Areas Examining the potential for multiple uses along the stream corridors will be essential within the urban context to protect riparian areas functionality while also providing	Areas to be examined will include greenspace linkages between existing greenspaces such as the Wildwood State Park and the	a. Implement County Greenspace Euclid Creek Vision through Sub-watershed projects. b. Provide information/presentations to various organizations and community governments. c. Implement vision.	Cleveland Metroparks Cuyahoga County Planning Commission Watershed Coordinator	Start – July, 2005 Ongoing	Costs: TBD ODNR, Coastal Mgmt Program, Clean Ohio Fund, Recrational Trail Funding – State and Federal	Number of trail miles established: 5 miles Number of stream miles within greenspace: 5 miles Number of greenspace projects. TBD Number of visitors/users to greenspace resources.

Task Description	Watershed Area	Activities for Implementation	Responsible Parties/ Partners	Time Frame	Cost/Funding Resources	Indicators of Success
community uses such as recreation to the residents of the watershed.	Cleveland Metroparks, as well as community parks.	Develop preliminary designs in areas of interest to communities. d. Construct and develop O&M plan. e. Identify ownership.	All Communities		Mitigation Funding/Clearinghouse. Foundations/Private Corporate	TBD Increase in fisherman use/catches annually in the watershed. Permanent areas of protection to maintain flood storage and riparian functionality.

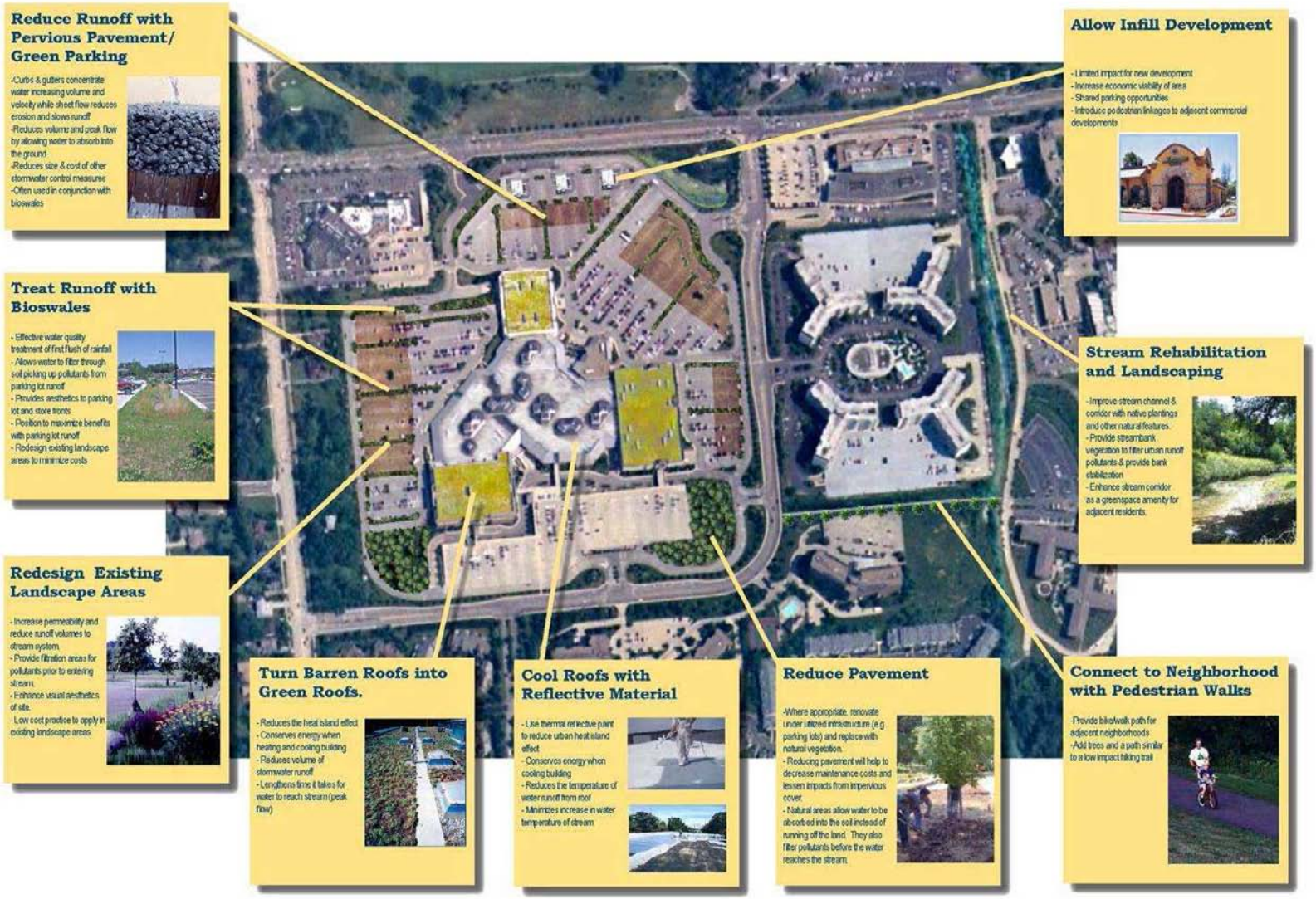


Figure 46: Best Management Practice Concept Recommendations – Beachwood Mall *Kerr Boron Associates*

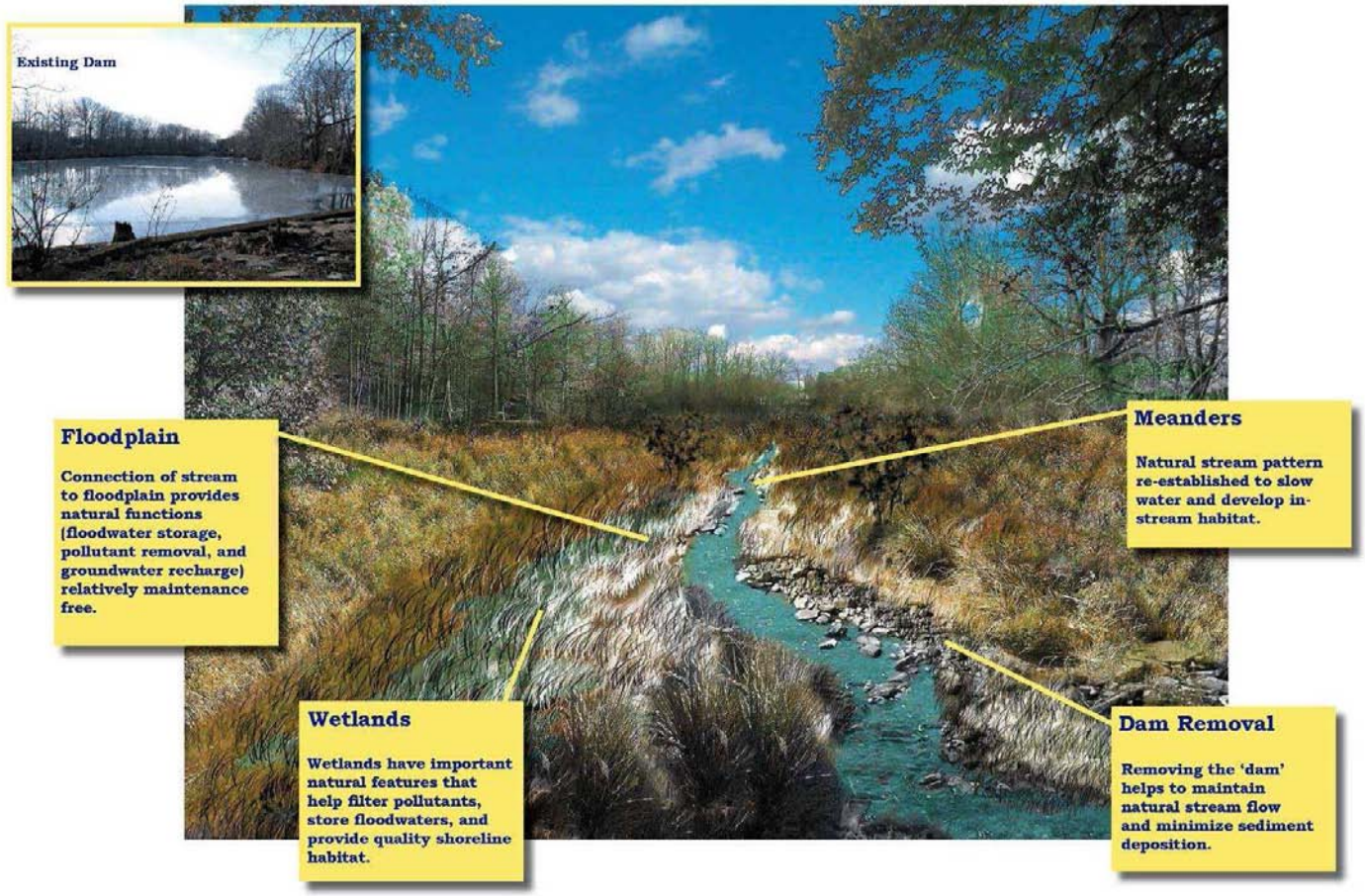


Figure 47: Restoration Concept Recommendations – Mayfair Lake *Kerr Boron Associates*

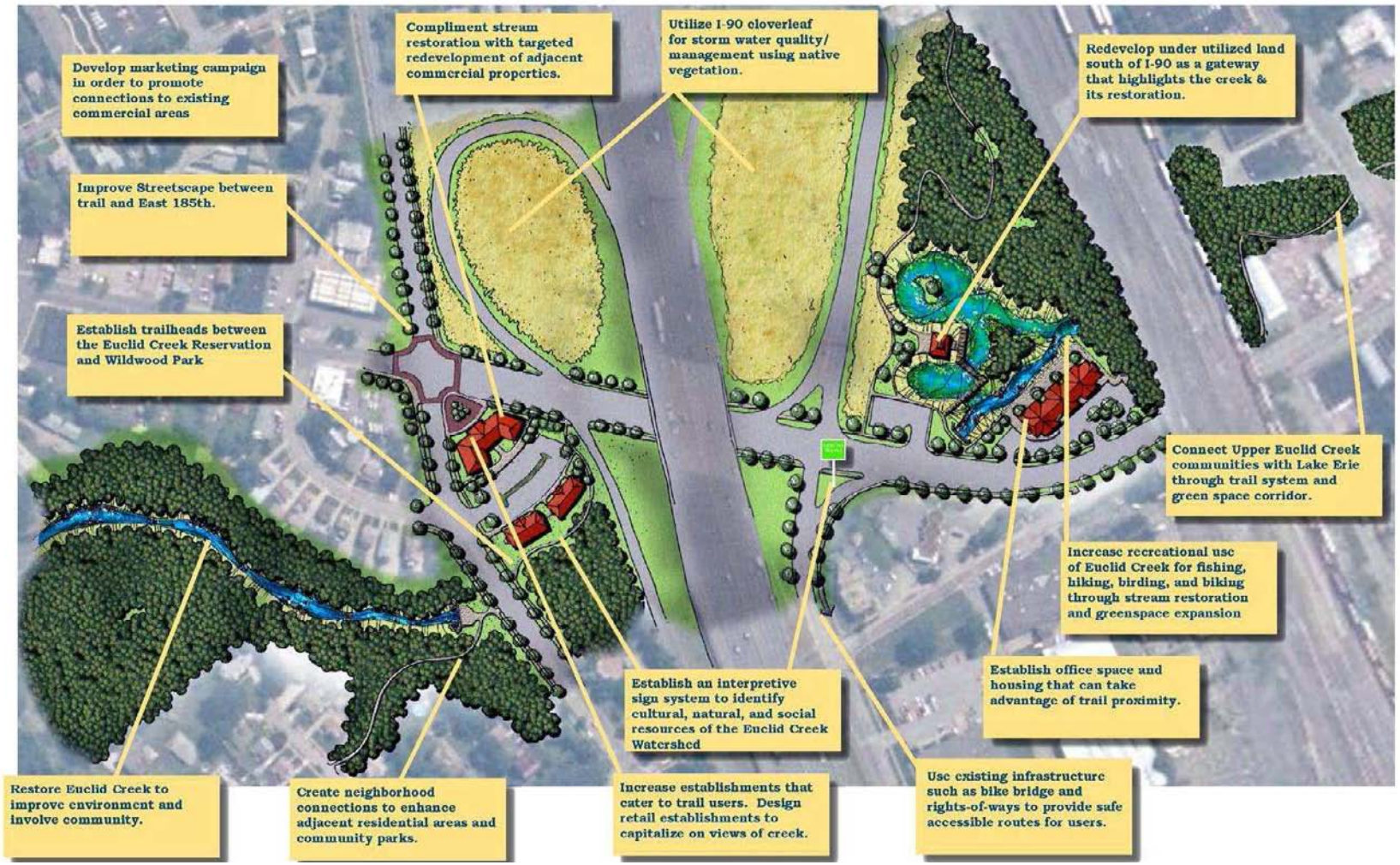


Figure 48: Redevelopment Concept Recommendations *Kerr Boron Associates*

1.2 Restoration of Habitat *Land Use Development & Management Recommendations*

Problem Statement*:* Habitat has continually been compromised in the watershed due to land development patterns the past 100 years within the watershed. These patterns have resulted in decreased attainment levels for biological and physical indices that Ohio EPA uses to measure a water body's capability of sustaining its functions as a healthy resource. These measurements include IBI, MiWB and QHEI and HHEI. Current conditions have also resulted in increased erosion, unstable streambanks and reduced areas for flood storage capacity.

Goal: Euclid Creek has a variety of opportunities to restore functionality of the stream corridors. While it is recognized that many areas are irreversible, the focus will be to increase habitat, reduce erosion and decrease velocity. The intent of the restoration activities will always be linked and evaluated to achieve habitat scores in meeting IBI, MiWB and QHEI measurements. The locations sampled in the Watershed in 2000 are below the attainment score of 38 for IBI. The goal is to increase biological and physical conditions within the watershed.

Task Description	Watershed Area	Activities for Implementation	Responsible Parties/ Partners	Time Frame	Cost/Funding Resources	Indicators of Success
Examine removal of dams The removal or retrofit of lowhead dams have been documented to provide various benefits to physical, economical and cultural aspects of a community.	The primary focus for dam removal will be the East Branch and East 185th dams since they provide the most restriction of nearshore Lake Erie habitat with watershed migration functions.	Identify feasibility, property acquisition, sediment loads, hydrologic study, plan, design and construction to remove dams. Examine priority dams – St. Clair, East Branch – Lake Erie Proximity Lower Headwaters Upper Headwaters Develop Designs and construction strategies for implementation.	Watershed Coordinator Ohio EPA ODOT/County Engineer Local communities NEORSD Cleveland, Euclid, Richmond Heights, Beachwood	Start June, 2005	LEPF WRRSP 319 GLNPO DNR Coastal Management USFWS	Number of dams removed/retrofitted. Goal 3 Number/diversity of fish populations upstream and downstream of dam location. Increased IBI scores to meet state standards of IBI score of 38 for WWH in wadeable streams greater than 20 sq miles.

Task Description	Watershed Area	Activities for Implementation	Responsible Parties/ Partners	Time Frame	Cost/Funding Resources	Indicators of Success
The removal of dams can restore fragmented stream corridors, re-establish fish migration, re-establish natural hydrologic regimes. (Heinz Center for Policy, Dam Removal, Science & Decision Making, 2001)	All other dams will be examined for their benefits physically and biologically to the watershed and the costs associated with the activity.					
Establish wetland/stream mitigation program Many of the remaining wetlands and streams impacted by current development continue to be permitted for mitigation outside of the watershed, prohibiting the use	The focus will be on all remaining wetlands, impacted streams, particularly headwaters.	Utilize Cuyahoga SWCD wetland mapping and Cleveland Metroparks headwater suvey both awainting completion in 2006 as a base map to identify acreage to target program . Acquire funding to identify mitigation restoration sites. Set mitigation scoring criteria.	Watershed Coordinator Ohio EPA Cuyahoga SWCD Cuyahoga River RAP Consultant	Start June, 2005 Ongoing	OEPA – Planning Grants LEPF Coastal Management GLC Sediment and Erosion Control	Identification of restoration sites. Goal 5 by 2008. Outreach to developers/permit holders Goal: 5 by 2008 Approval of sites by OEPA and US Army Corps to utilize in permit process. Number of acres restored: TBA

Task Description	Watershed Area	Activities for Implementation	Responsible Parties/ Partners	Time Frame	Cost/Funding Resources	Indicators of Success
of these opportunities to restore targeted areas in the watershed. The current practice continues to reduce the watershed's capability to reach attainment levels for pollutant loads, and biological and physical parameters due to increasing stream corridor fragmentation.		Develop database and GIS system. Work with property owners. Promote to local developers and communities as a service. Implement restoration sites.			NOAA Grants	Decrease to 0 in loss of wetland acres and stream segment miles by 2008.
Retrofit culverts where feasible As an older urban/suburban watershed, a large road infrastructure exists. As this infrastructure ages, the opportunity to replace pipe culverts under roads with open structures will	This strategy will be primarily focused on the headwater segments of the watershed.	Identify future road/bridge improvement projects. Identify potential stream retrofit opportunities with future projects. Develop plan with State/County/Local Engineers Integrate in road improvement project design process.	ODOT Cuyahoga County Engineers City Engineers Watershed Coordinator All communities	Start 2006-Ongoing	Cuyahoga County ODOT Capital Imp.	Number of open road crossings of streams. Goal: TBD

Task Description	Watershed Area	Activities for Implementation	Responsible Parties/ Partners	Time Frame	Cost/Funding Resources	Indicators of Success
improve the hydrologic regime of the stream channels.						
Retrofit Existing Stormwater Retention Ponds for Water Quality The detention ponds in place throughout the watershed were constructed when the volume of water was considered the design parameter for its construction. Utilizing these existing structures improve water quality can be a cost effective strategy to increase pollutant removal and decrease volume that can cause downcutting and accelerated erosion. (CWP , 2000)	The proximity of the approximately 10 basins in the watershed are in the headwaters.	a. Identify existing detention basins and accessibility. Obtain ownership permission. b. Evaluate two detention basins through monitoring on retrofit benefits and design solutions. C. Identify design solutions to decrease volume and increase pollutant load removal capacity. d. Implement design. e. Evaluate remaining basins.	Communities, City Engineers, Cuyahoga SWCD, Ohio EPA Watershed Coordinator John Carroll University	2006	USEPA Grants OEPA 319 Funding or WRRSP funding.	-Number of basins retrofitted. Goal: 3 basins -Reduction of phosphorous loads based upon sub-watershed load reduction needs. TBD

Task Description	Watershed Area	Activities for Implementation	Responsible Parties/ Partners	Time Frame	Cost/Funding Resources	Indicators of Success
Restore Headwaters	Headwaters	Develop a GIS mapping tool to determine land cover targets by subwatershed. Develop decision tool for communities to target bmp's on a watershed basis based upon TMDL phosphorous target load reductions.	Watershed Coordinator CSU/CPC OEPA All communities/ EC Council Local Universities	2005	USEPA OEPA	Number of bmp's installed. Lbs of phosphorous reduced.
Restore streambanks		Conduct QHEI on every mile of Euclid Creek to evaluate areas of concern and areas in good condition. Evaluate restoration actions for stream miles not obtaining QHEI score of 60 Perform LQHEI for coastal habitat assessment.- Determine coastal restoration needs,	All communities Watershed Coordinator OEPA Local Universities FOEC	June , 2005		-Number of stream miles with QHEI score of 60. -Number of restoration projects/stream miles restored. -Number of stream miles maintaining QHEI of 60.

1.3 Site Design of Development/Re-Development Areas

Land Use Development & Management Recommendations

Problem Statement*:* Impervious cover continues to increase due to the continuing development and redevelopment patterns of the watershed. One of the emerging trends within the watershed is to consolidate single home parcels into larger tracts for higher density developments. This can result in increased impervious cover. The level of impervious cover is intrinsically linked to habitat quality in the streams, increased soil erosion due to increase volume runoff and loss of infiltration methods of nutrient pollutants from urban landscapes.

Goal: Using future development and redevelopment patterns to incorporate water quality improvements and prevent further impacts in the watershed can maintain economic progress in the communities while meeting water resource goals simultaneously. Low Impact Development practices within new and redeveloped sites can increase a site's ability to increase infiltration rates, decrease sediment loads and increase nutrient removal prior to entering the stream corridors. This approach will intrinsically contribute to reducing phosphorous loads in the watershed with the use of appropriate best management practices.

Task Description	Watershed Area	Activities for Implementation	Responsible Parties/ Partners	Time Frame	Cost Funding Resources	Indicators of Success
Incorporate best management practices in new and redevelopment sites through the NPDES Phase II program and other local initiatives to reduce phosphorous pollutant loads.	The areas identified in Map __ under developed and redeveloped areas within the watershed will be the	1) Assemble a Builders/Developers/Municipal Roundtable to discuss local policies, market values, and opportunities and challenges to implement program. 2. Work with communities	Country side Program Watershed Coordinator All communities – Local Planning Commissions and City	Develop models and outreach practices in 2006. Incorporate into local decision	OEPA Grants Foundation ODNR - Grants USEPA Local Universities	Number of sites/acres incorporating conservation design principles. Goal: 100% of bmp implementation on new and redeveloped sites. 40% on sites developed from 2001-2005. 10% on retrofit sites

Task Description	Watershed Area	Activities for Implementation	Responsible Parties/ Partners	Time Frame	Cost Funding Resources	Indicators of Success
	targeted areas for implementation.	on identifying a design decision process to incorporate water quality best management practices in new development or redevelopment sites in concert with their USEPA Phase II requirements. Establish a checklist and guidance for watershed communities to use during local design review processes. 3. Advance the STEP L Model developed for the TMDL to examine the number of acres needed for bmps in the watershed to reduce phosphorous loads. 4. Develop an optimization model of the distribution of bmps' and their cost allocation in partnership with University of Maryland's Sustainability Project. The intent of the optimization model is to examine the most	Engineers Local and Regional Universities	making. 2007 Implement practices – Ongoing.		constructed before 2001 to assist in reducing phosphorous loads in the watershed. A load allocation will be developed as part of the modeling in 2006. (These are approximate percentages based upon Maryland's DNR bmp implementation program. Final percentage determination will be compiled as a result of the model results and Watershed Council Approval. Goal for 100 % participation of Euclid Creek communities.

Task Description	Watershed Area	Activities for Implementation	Responsible Parties/ Partners	Time Frame	Cost Funding Resources	Indicators of Success
		appropriate distribution of bmps and the cost associated with the bmp's. This will in establishment a benchmark to allocated costs appropriately for implementation and funding needs. .				
Sustainable Site Design Policies/Phase II Program Local City ordinances can provide a powerful local tool to implement good water quality policies in a community's decision process. Many of the current codes were established prior to Phase II and other non-point source water quality programs.	New construction sites or redeveloped sites will be the focus of this activity.	Review and introduce City Ordinances to incorporate the following but not limited to: Reduction/Variance of Parking space/roadway quantities and size. Impervious Cover caps. Density and setback requirements for sites to increase flexibility. Landscape infiltration practices. 1)Develop a guidance policies for communities. 2) Introduce to Watershed Council, Local Planning & Zoning Commissions. In addition, implementing	All communities Watershed Coordinator Cuyahoga SWCD Local Universities	Obtain Grants and develop initial informati on to communi ties. 2006 Assist communi ties in adoption consider ations and impleme ntation 2007	USEPA Grants OEPA Grants	Number of communities ordinances passed. Goal 100%.

Task Description	Watershed Area	Activities for Implementation	Responsible Parties/ Partners	Time Frame	Cost Funding Resources	Indicators of Success
Integrating water quality improvement and protection goals within the local context of design and development needs will provide a place-based tool and a community input process to implement water quality strategies as a key component of every new development.		NPDES Phase II requirements through local ordinances can serve both water quality needs and regulatory needs with local decision making taking the lead on how implementation occurs. Additional ordinances that will be examined and reviewed include 1) Erosion & Sediment Control 2) Post Construction Pollution Prevention Practices.				
Phase II Storm water Management Inspection/Enforcement of BMP's Once policies are in place, enforcement of those policies will be essential to their effectiveness to improve water quality in the watershed.	New Construction Sites within the watershed	Evaluate current activities and identify additional construction site inspection process for communities to utilize for all new development or redevelopment sites to ensure proper measures are in place. Assist communities on incorporating recommendations in their site construction process.	All communities Euclid Creek Technical Committee Ohio EPA	2006	This activity falls under current NPDES Phase II requirements.	Number of permits applied. Goal 100% Number of sites inspected. Goal 100% Number of plans reviewed. Goal 100% Reduction in sediment loads into Euclid Creek.
LEED Certification	New	Introduce LEED	All communities	Start-up	USEPA	Number of sites with

Task Description	Watershed Area	Activities for Implementation	Responsible Parties/ Partners	Time Frame	Cost Funding Resources	Indicators of Success
Incentive Program The LEED certification program administered by the US Green Building Council provides a linkage with architects and engineers and performance standards for sustainable building sites. Establishing a LEED performance standard with local communities and design professionals can integrate nutrient pollution load reduction needs and infiltration needs within a desired program .	Development and Redevelopment sites within the watershed.	Certification program on building and site design within local decision-making. 1) Develop a LEED Certification guidance for local communities. 2) Introduce to pilot sites/developers 3) Introduce incentives for local communities and developers. 4) Examine the intergration into local land use policies and adoption.	Watershed Coordinator Cleveland Green Building Coalition US Green Building Council	in 2007 Obtain Grant in 2007 to determine implementation in 2008	US Green Building Council/ LEED Program	LEED certification. Goal three sites by 2010 Reduction of nutrient loads off site. Decrease in impervious cover to 15%.

1.4 Best Management Practices on Existing Sites *Land Use Development & Management Recommendations*

Problem Statement*:* The developed nature of the watershed has altered much of the landscape over the years. Many of the existing developed areas will remain developed with its existing land uses and restrict the possibility of returning the original forested lands back to the watershed. This has posed undue stress on the watershed's functionality due to increased impervious cover, decreased infiltration capacity and loss of habitat.

Goal: Retrofitting existing land uses, unlikely for development in the next five years, can provide an opportunity to mimic natural hydrologic functions needed to restore the watershed's functional needs. Based upon land use types, best management practices and programs can provide place-based strategies to incorporate water quality benefits on a parcel by parcel scale. As a result, these practices cumulatively will result in reduced nutrient loadings, decreased sediment loads, decrease erosion rates, decrease impervious cover, and increase habitat functions.

Task Description	Watershed Area	Activities for Implementation	Responsible Parties/ Partners	Time Frame	Cost Funding Resources	Indicators of Success
Golf Courses Practices to be examined for best management practices include fertilizer management, stream buffers, mowing and maintenance programs and wildlife protection areas.	There are four existing golf courses within the watershed, all within the headwaters section of the watershed.	Assess Maintenance programs Introduce Conservation Easement Opportunities Introduce Audubon Certification Program	Watershed Coordinator Golf Course Managers Lyndhurst Willoughby Hills Highland Heights	2006- Pursue grants 2007 Conduct preliminary activities 2008 Implement recommendations with buy-in from local golf course managers	Audubon USFWS USEPA	Reduction of Phosphorous Loads. Resulting from buffer areas and fertilizer practices in the golf course. Number of Golf Course Assessments Performed Goal: 4 Number of Golf Course program implementation partnerships. Goal: 2

Task Description	Watershed Area	Activities for Implementation	Responsible Parties/ Partners	Time Frame	Cost Funding Resources	Indicators of Success
Airport	The Airport is located in the headwaters section of the watershed.	Assess Maintenance/Land Managment programs to determine impacts to watershed. Work with County to determine future development/restoration partnerships with adjacent lands through its Master Plan process and implementation.	Richmond Hts Willoughby Hills Highland Hts Cuyahoga County Watershed Coordinator	Meet with Airport in 2006 and 2007 to determine applicable implementation activities.		Development of a strategy plan with the Airport for management of its site and future operations.
Industrial	Many of the remaining industrial sites are located in the lower portions of the watershed along the Main Branch	Examine the use of ISO 14000 standards to integrate BMP's and meet environmental management objectives of companies. The BMPs' will need to be assessed for their effectiveness and applicability within the appropriate industry's operation and management needs.	Cleveland South Euclid Euclid Watershed Coordinator Local Chamber of Commerces	2007- Identify and obtain funding. 2008 Identify pilot sites to conduct EMS. 2009 Implement EMS 2010 Evaluate and Monitor benefits to water	Foundation Delta Institute	Number of industries to establish ISO 14000 standards. Goal: 2 industries. Reduction of air and water pollution contributions from on-site such as impervious cover and nutrient runoff loads and reduce runoff rates. Loads will be determined during the Step L and Optimination Models performed in previous tasks.

Task Description	Watershed Area	Activities for Implementation	Responsible Parties/ Partners	Time Frame	Cost Funding Resources	Indicators of Success
				quality.		
Commercial /Office	Commercial and office properties are located throughout the watershed. Primarily within the headwaters, Mayfield Road, Richmond Road, Cedar Road, Highland Road	Through the Optimization model developed, scope and types of bmps will be identified as well as costs. Suggested Activities may include: Introduce Pervious Parking areas in overflow areas with demonstration projects and provide incentives. Create demonstration projects on green roof design and devise incentives for implementation. Introduce landscape filtration practices to site maintenance program. Introduce LEED Site Design Certification program. Maximize existing landscape areas for permeability and infiltration purposes.	All Communities Cuyahoga SWCD Local Business Owners	2006 Pursue Funding for pilot sites 2008 Obtain funding for pilot sites. Perform implementation and monitor results. 2009 Identify next sites for implementation.	Foundations USEPA Grants Ohio EPA Grants	Goals: Identify bmp's for sites. Establish collaboration with three sites by 2009. Establish funding for additional sites after 2010. Reduce nutrient loads as identified in optimization model. Increase infiltration capacity./decrease impervious cover. Reduce runoff rates. Reduce water temperature in streams where necessary. Reduce sediment loads.
Residential Institutional Lands	Residential use predominates the entire	Through the optimization model , bmp's will be evaluated for their suitability to remove	All Communities NEOPIPE Watershed	Complete Optimization Model : 2006	OEPA Grants- 319 USEPA	Number of rain gardens installed. – Will be determined by model

Task Description	Watershed Area	Activities for Implementation	Responsible Parties/ Partners	Time Frame	Cost Funding Resources	Indicators of Success
	watershed.	pollutants and restore hydrologic functions. Rain Gardens Native Landscaping. Streamside Stewardship through public education program.	Coordinator CSWCD NOACA	Examine application for bmps and obtain grants: 2007 and 2008 Implement bmp's: 2008 and 2009	Grants Foundations ODNR Grants	Number of acres planted with native vegetation.- Will be determined by model.

Priority Action 2. Prevention & Reduction of Illicit Discharges

Problem Statement
Remaining septic systems and combined sewer overflows will continue to impair Euclid Creek in meeting State water quality standards if they are not maintained or eliminated in the future in terms of bacteria levels in the creek and additional phosphorous contributions. Continuing to monitor illicit discharge sources on a watershed-wide basis can also assist in determining sources of pollution and remediation measures in a timely and effective manner.

Goals
The goal is to reduce and prevent bacteria levels and phosphorous loads within the watershed through infrastructure improvements and monitoring. These infrastructure improvements and monitoring activities can virtually eliminate all illicit discharges within the watershed by 2015.

2.1 Recommended Actions of Implementation

Prevention & Reduction of Illicit Discharges

Recommendation	Watershed Area	Activities of Implementation	Resources	Timetable	Funding Resources	Performance Indicators
Remove/Improve Septic Systems	Remaining septic areas are mostly concentrated in the headwaters of the watershed.	Continue to evaluate the removal and improvement of septic systems. Cuyahoga Board of Health , through its current home septic system program, will continue working with watershed communities to monitor remaining septic systems within the watershed to reduce failure rates and introduce	Local Communities. Cuyahoga County Board of Health Richmond Hts, Mayfield Village, Pepper Pike, Willoughby Hills, Highland Hts.	Ongoing - 2005	Capital Improvements	Number of HSTS eliminated. Goal : 300 systems Number of HSTS inspected. Goal: 100 every five years. Reduction of phosphorous loads and

Recommendation	Watershed Area	Activities of Implementation	Resources	Timetable	Funding Resources	Performance Indicators
		e areas for additional tie-ins where appropriate				potential bacteria levels.
Monitor Pump Stations	East Branch Lower Main Branch	Examine reductions to future illicit discharges. Examine maintenance and operation improvements of stations.	OEPA Local Communities Richmond Hts, Euclid	Ongoing - 2005	Capital Improvements	0% contribution to nutrient loads and bacteria levels in Euclid Creek.
NPDES Permits	Lower Main Branch	Monitoring and maintaining reduction of impacts to Euclid Creek.	Ohio EPA/USEPA Cleveland, Euclid	Ongoing - 2005	Permit Holder	No permit violations from 2006-2010 of illicit discharge limits.
CSO Control/Reduction Strategy Plan	The affected area includes the lower portion of the creek from the Cleveland Metroparks to Lake Erie.	Implement Long Term Control Plans for Euclid Creek and monitor its improvements to creek as a result.	Cleveland NEORSD	Implement ation - 2010	NEORSD	Implementation of Plan. Reduction in overflow frequencies to five per year.
Identify other illicit discharges Providing a guidance on monitoring, evaluation and action when an iliicit discharge is identified will provide a tool to communities to act quickly when these	Watershed-wide	The Cuyahoga County Board of Health will continue to perform outfall surveys for Euclid Creek communities and monitor any illicit discharges as part of the NPDES Phase II permit requirements. The Cuyahoga County Board of Health (CCBH)	All Communities NEORSD Cuyahoga Board of Health	Ongoing July, 2006	Capital Improvements Funding from Municipal, County, State and Federal sources. OEEF/OEPA	Number of outfalls mapped. Reduction of illicit discharges documented. Reduction in bacteria levels annually.

Recommendation	Watershed Area	Activities of Implementation	Resources	Timetable	Funding Resources	Performance Indicators
concerns arise. This will reduce the potential volume of pollutant loads potentially entering the water.		received a grant from the Ohio Environmental Education Fund through the Ohio EPA to produce an Illicit Discharge Detection and Elimination (IDDE) Standard Operating Procedure Manual for the State of Ohio. This manual will be completed by July 2006 and be made available to all communities via the CCBH's webpage and on CD-ROM. The CCBH is working with the Ohio EPA, community engineers, service directors and watershed organizations in the creation of this manual. This manual will serve as a guidance manual for Phase II designated communities in developing there IDDE protocol.				

Priority Action 3. Stewardship through Education

Problem Statement:
The education and awareness of Euclid Creek has continued to grow the past five years since the inception of the Friends of Euclid Creek and Euclid Creek Watershed Council. However, the local decision-making in land development and awareness of property stewardship has not been addressed to the fullest extent. Providing additional resources to targeted audiences can further strengthen the community-based stewardship approach being conducted in Euclid Creek.

Goals:
The goal of this recommendation is to increase awareness of local watershed issues and solutions. In addition, developing a sense of ownership with watershed residents of their local resources and the value these resources provide for their community can create leadership in initiating change in human behavior.

3.1 Recommended Actions for Implementation – Stewardship through Education

Recommendation	Watershed Area	Activities of Implementation	Resources	Timetable	Funding Resources	Indicators of Success
Continue and Strengthen Euclid Creek PIPE Committee	Watershed-wide	Encourage additional members. Maintain Annual Watershed Day Maintain & Review PIPE Workplan annually. Continue to expand outreach audiences/community involvement through publications and media Expand distribution of Euclid Creek e-newsletter through promotion.	Watershed Coordinator Euclid Creek PIPE Committee DNR/EPA/Cuyahoga SWCD	Continuing	In-Kind Local Foundations OEEF Other Community Service Grants	Number of participants in Annual Stewardship Day Number of groups participating Number of people reached through Euclid Creek e-newsletter.
K-12 Education Programming	Watershed-wide	a) Outreach to each Euclid Creek School District b).	Watershed Coordinator	Continuing	Local Communities	Number of schools

Recommendation	Watershed Area	Activities of Implementation	Resources	Timetable	Funding Resources	Indicators of Success
		Develop a Watershed Partnership Program b) Provide outreach events/partnerships throughout the year.	Local Schools PIPE Committee Members Cuyahoga SWCD		ODNR OEPA OSU Extension	Number of events/programs participation. Number of students participating. Number of teachers involved.
Establish Volunteer Stewardship Network	Watershed-wide	Determine outreach venue for groups/others to access. Identify annual volunteer projects in watershed. Identify collaboration with other regional watershed groups to establish network. Implement and identify maintenance for long-term application/	Watershed Coordinator	2006	Foundations Private Donors	Number of Volunteers Number of Donors Number of Projects
Establish Volunteer Monitoring Program	Watershed-wide	Identify sites and monitoring needs from WAP. Identify partners to establish long term sampling program. Conduct sampling. Outreach with additional groups/individuals	Watershed Coordinator OEPA Tri-C East Campus John Carroll Univ FOEC	May, 2005 (planning) Start-up September, 2005	OSU Extension EPA /Grants	Number of Volunteers Number of Sites Monitored Number of Data Collected
Establish Technical Assistance Team for Local Community Decision -Making	Watershed-wide	Recruit Team Members (OEPA, NEORSD, Watershed Coordinator, SWCD, CMNH) Conduct meetings to collaborate on water quality solutions within the watershed.	Watershed Coordinator	Fall , 2005	OEPA	Number of meetings Number of attendees Goal is three meetings

Recommendation	Watershed Area	Activities of Implementation	Resources	Timetable	Funding Resources	Indicators of Success
						annually.
Develop /Partner Workshops for a variety of audiences on Watershed Stewardship	Watershed-wide	Identify target audiences for Euclid Creek/solicit needs from stakeholders. Develop workshop venues and partners. Develop and conduct workshops/speaker series	Cleveland State Chagrin Watershed Partners Shaker Lakes Cuyahoga SWCD	2006	Foundations OEPA ODNR	Number of Workshops Number of Participants
Expand awareness of Creek's location and proximity	Watershed-wide	Euclid Creek signage at bridge crossings and watershed boundaries.	FOEC Cuyahoga County Engineer, Watershed Coordinator PIPE Committee	2006	ODNR OEEF	Number of signs installed.
Continue to collaborate with FOEC on programs and outreach activities	Watershed-wide	Euclid Creek Historic Resource Book Promotion. Outreach to businesses for sponsorship of events. Increase of membership. Collaborate on annual work plans.	FOEC Watershed Coordinator	Ongoing	Foundations Private Donors	Meeting financial and program goals of FOEC.

Sub-watershed Project Recommendations

Introduction

Due to the size of the Euclid Creek watershed, it is has afforded the opportunity to assess and develop detailed subwatershed plan recommendations and implementation actions. The watershed was subdivided into eight subwatersheds varying in size from 1,400 to 3,000 acres. The subwatershed delineations were determined by the previous work of the NEORSD Draft RIDE Study and local patterns of land use. The subwatershed recommendations will serve as a foundation for future areas for protection, restoration, and management. Delineating these areas are a result of determining critical resource areas, field assessment of stream conditions, development or redevelopment opportunities to sustainable development practices and best management practices for existing development that will likely remain intact. Further determination of feasibility, community endorsement and property owner cooperation will need to be examined on a project by project basis in the implementation phase of the watershed effort. These place-based recommended actions are linked directly to the measurable results that are aimed for in the priority actions identified in ***Land Management, Illicit Discharges and Stewardship through Education.***

Subwatershed 1: Lake Plain – Nottingham

Recommended Actions for Sub-Watersheds

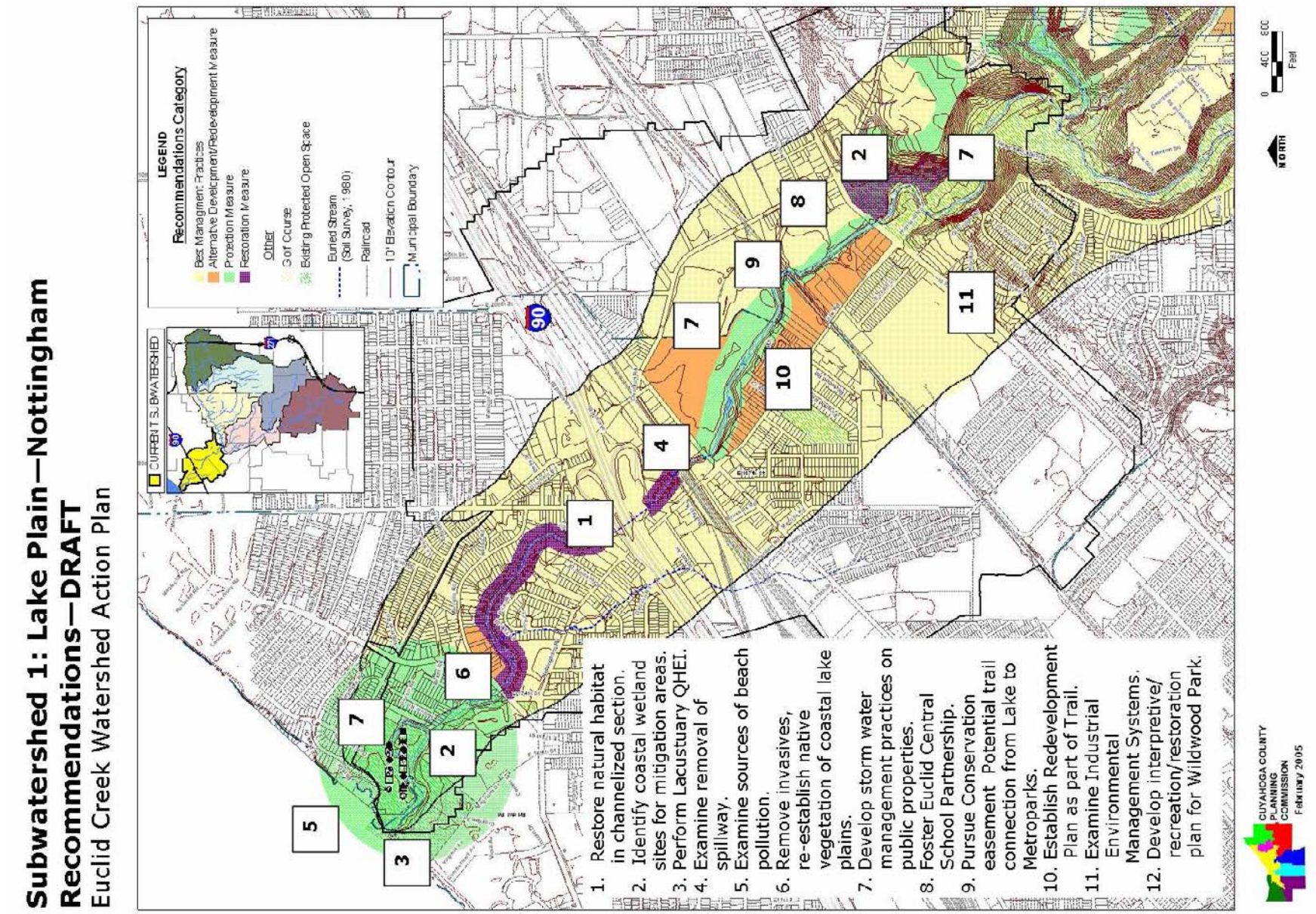
Communities: Cleveland, Euclid

Description: This highly urban area that enters Lake Erie and contains coastal areas have been highly modified and restrictive to fish communities to rhrive. Some riparian areas are intact and a number of public property owners exist. Recreational linkages from Wildwood State Park to the Cleveland Metroparks can provide additional greenspace and water quality benefits to the local community.

Goal	Activity/Recommended Projects	Indicators of Success
Restore Natural Range of resident and anadromous fish populations	Examine dam removal at St. Clair/E.185th	Increased fish migration Increased fish diversity and populations.
Restore Coastal Habitat in both plant and aquatic populations	Utilize lake plain settings for wetland restoration sites reflective of compatible reference coastal wetlands. Remove invasive plants along streambanks and re-introduce coastal and and native streamside plants. (i.e. Wildwood State Park)	Number of invasive plants present. Number of acres of new coastal wetlands.

Restore natural hydrologic flows and riparian areas.	Examine Flood Control Project between Lakeshore and Waterloo for enhances hydrologic, physical and biological enhancements. CMAG Lower Euclid Creek project is underway to assist with identifying these opportunities. Examine conservation easement opportunities along riparian corridor.	Number of natural riparian corridor re-established. Implementation of Lower Euclid Creek Greenway Plan Number of Acres of Conservation Easements established.
Restore lacustuary and nearshore habitat relationships of the Creek and Lake Erie	Examine coastal shoreline and harbor for nearshore habitat friendly retrofit opportunities. Conduct LQHEI to determine restoration needs and opportunities.	Projects identified.
Provide and enhance greenspace and recreational connections between Lake Erie and Cleveland Metroparks.	CMAG funded Lower Euclid Creek project is underway to identify these opportunities.	Implementation of Lower Euclid Creek Greenway Plan.
Eliminate illegal dumping and remove debris from stream banks.	Education and Volunteer Clean-ups annually	Number of clean-ups performed. Number of dumping incidents reported.
Reduce beach advisories caused by water quality pollution.	Annual evaluation and review of monitoring activities conducted by NEORSD, Cuyahoga Board of Health, Cuyahoga Sanitary Engineer and USGS. Develop strategy to reduce beach closing days at Villa Angela and Euclid Beach.	Reduction in Beach Advisory Days
Increase permeability of sub-watershed.	Incorporate BMP's as part of optimization model to be performed in 2006/07. Emphasis will be on utilizing existing publicly owner land including Wildwood State Park, City Parks, Nottingham Water Plant, Euclid Central Middle School, I-90 Interchange and Cleveland Metroparks.	Number of acres converted from impervious to pervious in sub-watershed.

Figure 49: Sub-Watershed 1 Recommendations

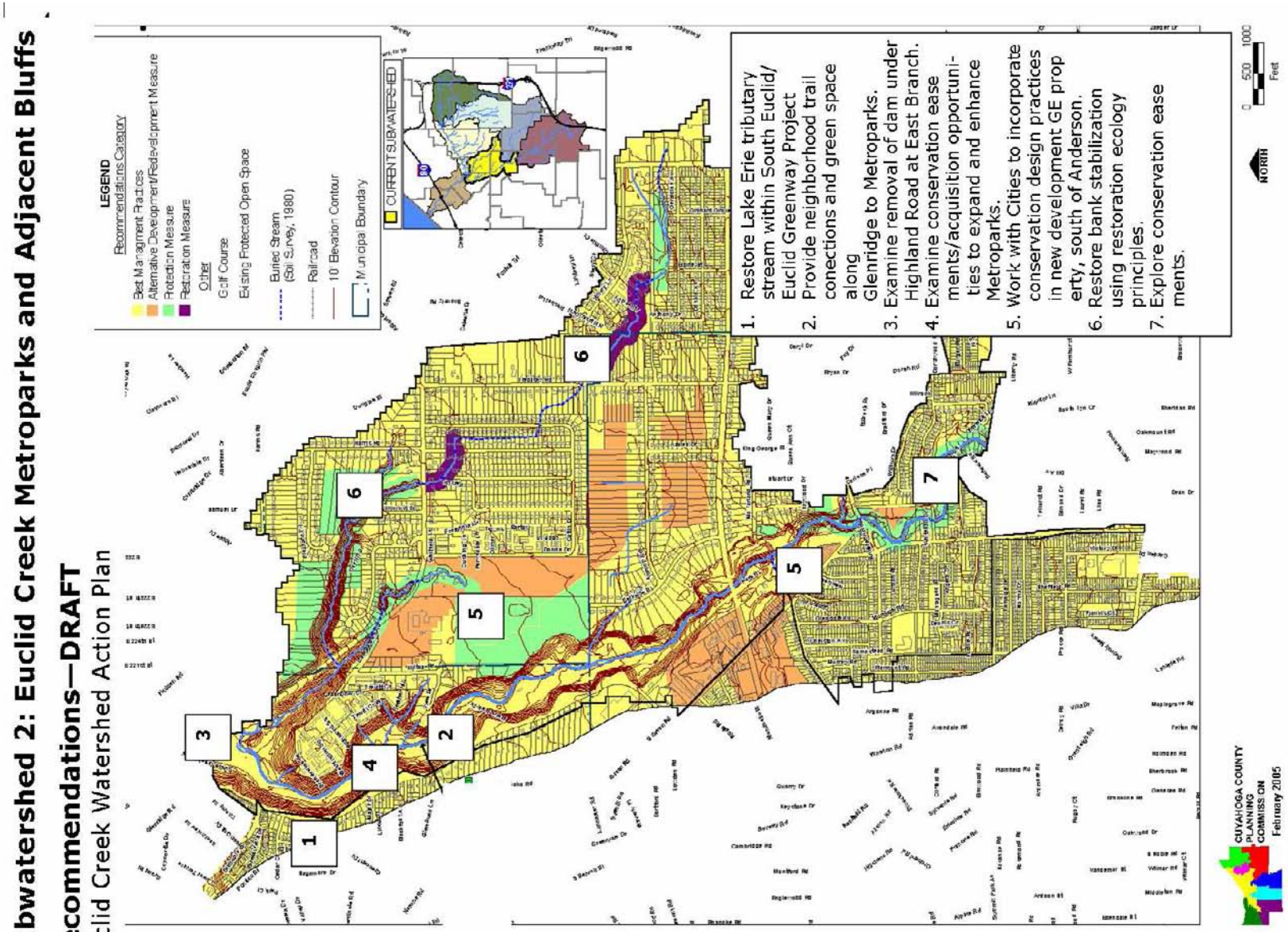


Subwatershed 2: Euclid Metroparks & Adjacent Bluffs ***Recommended Actions for Sub-Watersheds***

Communities: Euclid, South Euclid, Richmond Heights
Description: This highly protected protected area has very steep terrain and experiences flashy flows as a result of the topography. It serves as a buffer between the lower and upper reaches of the creek. Development continues to encroach on this area and its remaining forest cover.

Goal	Activity	Indicators of Success
Maintain and enhance natural state of area to serve the water resource needs upstream and downstream	Work with Cities and Cleveland Metroparks on priority parcels to expand Metroparks where feasible. Explore conservation easements with riparian property owners.	Number of acres conserved.
Maintain impervious cover below 15%	Work with Cities to incorporate conservation design practices in new development at GE property and Anderson Road.	No increase in impervious cover.
Stabilize and maintain streambanks with natural practices where feasible.	Examine stream restoration areas through QHEI assessment.	Number of linear feet stabilized.
Reduce and prevent illicit discharges.	Work with Board of Health and local communites on infrastructure needs and annual outfall reporting.	No illicit discharges.
Reduce further alteration of stream hydrology.	Examine removal of East Branch dam under Highland Road.	Acres of stream impacted.
Continue to expand Greenspace corridor connections where feasible.	Work with Cities of Euclid, South Euclid and Richmond Heights on Greenspace enhancement projects in association with water resource protection and restoration. i.e Euclid/South Euclid Greenway Project.	Acres of trail/greenspace amenities developed.

Figure 50: Sub-Watershed 2 Recommendations

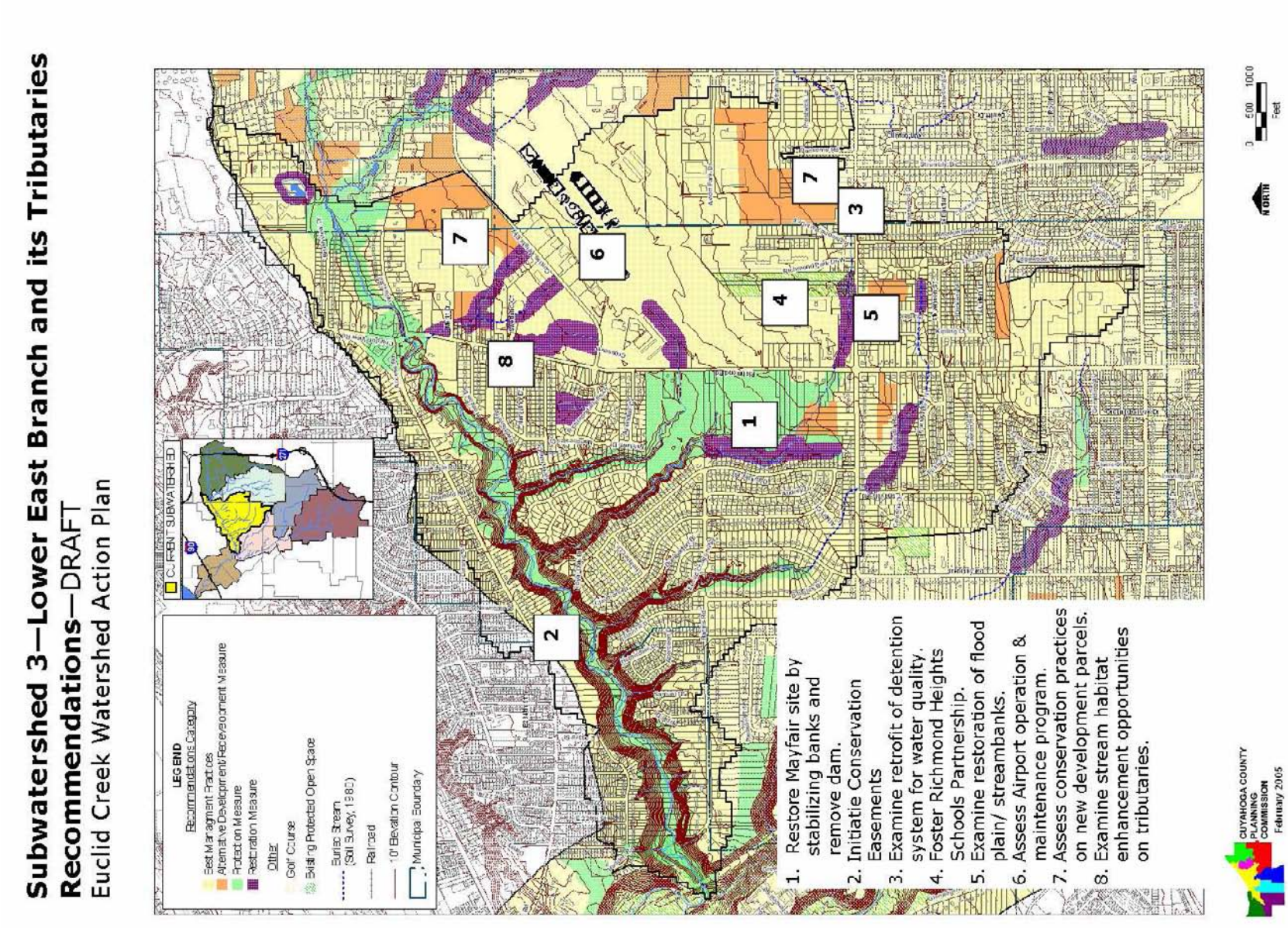


Subwatershed 3: Lower East Branch and its Tributaries ***Recommended Actions for Sub-Watersheds***

Communities: Richmond Heights, Highland Hts, Willoughby Hills, Euclid
Description: As a result of its topography and steep terrain, the lower East Branch remains mostly in tact. However, discharges from remaining septics and increased flows from upper reach development limit this area to an extent.

Goal	Activity	Indicators of Success
Conserve and protect remaining features of the Lower East Branch to prevent further degradation of the watershed.	Introduce Conservation Easements to property owners along East Branch Corridor.	Number of acres conserved.
Prevent further discharges from remaining septic systems.	Elimination of HSTS with municipal infrastructure projects already being conducted. Continue monitoring and evaluating remaining septic systems.	Number of septic systems eliminated and monitored.
Reduce non-point pollution sources from urban land uses.	Evaluate appropriate bmp's for watershed. Examine retrofit of existing detention basin south of Highland Road. Work with County Airport to evaluate bmp application on their property.	Phosphorous load limits for sub-watershed met.
Restore headwater streams to enhance habitat and riparian functionality.	Evaluate headwaters with HHEI evaluation to target headwaters. Work with City of Richmond Heights on municipal complex stream restoration opportunity. Examine Mayfair Dam removal.	Acres of headwaters restored.
Reduce further alteration of remaining streams and wetlands.	Work with municipalities on local design review and conservation development approaches.	Number of acres impacted.
Increase permeability of sub-watershed.	Evaluate appropriate bmp's for watershed.	Acres of impervious cover reduced.
Stabilize and reduce along streambanks.	Evaluate streambanks and stabilization benefits/needs.	Linear feet of streambanks stabilized.

Figure 51: Sub-Watershed 3 Recommendations

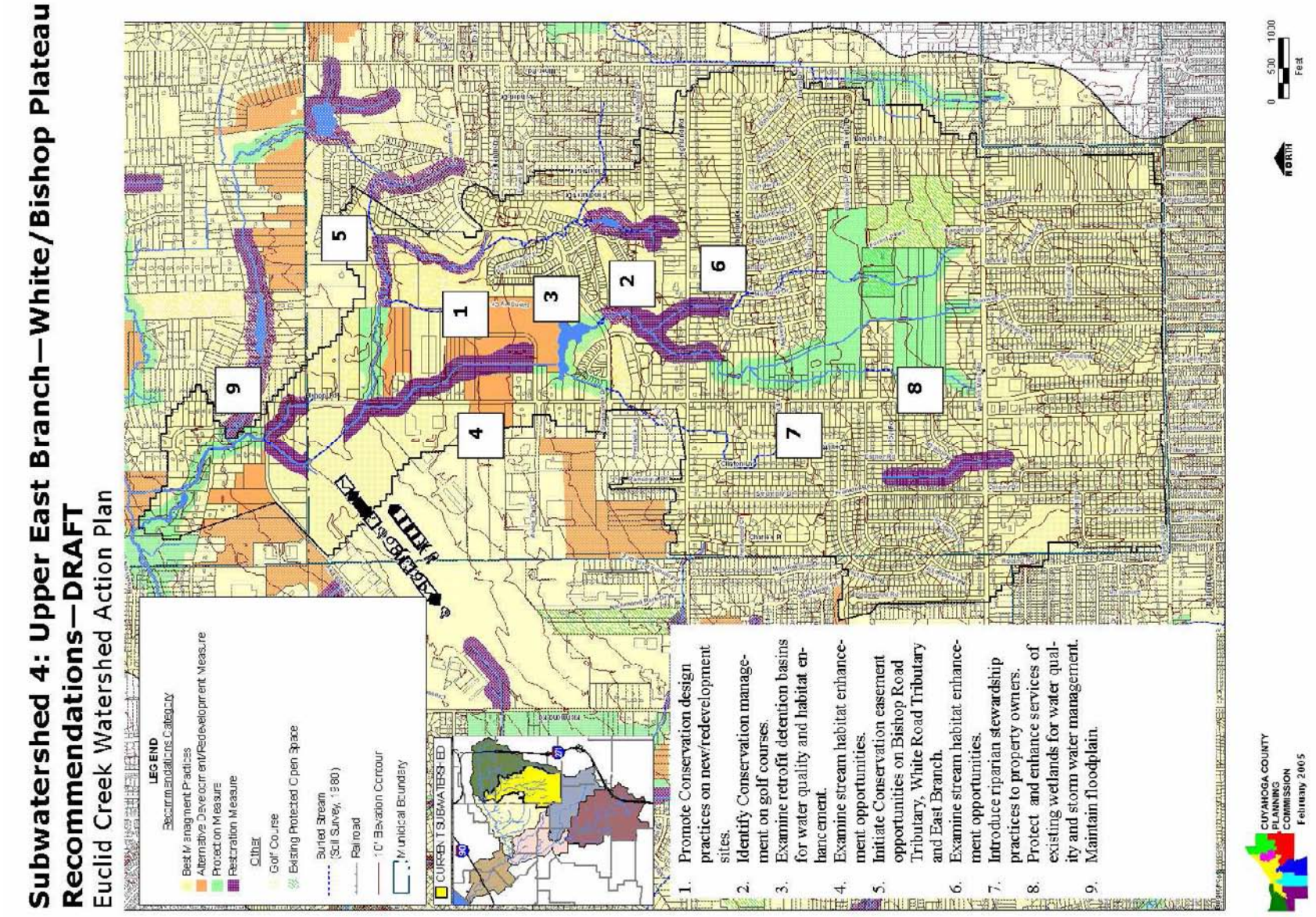


Subwatershed 4: Upper East Branch – White/Bishop Plateau ***Recommended Actions for Sub-Watersheds***

Communities: Highland Heights, Willoughby Hills
Description: The riparian corridor continues to be intact on the East Branch. However the headwaters have been altered for development. Existing land uses and their management may contribute to non-point source pollution and increased erosion as well as continued development areas. Few remaining areas of floodplain remain.

Goal	Activity	Indicators of Success
Maintain East Branch natural conditions to prevent further degradation of water resources within the watershed.	Introduce conservation design opportunities on new development sites. Introduce conservation easement opportunities to private property owners along stream corridors. Protect Highland Heights Park area. Introduce conservation management practices on golf courses.	Number of acres protected.
Reduce non-point pollution from suburban development.	Develop appropriate bmps for suburban development land patterns.	Number of acres with associated bmps.
Reduce and restore natural hydrology and habitat where feasible.	Examine retrofit of existing detention basins.	Water quality attainment in watershed is met.

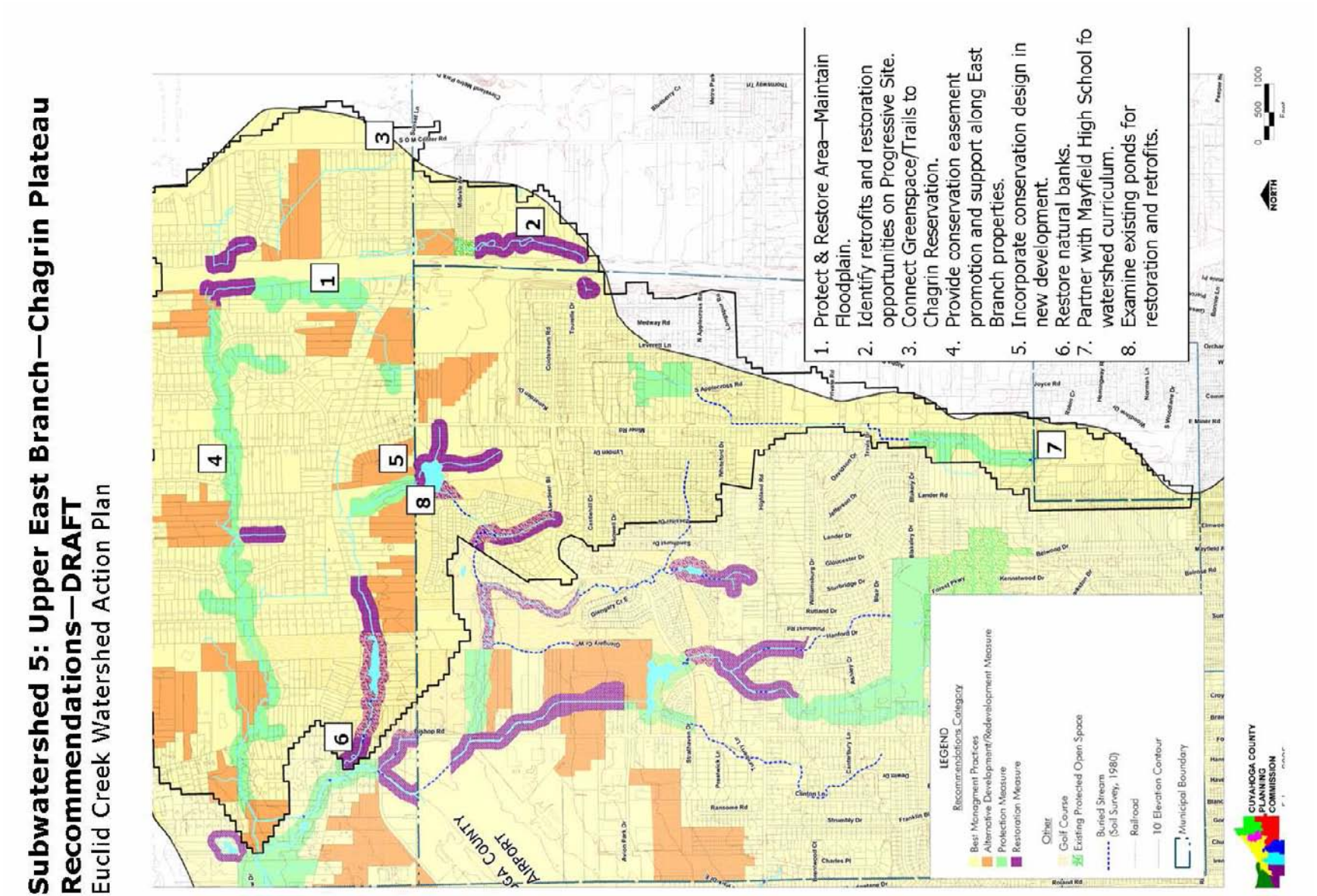
Figure 52: Sub-Watershed 4 Recommendations



Communities: Mayfield Village, Highland Heights, Willoughby Hills
Description: The headwaters of the East Branch have been modified with a few remaining pockets of natural stream corridor. Impervious cover remains low which benefits the lower portions of the East Branch. Greenspace connections to Chagrin Reservation provide opportunities for community enhancements. Development continues to occur in this area.

Goal	Activity	Indicators of Success
Maintain impervious cover below 10%	Introduce conservation development design in new development. Develop and implement bmps.	No increase in impervious cover.
Reduce further hydrologic alteration of streams and filling of headwater streams.	Identify retrofits for detention basins and other infrastructure. (i.e. Progressive Campus, Mayfield High, Mayfield Library)	Water quality attainment parameters for subwatershed.
Maintain remaining wetlands and restore headwaters where feasible.	Evaluate conditions and prioritize.	Acres of wetlands restored and protected.
Protect East Branch main corridor and tributaries.	Explore conservation easements with property owners.	Numbers of acres.

Figure 53: Sub-Watershed 5 Recommendations

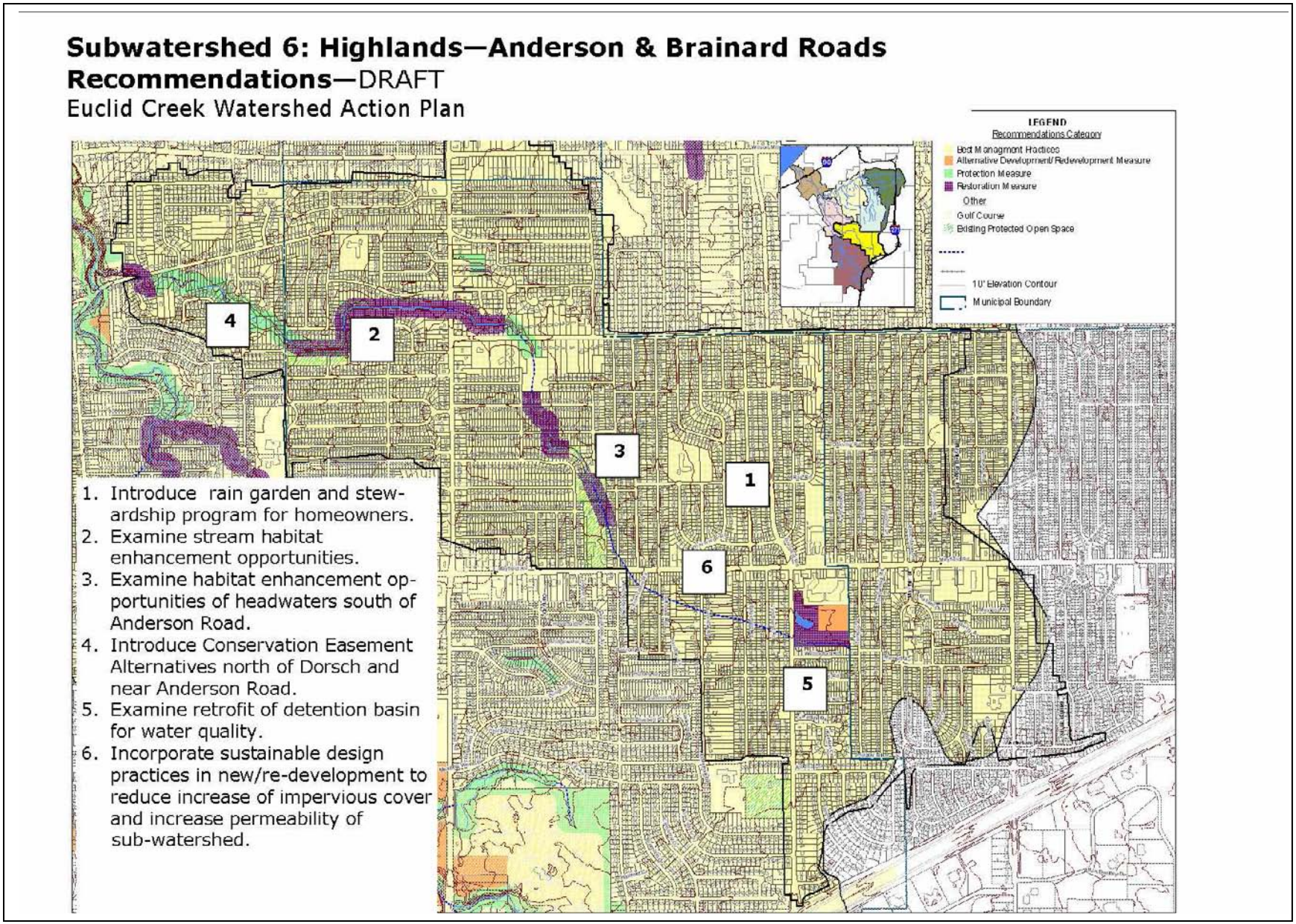


Subwatershed 6: Highlands – Anderson & Brainard Roads

Communities: Lyndhurst, Mayfield Heights, South Euclid
Description: The headwaters of the Main Branch have been highly developed over the past fifty years. Streams are somewhat channeled and entrenched with many structurally stabilized. The impervious cover is over 25% which can limit the water resource and their quality.

Goal	Activity	Indicators of Success
Reduce non-point pollution sources from urban runoff	Introduce bmp's appropriate for density of development. Examine retrofits of storm water structures for water quality benefits (detention pond at Greens of Lyndhurst)	Reduction of phosphorous load allocation for sub-watershed.
Increase permeability of land cover.	Incorporate pervious retrofits where feasible (i.e, Mayfield Road, Brainard Road, Richmond Road)	Acres of impervious cover reduced.
Restore and stabilize streambanks and floodplains where feasible to reduce erosion prone areas.	Examine restoration and use of Schaeffer Park and institutional lands. Examine restoration and streambank protection south of Anderson Road stream segment.	Linear feet restored.
Restore and maintain headwaters.	Examine opportunities for restoration and existing conditions. Prioritize areas.	Linear feet of headwaters protected and restored.

Figure 54: Sub-Watershed 6 Recommendations



Subwatershed 7: Headwaters! Cedar & Mayfield Roads ***Recommended Actions for Sub-Watersheds***

Communities: Lyndhurst, South Euclid, Beachwood, Pepper Pike

Description: The headwaters of the Main Branch have been modified with some remaining areas functioning within the golf courses. Impervious cover is over 25% and development activity remains high within this sub-watershed. Existing development is very dense with residential and commercial development predominant.

Goal	Activity	Indicators of Success
Increase permeability of land cover.	Introduce appropriate bmps on existing and new development sites. Partner with local institutions and property owners including Notre Dame College, Cleveland Clinic, Legacy Village, Beachwood Place and private golf courses.	Number of acres removed from impervious cover.
Conserve remaining wetlands, floodplains and forest cover along stream banks.	Introduce conservation easement opportunities to property owners.	Number of acres conserved.
Reduce non-point source pollution from urban runoff	Implement appropriate bmps for urban land uses.	Pounds of phosphorous reduced for sub-watershed.
Reduce erosion rates and flooding incidents.	Examine stream restoration areas.	Reduced erosion prone areas.
Restore hydrology and water quality proection of main branch and its headwaters.	Examine restoration and protection areas.	Acres restored with increase functionality. QHEI score of 60.

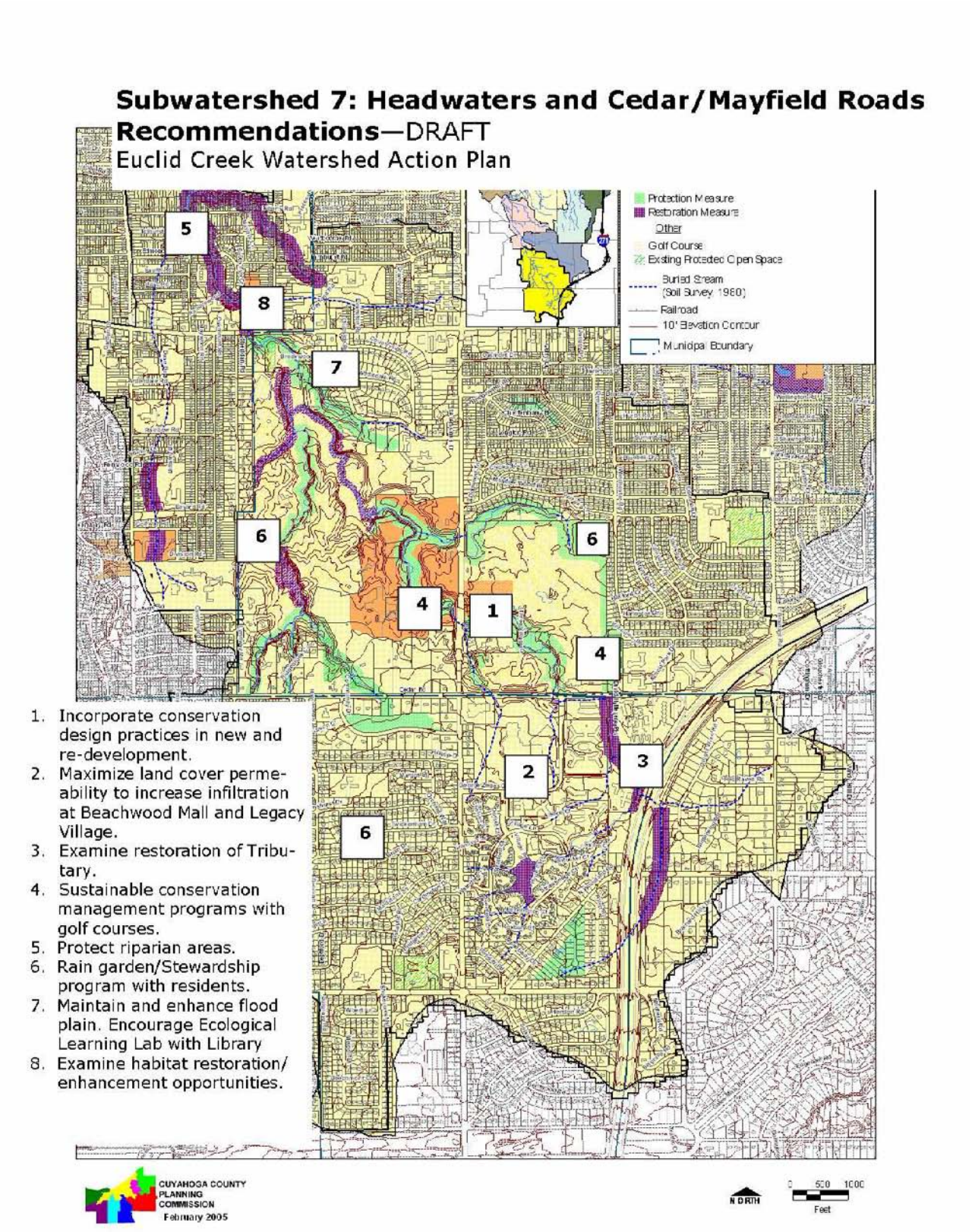


Figure 55: Sub-Watershed 7 Recommendations

Restoration of Beneficial Uses

Problem Statement: The examination of beneficial use impairments at local tributary watershed scale has not occurred within the Cuyahoga Area of Concern prior to this opportunity. As with many urban watersheds throughout the Great Lakes, determining the status of the beneficial uses and the needs for restoration are complex and somewhat still being established.

Euclid Creek remains in impairment of many of the BUI's established as identified for this Watershed Action Plan process. Strategies to remediate these impairments will set a program to move the watershed towards restoration and meet the GLWQA objectives.

Goals:
Full recovery of all 14 beneficial uses.

The timeline and performance indicators will be developed through the cooperation with the Cuyahoga RAP Delisting Work Group for the remainder of 2005 and 2006.

Recommended Actions for Implementation

Beneficial Use Impairment	Current Status	Activities of Implementation	Resources	Timetable	Funding Resources	Performance Indicators
BUI 1: Restrictions on Fish & Wildlife Consumption	**Unknown**	-Euclid Creek fish tissue analysis. -Lower Euclid Creek sediment analysis. -Euclid Creek CREEL Surveys -Collaborate on Lake Erie efforts on mercury and air toxic deposition. -Monitoring of Wildlife.	**To be developed with the Cuyahoga RAP Delisting Work Group, 2005-2006.**			
BUI 2: Tainting of Fish and Wildlife Flavor	**Unknown/In Recovery**	**-** Contact fish and wildlife managers to report tainting incidences in Euclid Creek.				

BUI 3: Degradation of Fish and Wildlife Populations	**Impaired**	TMDL and Euclid Creek Watershed Action Plan Recommendations/Implementation.	**To be developed with the Cuyahoga RAP delisting Work Group in 2005-2006.**
BUI 4: Fish Tumors and Other Deformities	**Impaired/In Recovery**		
BUI 5: Bird or Animal Deformities or Reproductive Problems	**Unknown**	Survey local wildlife managers to report observances. Work with local Audubon and Bird Clubs to report sitings.	
BUI 6: Degradation of Benthos	**Impaired**	TMDL and Euclid Creek Watershed Action Plan recommendations/implementation.	
BUI 7: Dredging			
BUI 8: Eutrophication or Undesirable Algae	**Unknown**	Survey of streams to evaluate algae type and nuisance level. TMDL and Euclid Creek Watershed Action Plan recommendations/implementation.	
BUI 9: Restrictions on Drinking Water Consumption or Taste and Odor Problems	**Not Impaired**		
BUI 10: Beach Closings	**Impaired**	Work with USGS/NEORSD Beach Study Work Group	

BUI 11: Degradation of Aesthetics	**Impaired**	TMDL and Watershed Action Plan recommendations.	**To be developed with the Cuyahoga RAP Delisting Work Group in 2005-2006.**
BUI 12: Added Costs to Agriculture and Industry	**Not Applicable**		
BUI 13: Degradation of Phytoplankton and Zooplankton	**Unknown**	Examine LQHEI in lacustuary zone to determine conditions.	
BUI 14: Loss of Fish and Wildlife Habitat	**Impaired**	TMDL and Euclid Creek Watershed Action Plan recommendations/implementation.	

Implementation of Coastal Non-Point Pollution Control Measures Euclid 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 Euclid Creek efforts will address and implement the applicable management measures to meet the conditions of the Ohio Coastal Non-point Pollution Control Program. The Euclid 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 Euclid 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 Euclid Creek Watershed Action Plan implementation program.

Due to the urban nature of the Euclid Creek watershed the emphasis of addressing the coastal non-point pollution control measures will be on the urban impacts and modification elements of the Coastal Non-Point Control Plan. Detailed priority areas for implementation are identified in the general recommendation map on page 122 of the Watershed Plan and in sub-watershed detail on pages 153-165.

The following management measures are addressed for the Euclid Creek watershed:

1. Agricultural: Irrigation Water Management
2. Urban:
    - New Development
    - Watershed Protection
    - Site Development
    - Existing Development
    - New On-Site Disposal Systems
    - Operating On-site Disposal Systems
    - Planning, Siting, and Developing Roads and Highways (Local Only)
    - Bridges (Local Only)
    - Operation and Maintenance of Roads, Highways and Bridges
    - Runoff Systems for Roads, Highways and Bridges

Agricultural Sources – Request for Exemption

The watershed currently does not hold any agricultural land or uses that require grazing, livestock waste operations, nutrients or pesticides from agriculture or irrigation of large agricultural areas greater than 10 acres. There is one property in Willoughby Hills identified through a field land use inventory conducted by the Cuyahoga Soil & Water Conservation District and the Cuyahoga County Planning Commission in 2004 that has some horse operations, but the property is not greater than 10 acres. Due to the

absence of these uses within Euclid Creek, this management measure is not applicable and Euclid Creek is exempt. Please refer to the Table 7 on land use distribution and the Figure 29 on the land use map demonstrating the lack of agricultural land both for crop and nursery products within the watershed.

Urban

Exemptions as NPDES Phase II Area

All eleven municipalities within Euclid Creek are within a NPDES Phase II area and considered MS4 communities by the Ohio EPA and US Census Bureau. Each community has been notified by Ohio EPA of this permit requirement under the NPDES Phase II program. Therefore the watershed is exempt from the following four management measures:

5.3.1 New Development
5.5.1 Existing Development
5.8.5 Road, Highway and Bridge Operation and Maintenance
5.8.6 Road, Highway and Bridge Runoff Systems
7.5.3 Dams – Water Quality and Riparian Habitat

Overview
The Euclid Creek Watershed Program established by the Euclid Creek Watershed Council, Friends of Euclid Creek and the Cuyahoga Soil & Water Conservation District has outlined a strategy to protect and manage the urban coastal non-point pollution sources. The strategy outlined in the following map identifies the following areas: Protection of critical resources, restoration of functional resources, site development best management practices and retrofits for existing development areas.

This strategy has been outlined in the Euclid Creek Watershed Action Plan on how the Euclid Creek Council and the Cuyahoga Soil & Water Conservation District intends to implement the program to achieve these goals. These goals have been included under each management measure where appropriate.

5.3.2 Watershed Protection Management Measure

Introduction
Due to the continuing development and redevelopment within the watershed expected in the next ten years, loss of forest cover and increase in imperviousness will continue to impact the watershed resources and its coastal connections.

One of the main goals and priority actions for the watershed will be protecting critical resources to maintain water quality and assist in managing non-point coastal pollution control.

Management Measure Goals:

1. Avoid conversion, to the extent practicable, of areas that are particularly susceptible to erosion and sediment loss;

2. Preserve areas that provide important water quality benefits and/or are necessary to maintain riparian and aquatic biota; and

3. Site development, including roads, highways, and bridges, to protect to the extent practicable the natural integrity of waterbodies and natural drainage systems.

Existing Programs & Enforceable Policies and Mechanisms: State and Local

Watershed Coordinator Program and the Watershed Action Plan

The Euclid Creek Watershed Coordinator Program and the Euclid Creek Watershed Action Plan provides the local strategy to implement the management measure goals for Watershed Protection.

Overview of Current Program

The state of Ohio has implemented a coordinated effort to meet this management measure. The ODNR's Watershed Coordinator Program provides a collaborative approach to assist in watershed protection at the local watershed level.
This collaboration involves a local watershed coordinator, Ohio Department of Natural Resources, Division of Soil & Water, OSU Extension and Ohio EPA which comprises an Area Assistance Team for the watershed.

Through this effort, the watershed coordinator for Euclid Creek has assembled a Watershed Action Plan to assemble a Watershed Action Plan. This plan provides the guidance on prioritizing areas for protection and has been locally endorsed by the Euclid Creek Watershed Council.

Additionally, the Euclid Creek TMDL through Ohio EPA and USEPA has been completed and federally approved The TMDL program provided the establishment of impairments towards watershed protection and recommendations for protection to meet this management measure.

Practices to meet Watershed Protection Management Measures

Resource Inventory & Information Analysis

As part of the Euclid Creek Watershed Planning process conducted from 2003 through 2005, a resource inventory was conducted. This inventory and available data is a component of the Euclid Creek Watershed Action Plan

Development of Watershed Management Plan

The Cuyahoga Soil & Water Conservation District, the Euclid Creek Watershed Council and Friends of Euclid Creek developed a Watershed Management Plan under the direction of ODNR's Watershed Coordinator program for Euclid Creek in 2005. The following practices have been outlined in the Plan as recommendations for implementation.

Development of Model Ordinances

The Northeast Ohio Areawide Coordinating Agency has established ordinances pertaining to riparian and wetland setbacks, erosion and sediment control and post construction best management practices related to the Phase II requirements for communities in Northeast Ohio, including Euclid Creek. These ordinances are being introduced to the Euclid Creek communities for their

consideration to adopt. The ordinances will also apply to new roads, highways and bridges. The introduction of ordinances is being led by the Euclid Creek Watershed Coordinator and the Cuyahoga Soil & Water Conservation District

Euclid Creek Conservation Easement Program

Priority Parcel Identification

The Euclid Creek Watershed Action Plan has identified critical areas for watershed protection. These areas will be aimed for protection through conservation easements through the Cuyahoga SWCD and other local land conservancies. The initial targeted parcels have been selected and approved by the Watershed Council to request easement agreements. This initial introduction to the targeted parcel owners will be conducted in 2006. An annual list of targeted parcels will be developed and approved by the Watershed Council.

Easements on New Development

In addition, conservation easements are currently being introduced on two new potential development sites in Euclid Creek and one new development site in the Nine mile creek watershed where riparian areas and wetlands exist. An easement was recently established for _ acres of Category II wetland on a residential development in the City of Richmond Heights.

Guidance for Easements to Local Planning Commissions

A checklist is being developed for each municipal planning commission in the watershed to evaluate the potential of conservation easements during plan approval procedures by the Euclid Creek Watershed Coordinator.

The Conservation Easement Program is being led by the Euclid Creek Watershed Coordinator with support from the Euclid Creek Watershed Council, individual municipalities, Cuyahoga Soil & Water Conservation District and local land trusts that include the Trust for Public Land, Cleveland Metroparks and Western Reserve Land Conservancy.

Relevant Watershed Action Plan Strategies for Implementation

A table describing the lead agency, measurement of success, resource needs and timeframe for these practices are outlined on pages 123-165 of the Euclid Creek Watershed Plan. The following Watershed Action Plan Strategies outlines the practices to address this management measure.

1.1 Protection of Habitat

5.3.3 Site Development Management Measure:

Introduction:

New site development will continue to occur in concentrated areas of the watershed. However the watershed is close to being completely built out but redevelopment will continue to be a trend in the watershed in the next ten years. These areas are identified in under *Areas for Best Management Practices* on Figure 45 of the Watershed Action Plan

Management Measure Goals:

Plan, design, and develop sites to:
(1) Protect areas that provide important water quality benefits and/or are particularly susceptible to erosion and sediment loss;
(2) Limit increases of impervious areas, except where necessary;
(3) Limit land disturbance activities such as clearing and grading, and cut and fill to reduce erosion and sediment loss; and
(4) Limit disturbance of natural drainage features and vegetation.

Existing Programs & Enforceable Policies and Mechanisms: State and Local

ODNR Watershed Coordinator Program

ONDR Watershed Coordinator Program – Euclid Creek Watershed Program
Through the guidance of the Euclid Creek Watershed Action Plan, actions are being developed and recommended to Euclid Creek communities to ensure site development is conducted with the least amount of impact to the resource as practicably feasible.

Practices to meet Management Measures

Erosion & Sediment Control Plans

The Euclid Creek Watershed Program through the ODNR Watershed Coordinator Program and the Cuyahoga Soil & Water Conservation District are working with the Euclid Creek Technical Committee in introducing the NOACA model ordinances for Erosion & Sediment Control. The City of Lyndhurst, Beachwood and Highland Heights has an erosion and sediment control ordinance in place.

The Cuyahoga SWCD and Lake SWCD provides technical assistance for review of erosion and sediment control plans for municipalities. The Cuyahoga SWCD and the Euclid Creek Watershed Council will be holding roundtable planning sessions with Euclid Creek Community planning commission members in 2006 to discuss implementation of a strategy to develop, review, and install good erosion and sediment control plans and practices.

Preserving Natural Drainage Features

The Cuyahoga SWCD is developing through local support and a grant from the Great Lakes Commission a soil survey stream GIS layer and a wetland GIS layer for communities to use for their local planning and site development decision – making. This will be used as a guide for communities to meet their Phase II storm water management requirements as well as for local planning. These maps will be distributed to Euclid Creek communities in 2006.

Conservation Easements

Limiting disturbance of natural drainage features and susceptible erosion areas will also be conducted through the introduction of conservation easements on existing and new development sites. The activity will be the same as outlined in the Watershed Protection Measure.

Reducing Hydraulic Connectivity of Impervious Surfaces
Through the Euclid Creek Technical Committee, best management practices are being introduced to reduce hydraulic connectivity of impervious surfaces. These practices include bioretention areas, storm water wetlands, rain gardens and re-establishment of flood plain and storage areas.

One development site in the watershed is currently developing a site plan to include bioretention cells on its sites. The Cuyahoga SWCD has received a grant from the Ohio Lake Erie Protection Fund to install two rain gardens in the watershed and the Lower Euclid Creek Greenway Plan under development has identified areas for floodplain and wetland restoration.

The NOACA model ordinance, Post Construction Best Management Practices is being introduced to Euclid Creek communities by the Cuyahoga SWCD to consider for adoption that will establish a strategy for the municipalities to ensure these types of practices are being explored for implementation in the watershed.

Relevant Watershed Action Plan Strategies for Implementation

1.1 Protection of Habitat
1.3 Site Design of Development/Redevelopment Areas
1.4 Best Management Practices on Existing Sites

5.6.1 New Operating On-Site Disposal Systems
Introduction
The watershed is 85% built out and is in the process of connecting many existing on-site disposal systems with the local sewer management systems. It is very unlikely that any new on-site disposal systems will be installed within the watershed as a result of its urbanization and close proximity to local sewer management systems.

The Capital Improvements Plan of the Watershed, 2004-2006 (Figure 34 in the watershed action plan) from all eleven municipalities of the watershed does not outline any plans for additional on-site disposal systems. Hence. no new on-site disposal systems are planned for the next two years within the watershed. If a development is proposed that is more than 200 feet of an existing sewer connection and a on-site disposal system is required, the local community will work with the Cuyahoga County Board of Health, as regulated by OAC 3701-29, and the guidance set forth in the Clean Water 2000 plan by NOACA (Northeast Ohio Area-wide Coordinating Agency) and adopted by the NOACA governing board in 2000.

The Cuyahoga County Board of Health will administer these programs in cooperation with the local municipalities within the watershed.

Management Measure Goals:

1. Ensure that new Onsite Disposal Systems (OSDS) are located, designed, installed, operated, inspected, and maintained to prevent the discharge of pollutants to the surface of the ground and to the extent practicable reduce the discharge of pollutants into ground waters that are closely hydrologically connected to surface waters. Where necessary to meet these objectives: (a)

discourage the installation of garbage disposals to reduce hydraulic and nutrient loadings; and (b) where low-volume plumbing fixtures have not been installed in new developments or redevelopments, reduce total hydraulic loadings to the OSDS by 25 percent. Implement OSDS inspection schedules for preconstruction, construction, and post construction.

2. Direct placement of OSDS away from unsuitable areas. Where OSDS placement in unsuitable areas is not practicable, ensure that the OSDS is designed or sited at a density so as not to adversely affect surface waters or ground water that is closely hydrologically connected to surface water. Unsuitable areas include, but are not limited to, areas with poorly or excessively drained soils; areas with shallow water tables or areas with high seasonal water tables; areas overlaying fractured bedrock that drain directly to ground water; areas within floodplains; or areas where nutrient and/or pathogen concentrations in the effluent cannot be sufficiently treated or reduced before the effluent reaches sensitive waterbodies;

3. Establish protective setbacks from surface waters, wetlands, and floodplains for conventional as well as alternative OSDS. The lateral setbacks should be based on soil type, slope, hydrologic factors, and type of OSDS. Where uniform protective setbacks cannot be achieved, site development with OSDS so as not to adversely affect waterbodies and/or contribute to a public health nuisance;

4. Establish protective separation distances between OSDS system components and groundwater which is closely hydrologically connected to surface waters. The separation distances should be based on soil type, distance to ground water, hydrologic factors, and type of OSDS;

5. Where conditions indicate that nitrogen-limited surface waters may be adversely affected by excess nitrogen loadings from ground water, require the installation of OSDS that reduce total nitrogen loadings by 50 percent to ground water that is closely hydrologically connected to surface water.

Existing Programs & Enforceable Policies and Mechanisms: State and Local
The Cuyahoga Board of Health has established a program that provides assistance to the local municipalities for siting, installation and inspection of new on-site disposal systems.

Practices to meet Management Measures

Guidelines and Assessment for Siting, Design and Construction of New Systems
The current sewage rules do provide some guidance on siting, design and construction of new on-site disposal systems. The new rules proposed will meet these practices as a requirement for any new system and administered by the Cuyahoga County Board of Health in partnership with the local municipalities. Recently, the new rules were established by the state under the *Chapter 3701-29 Sewage Treatment Systems Rule* in which the Board of Health and Municipalities will administer.

Relevant Watershed Action Plan Strategies for Implementation

2.1 Prevention & Reduction of Illicit Discharges
3.1 Stewardship through Education

5.6.2 Operating On-site Disposal Systems

Management Measure Goals:

1. Establish and implement policies and systems to ensure that existing OSDS are operated and maintained to prevent the discharge of pollutants to the surface of the ground and to the extent practicable reduce the discharge of pollutants into ground waters that are closely hydrologically connected to surface waters. Where necessary to meet these objectives, encourage the reduced use of garbage disposals, encourage the use of low-volume plumbing fixtures, and reduce total phosphorus loadings to the OSDS by 15 percent (if the use of low-level phosphate detergents has not been required or widely adopted by OSDS users). Establish and implement policies that require an OSDS to be repaired, replaced, or modified where the OSDS fails, or threatens or impairs surface waters;

2. Inspect OSDS at a frequency adequate to ascertain whether OSDS are failing;

3. Consider replacing or upgrading OSDS to treat influent so that total nitrogen loadings in the effluent are reduced by 50 percent. This provision applies only:

    - where conditions indicate that nitrogen-limited surface waters may be adversely affected by significant ground water nitrogen loadings from OSDS, and

    - where nitrogen loadings from OSDS are delivered to ground water that is closely hydrologically connected to surface water.

Existing Programs & Enforceable Policies and Mechanisms: State and Local
NPDES Phase II program administers the review of illicit discharges into the waters of the State including discharges from existing failing septic systems. Many communities throughout the watershed have included a review of these potential sources in their Storm Water Management Plan submitted to Ohio EPA.

Practices to meet Management Measures

Reduction of On-Site Disposal Systems
As stated in the inventory, the watershed does contain nearly 400 home septic sewage systems within its boundaries. However, due to numerous capital improvements initiated by local municipalities many of these systems are currently being eliminated. The number of systems will significantly be reduced to under ten systems by the end of 2007 based upon the watershed communities projected capital improvement plans. These improvements are being conducted by the local municipalities in the watershed. As a result of these planned improvements, the number of on-site disposal systems will be under one system per 20 acres.

Monitoring for Illicit Discharges from Operating Systems
The failure of current systems was evaluated in 2002 by the Cuyahoga County Board of Health in Euclid Creek and the Chagrin River watersheds. Of the 2,700 operating systems within the two watersheds, 180 were found to be failing or not operating as designed. (*The Chagrin River/Euclid Creek Water Quality Assessment and Sewage System Evaluation Project, 2002-2003*) Additionally, as the number of systems in place are reduced, the failure rate becomes less due to the individualized approach of each system that agencies and municipalities can provide if a problem arises. The Cuyahoga

County Board of Health is working with municipalities in the watershed to monitor all illicit discharges and identifying sources when elevated levels of nutrients and bacteria are identified.

The local effort to reduce existing systems in the next two years will greatly reduce the threat of coastal non-point pollution. These local initiatives to eliminate the majority of systems in the watershed and the evaluation of the maintenance of remaining systems will continue to be monitored by the Watershed Coordinator, with support from the Cuyahoga Board of Health and local communities.

Perform Regular Inspections and Maintenance
The Cuyahoga County Board of Health On-Site Disposal Program continues to work with the local municipalities in the Euclid Creek Watershed on the remaining on-site disposal systems to educate homeowners on the maintenance of these systems, provide service assistance as provided by the Clean Water 2000 Plan guidance, and continue to monitor the operation and maintenance of these systems every five years or as problems arise. Also the Board of Health, in cooperation with Ohio EPA and the local municipalities, will continue to evaluate the remaining systems for sewer system tie-ins as they relate to coastal non-point pollution control improvements as part of their existing cooperative programs.

Implementation of State Sewage Rules
New rules on requiring these programs have been established by the State Legislature Chapter 3701-29 Sewage Treatment Systems Rule in 2006. This will administer how the Board of Health and local municipalities will further address the OSDS within the watershed.

Discourage Use of Phosphates in Detergents
Section 6111.10 of the ORC limits the amount of phosphorus in household laundry detergent to 0.5% by weight for all counties in the Lake Erie basin. This went into effect on January 1, 1990. This applies to Euclid Creek since it is within the Lake Erie Basin.

Relevant Watershed Action Plan Strategies for Implementation

2.1 Prevention & Reduction of Illicit Discharges
3.1 Stewardship through Education

5.8.1 Planning, Siting and Developing Roads and Highways

Introduction
As a result of the watershed being close to being fully built out, the planning and construction of new roads or highways will be minimal. The roads that may be constructed in the future will be part of new residential and or commercial development in the upper reaches of the watershed. According to the ODOT 10 year Program Plan, 2004, and the Municipalities Capital Improvement Plans 2004, there are no new major roads being sited within the watershed

Management Measure Goals:
Plan, site, and develop roads and highways to:

1. Protect areas that provide important water quality benefits or are particularly susceptible to erosion or sediment loss;

2. Limit land disturbance such as clearing and grading and cut and fill to reduce erosion and sediment loss; and

3. Limit disturbance of natural drainage features and vegetation.

Existing Programs & Enforceable Policies and Mechanisms: State and Local
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 Euclid Creek municipality have an established storm water pollution prevention plan strategy to address this management measure.

Practices to meet Management Measures

Capital Improvement Planning Map
The Euclid Creek Watershed Technical Committee 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.

Erosion & Sediment Control
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.

Accordance with Local Planning Ordinances
The Euclid Creek communities have local ordinances in place to guide planning of roads pertaining to siting, widths and use these local ordinances to ensure proper planning is conducted for new roads.

Relevant Watershed Action Plan Strategies for Implementation

1.1 Protection of Habitat
1.2 Restoration of Habitat
1.3 Site Development
1.4 Best Management Practices

5.8.2 Bridges

Introduction
According to the Cuyahoga County Engineer Capital Improvement Plan 2005-2010 and the ODOT 10 year program, there are no bridge replacements or rehabilitation projects scheduled in the Euclid Creek Watershed. The Cuyahoga Soil & Water Conservation District in partnership with Ohio EPA, ODOT, the Cuyahoga County Engineer and local

municipalities in evaluating future bridge and culvert projects and maintenance schedules that may impact Euclid Creek through the review of alternative designs in bridge construction or reconstruction in a manner that protect and restore the aquatic habitat of the affected areas.

Management Measure Goal:

Site design, and maintain bridge structures so that sensitive and valuable aquatic ecosystems and areas providing important water quality benefits are protected from adverse effects.

Existing Programs & Enforceable Policies and Mechanisms: State and Local
The Ohio Department of Transportation, the Cuyahoga County Engineer and the local municipalities within Euclid Creek 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.

Practices to meet Management Measures

Storm Water Pollution Prevention Plans
The Cuyahoga Soil & Water Conservation District through the Euclid Creek Watershed Coordinator will continue to work with ODOT, Cuyahoga County Engineer and their established Storm Water Management Polllution 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 Euclid Creek.

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.

Relevant Watershed Action Plan Strategies for Implementation

1.1 Protection of Habitat
1.2 Restoration of Habitat
1.3 Site Development
1.4 Best Management Practices

Marinas and Recreational Boating

The Watershed holds one marina and access point for boating uses to Lake Erie at its mouth located within Wildwood State Park. The Cuyahoga Soil & Water Conservation District through the Euclid Creek Watershed Coordinator and in cooperation with the Euclid Creek partners and the marina owner will examine the opportunity to participate in the Ohio Clean Marinas Program in 2006 for potential implementation in 2007, coordinated through ODNR and the Ohio Sea Grant office for all Lake Erie Marinas.

Hydromodification

Introduction

This management measure is applicable to Euclid Creek as a result of its urbanized state and the many channelized and modified areas of Euclid Creek channels that have occurred over the last 100 years in the watershed. Reversing and restoration of these areas in Euclid Creek will be a challenging but very beneficial endeavor as well as provide additional services to reduce coastal non-point pollution in our surface waters and Lake Erie. The Watershed Action Plan's Inventory, Table 14 outlines the number of miles of channelized portions of the Creek as well as the subwatershed assessments of hydromodification areas of the watershed.

7.4.1 Operation and Maintenance for Existing Modified Channels - Protect Surface Water (Physical and Chemical Characteristics)

Management Measure Goals:

1. Evaluate the potential effects of proposed channelization and channel modification on the physical and chemical characteristics of surface waters in coastal areas;

2. Plan and design channelization and channel modification to reduce undesirable impacts; and

3. Develop an operation and maintenance program for existing modified channels that includes identification and implementation of opportunities to improve physical and chemical characteristics of surface waters in those channels.

Existing Programs & Enforceable Policies and Mechanisms – State and Local Practices to meet Management Measures

Inventory of Existing Modified Channels

The Northeast Ohio Regional Sewer District performed an extensive study in 2001 on the location of existing modified channels as part of its Inter-Community Drainage Evaluation for the watersheds within their service area. This information will be used for communities to identify current areas in need of evaluation for maintenance.

Watershed Action Plan Program

The Euclid Creek Watershed Program and Plan have identified practices to be conducted to address this management measure as outlined in the Watershed Protection management measure, including conservation easements, adoption of ordinances, evaluation of site plan development

Relevant Watershed Action Plan Strategies for Implementation

1.1 Protection of Habitat
1.2 Restoration of Habitat

7.4.2 Operation and Maintenance Program for Existing Modified Channels – Restore In-stream and Riparian Habitat.

Introduction

The Watershed Action Plan inventory, Table 14 identifies the number of modified stream miles within the watershed. Clearly, as a developed watershed, restoration will be one of the priority actions that the Cuyahoga Soil & Water Conservation District will work with the Euclid Creek Watershed Council. The recommended actions for restoration of in-stream and riparian habitat are identified in following recommendations of the Watershed Action Plan.

Management Measure Goals:

- Evaluate the potential effects of proposed channelization and channel modification on instream and riparian habitat in coastal areas;
- Plan and design channelization and channel modification to reduce undesirable impacts; and
- Develop an operation and maintenance program with specific timetables for existing modified channels that includes identification of opportunities to restore instream and riparian habitat in those channels.

Existing Programs & Enforceable Policies and Mechanisms: State and Local

The ODNR Watershed Coordinator Program as mentioned in the Watershed Protection management measure will provide the program and action strategy to meet this management measure.

The OEPA 401 mitigation program will provide a tool in which to introduce restoration projects to occur in Euclid Creek by requirements to replace and restore habitat where available.

Practices to meet Management Measures

Inventory of Existing Habitat Conditions

The Watershed Action Plan inventory, Table 14 identifies the number of modified stream miles within the watershed. Clearly, as a developed watershed, restoration will be one of the priority actions that the Cuyahoga Soil & Water Conservation District will work with the Euclid Creek Watershed Council. The recommended actions for restoration of in-stream and riparian habitat are identified in following recommendations of the Watershed Action Plan.

Watershed Action Plan Program Recommendations

<u>Evaluation of Habitat through Assessments</u>

The plan recommends continued evaluation of habitat on existing channels. The Cleveland Metroparks has conducted a Headwater Habitat evaluation of over 80% headwater stream segments in the watershed. This information will be used to evaluate conditions of modified and non-modified channels of the watershed. Additional parameters that will be continued to be evaluated and established as a database include index of biological integrity and qualitative habitat evaluation, both approved measurement methods by Ohio EPA. Evalution will be conducted as funds become available.

Relevant Watershed Action Plan Strategies for Implementation

1.5 Protection of Habitat
1.6 Restoration of Habitat
1.7 Site Development
1.8 Best Management Practices

7.5.3 Dams- Request for Exemption

There are a number of small low head dams throughout the watershed as identified on Figure 39 and Table16. The dams located in Euclid do not meet the Coastal Management Measure applicable guidelines of greater than 25 feet in height and greater than 15 acre feet capacity or 6 feet high and greater than 50 acre feet in capacity. Therefore Euclid Creek is exempt from this management measure.

7.6.1. Eroding Streambanks and Shorelines

Management Measure Goals:

1. Where streambank or shoreline erosion is a non-point source pollution problem, streambanks and shorelines should be stabilized. Vegetative methods are strongly preferred unless structural methods are more cost-effective, considering the severity of wave and wind erosion, offshore bathymetry, and the potential adverse impact on other streambanks, shorelines, and offshore areas.

2. Protect streambank and shoreline features with the potential to reduce NPS pollution.

3. Protect streambanks and shorelines from erosion due to uses of either the shorelands or adjacent surface waters.

Existing Programs & Enforceable Policies and Mechanisms: State and Local

The NOACA Model Ordinances for Riparian & Wetland Setback and Erosion and Sediment Control are available for watershed communities to adopt to meet their Phase II NPDES MS4 permit requirements. The Cuyahoga SWCD and various local land conservancies have established conservation easement programs to protect streambanks and shorelines and maintain their vegetative state.

Practices to meet Management Measures

Inventory and Evaluation

The Northeast Ohio Regional Sewer District conducted a detailed assessment and examination of erosion areas along Euclid Creek streambanks as part of its RIDE Study in 2002. In addition, the Watershed Action Plan process identified areas to further examine their stabilization concerns as it relates to water resource quality. Both the Euclid Creek streambanks and the adjacent Lake Erie shoreline (Euclid Beach State Park to E. 185th Avenue) pose risks to further degradation and erosion issues to the resources of Lake Erie.

Setbacks to Minimize Disturbance & Avoidance of Slope Erosion
As outlined in the Watershed Protection Measure, riparian and wetland setback ordinances have been introduced to local watershed communities to adopt. In addition, the Euclid Creek Conservation Easement Program will also work towards protecting streambanks and preventing slope erosion

Relevant Watershed Action Plan Strategies for Implementation

1. 1 Protection of Habitat
1.2 Restoration of Habitat
1.3 Site Design of Development and Redevelopment Areas
1.4 Best Management Practices on Existing Sites

Conclusion
The coastal non-point pollution management measures outlined for Euclid Creek will be evaluated on an annual basis and integrated with the Watershed Action Plan and TMDL recommendations for non-point source pollution reductions. This initial evaluation has outlined initial target areas that the watershed will focus its implementation efforts on. The primary management measures Euclid Creek will focus on include:

Urban Areas
Hydromodification

The Euclid Creek Partners of the Euclid Creek Watershed Council, Friends of Euclid Creek and the Cuyahoga Soil & Water Conservation District will continue to work with Ohio DNR and its local, state and federal partners in meeting the management measures of the Coastal Non-Point Pollution Control Program through the implementation program recommendations of the Euclid Creek Watershed Action Plan and the Euclid Creek TMDL..

VII. Evaluation

To ensure that the Watershed Action Plan recommendations provide water resource quality improvements, evaluation of the progress will be evaluated on two levels of reporting. These levels include:

1. Long Term – Water Quality Resource Improvements
   Programmatic Success
2. Short Term – Performance Indicator Success

1. Long Term – Water Quality Resource Improvements
   Evaluating the progress to meet the long-term goals will be determined through the establishment of a local monitoring program and assistance from agencies such as Ohio EPA, NEORSD and County Board of Health for sampling to determine if the watershed is reaching these long-term goals.

   Long Term Goals:
   - Full attainment of watershed
   - Phosphorous load reductions
   - QHEI scores of 60.

   The goals will be evaluated on an annual basis or as determined by the monitoring program to assess the progress being made.

   The monitoring program will include the establishment of the Volunteer Monitoring Program through the Monitoring Sub-Committee formed in 2005. The evaluation of data will be with the committee on an annual basis with Ohio EPA and the Watershed Council. In addition the monitoring by local agencies every five years where budgets allow will gauge progress or decline with these recommendations in place.

   The database will be developed by the Monitoring Committee. The work plan for the monitoring will be developed in 2006 including a Quality Assurance Plan Procedure.

   Programmatic Progress
   The Euclid Creek program and its sustainability will be essential to reaching the goals of water resource quality to ensure it is effective for the watershed communities and reaching the goals of the watershed plan recommendations.

   Programmatic elements include staffing of the watershed coordinator, funding, scope of work and tasks. These elements will be evaluated on an annual basis and evaluation through the DNR Area Assistance Team, Euclid Creek Watershed Council and Friends of Euclid Creek.

2. Short-Term – Performance Indicator Success
   As presented in Chapter 5 performance indicators are outlined to evaluate the success of the watershed recommendations and their implementation. For example, the goal of protection riparian corridors is measured by the goal of five conservation easements by 2008. These performance indicators will be

evaluated on an annual basis through the review of the previous years work plan and accomplishments and the development of annual work plan. As part of this evaluation, a tracking database will be developed for each recommendation to measure progress and if it's meeting the performance indicators.

The combination of load reduction, restoration and conservation actions can provide the infrastructure for the watershed to bring the stream into attainment. This strategy to reach attainment has not been proven in Ohio to date. However, numerous urban streams in Ohio and around the country are implementing similar strategies. Based upon this strategy as an emerging trend in urbanized watersheds, measuring progress and adapting appropriately will be essential.

The establishment of a monitoring program, annual work plan and evaluation process will identify the advantages and challenges of these recommendations as implementation begins. These products will be produced by the Euclid Creek Monitoring Committee, Technical Committee with support from the Cuyahoga Soil & Water Conservation District. This will provide an evaluation process to ensure the progress toward achievement of the Watershed as well as document measurable results for water resource quality in Euclid Creek.

VIII. Plan Update/Revision

Distribution list for plan
The Plan will be distributed to all nine Euclid Creek Watershed Council communities, Friends of Euclid Creek and one for the South Euclid –Lyndhurst Library and Cleveland Nottingham Library.

The Plan will also be available via the Cuyahoga Soil & Water Conservation District's website to download for printing and viewing at www.cuyahogaswcd.org

The plan will be reviewed and revised as more information becomes available to further refine the recommendations and priorities for the watershed through the Euclid Creek Watershed Council and Friends of Euclid Creek.

IX. Conclusion

Euclid Creek stands at a crossroads of watershed stewardship unlike any other watershed along the Lake Erie coastline. The threshold to withstand additional stresses on its system can prohibit its return to a viable healthy water body within the Lake Erie basin. On the other side, instituting change today can catapult this resource to a self-sustaining treasure within the urban landscape it travels through.

Urban stream restoration both from a physical and a biological/chemical point of view can be very challenging. Changing human influence for the next 20 years can have a profound effect in Euclid Creek as well as the numerous small Lake Erie tributaries that feed into its ecosystem.

To realize this change, the efforts in Euclid Creek will require an unprecedented collaboration of local communities, residents, businesses and agency support. The momentum has begun in Euclid Creek. Now is the time to see how far these efforts can go while further enhancing the great communities located within the watershed as we position the region for its future.

References

Todd Houser, CPSSc, CSS, Stormwater Specialist, Cuyahoga SWCD

References: Cuyahoga County Soil Survey (1980), Quaternary Geology of Ohio (1999)

Joe Hannibal, Cleveland Museum of Natural History, Geology

Jim Bissel, Cleveland Museum of Natural History, Plants

The Doan Brook Handbook, Laura Gooch

Soil Survey of Cuyahoga County, 1978

Soil Survey of Lake County, 1991

NOAA Climate Diagnostics Center

NEORSD Draft RIDE Study, 2004

Drinking Water Source Assessment for the City of Cleveland, Ohio EPA Division of Surface Water and Division of Drinking and Ground Waters, Northeast District Office, December, 2003. Robin Haleprin, City of Cleveland, Kelvin Rogers OEPA

St. Clair Avenue Revitalization, Urban Design Center of Northeast Ohio, November 2002

Cuyahoga County Airport Runway Master Plan Update Runway Safety Area Study – Project Pupdate, November, 2004

Metroparks 2000, Park District Plan, Cleveland Metroparks, June, 1995

Detailed Project Report and Environmental Assessment for Section 205 Study at Euclid Creek, Ohio, Stage III Documentation Final Report, U.S. Army Corps of Engineers, Buffalo District, 1981

Vascular Plant Flora of Highland Heights Community Park: A floristic Survey and Trend Analysis of a Suburban Wetland, Suneeti Jog Thesis for Doctor of Philosophy in Regulatory Biology, Cleveland State University

Euclid Township, 1796-1801, Protest in the Western Reserve Roy Larick and Craig Semsel, 2003

Ohio EPA Final 2004 Integrated Water Quality Monitoring and Assessment Report, 2004

Nearshore Distribution of Shore Structures Along Ohio's Lake Erie Shore and their Erosion Effectiveness and Biological Compatibility, Gerke, Fuller, Livchak et al. Ohio Department of Natural Resources, Division of Geological Survey, Lake Erie Geology Group, 2002.

Easterly CSO Phase II Facilities Plan, Northeast Ohio Regional Sewer District

Draft Regional Inter-Community Drainage Evaluation, Northeast Ohio Regional Sewer District, 2004

Greater Cleveland Area Environmental Water Quality Assessment, 1996-1998, Northeast Ohio Regional Sewer District

An Analysis of an Urban Watershed: Euclid Creek, John Carroll University Research Project with Department of Chemistry Undergraduate Students, Dr. Michael Nichols, Summer, 2001

Cuyahoga County Board of Health Watershed Water Quality Report Euclid Creek Watershed, 2003.

Methods of Assessing Habitat in Lake Erie Shoreline Waters Using the Qualitative Habitat Evaluation Index, OEPA, June, 2004

Center for Watershed Protection

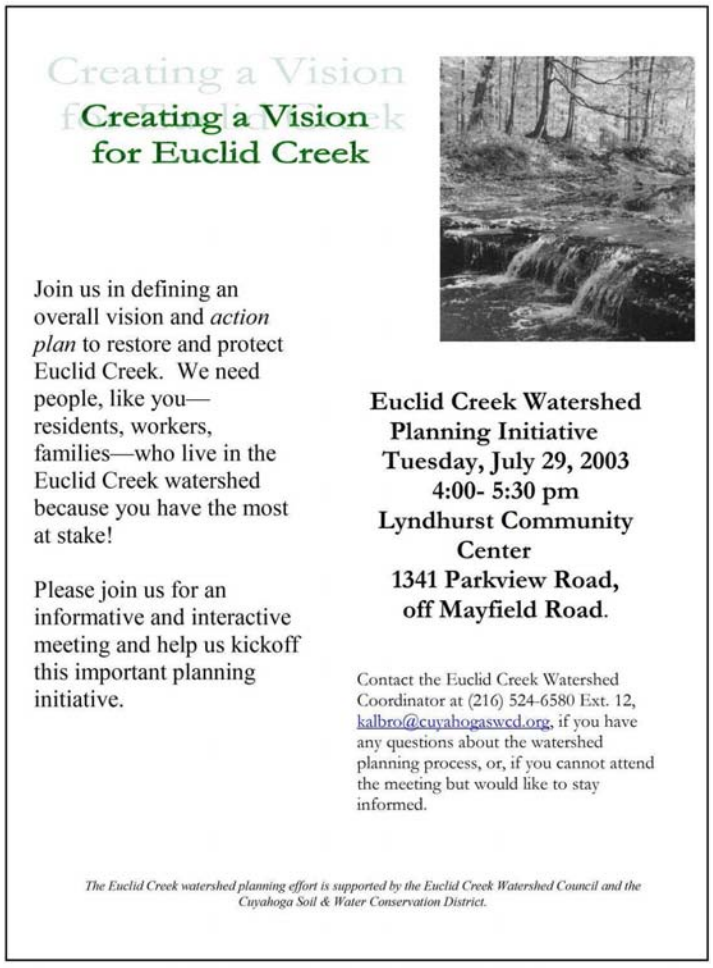
Appendices:

Appendix A. Public Meetings & Participation

The public participation and municipal involvement was the cornerstone to the development of the recommendations of this plan. This section outlines the meeting events and participation at those meetings. We appreciate all of the participants time and dedication to this planning process.

Public Meetings

July, 2003 , Lyndhurst City Hall
Introduction to Watershed Plan /Invitation for Involvement
Attendance: 45



October, 2004, South Euclid City Hall
Introduction of Watershed Plan Inventory, TMDL and Invitation of prioritize Watershed Issues
Attendance: 30

January 19 & 26, South Euclid City Hall
Work Sessions on Priorities and Actions for Implementation
Attendance: 80

EUCLID CREEK PARTNERS

Euclid Creek Watershed Council, Friends of Euclid Creek and Cuyahoga Soil & Water Conservation District

Euclid Creek Watershed Coordinator
Cuyahoga Soil & Water Conservation District
6100 West Canal Road
Valley View, OH 44125
Phone: 216-524-6580
Fax: 216-524-6584
Email: lgarrity@cuyahogaswcd.org

Euclid Creek Watershed Sessions

WHAT WILL EUCLID CREEK LOOK LIKE IN THE FUTURE?

Join in and provide input on the Euclid Creek Watershed Plan to set the blueprint for protection, restoration and management of water resources for the future.

As a result of the inventory and public meetings, three priorities have been determined to focus efforts within Euclid Creek to improve water resources. These work sessions will provide the foundation to create actions in the coming years to sustain and improve the health of Euclid Creek.
Refreshments and door prizes!

When:
Thursday, January 13
Focus: Education of Various Watershed Stakeholders

Wednesday, January 19
Focus: Strategies for Creek Protection and Restoration

Both meetings will be held from 7-9pm at the South Euclid Community Center, 1370 Victory Drive

Come be part of Euclid Creek 's future!

May 11, 2005, Highland Heights Community Center
Presentation of Draft Watershed Action Plan and TMDL to Community for Comment
Attendance: 35

EUCLID CREEK

Euclid Creek Partners
Euclid Creek Watershed Council
Friends of Euclid Creek
Cuyahoga Soil & Water Conservation District

Ohio EPA

Cuyahoga Soil & Water Conservation District
Euclid Creek Watershed
6100 West Canal Road
Phone: 216 524 6580, Ext 16
Fax: 216 524 6584
Email: lgarrity@cuyahogaswcd.org

COMMUNITY MEETING

Presentation and Opportunity for Comments on the Draft Euclid Creek TMDL (Total Maximum Daily Load) Plan and the Draft Euclid Creek Watershed Action Plan

Wednesday, May 11 7:00pm
Highland Heights Community Center
5827 Highland Road

Watershed Council, Committee Meetings and Friends of Euclid Creek

Euclid Creek Watershed Council Meetings Conducted – Plan progress was presented at each of these meetings to gain input from the Council during the process.

January, 2004 – Update of Planning Progress
May, 2004 – Presentation of Inventory of Headwater Habitat Survey Project
October, 2004 – Presentation of Plan Inventory
January 19, 2005 – Presentation of Preliminary Recommendations
April 21, 2005 – Presentation of Watershed Plan Draft Recommendations & Request for Endorsement

Committee Meetings

Technical Committee
January, 2004
July, 2004
November, 2004
March, 2005

Plan Committee
September, 2004
November, 2004
March, 2005

Friends of Euclid Creek
The Euclid Creek Watershed Coordinator presented bi-monthly updates of the Watershed Plan in 2004-2005 at the Friends of Euclid Creek's monthly meetings held on the first Tuesday of each Month.

Appendix B. Stakeholder Involvement

Stakeholders and partners involved in the watershed plan development process

Stakeholder Group	Individual Representative(s)
Local watershed residents	More than 100 landowners and residents.
Educators and students	Euclid Central Middle School Collinwood High School Hawken Middle School, Peter Thomas Beachwood Middle School Cuyahoga Community College – Eastern Campus Lou Rifici, Kim Royal, Mike Rowan John Carroll University – Michael Nichols Mayfield Middle School
Community Volunteers	Friends of Euclid Creek
	Wild Ones
	Local Scout/Church Groups
Euclid Creek Watershed Mayors	Mayor Gorden, Mayor Cervenik, Mayor Coleman, Mayor Ursu, COO Darnell Brown, City of Cleveland, Mayor Welo, Mayor Egensperger, Mayor Cicero, Mayor Rinker
Council Presidents/Persons	Lee Gase, City of Richmond Heights Sunny Simon, City of South Euclid Michael Polensek, City of Cleveland, Ward 11 Gayle Teresi, City of Mayfield Heights David Roche, City of Richmond Heights
Cuyahoga Soil & Water Conservation District	Jan Rybka, District Administrator District Staff
Cuyahoga County Planning Commission	Carla Regener Jim Danek
Ohio EPA	Bill Zawiski Mark Bergman Kelvin Rogers Steve Tuckerman
USEPA	Paul Novak
USDA NRCS	Jim Storer
ODNR	Matt Adkins Carol Ward Tim Bader Brent Culver Tom Holmes
Cuyahoga Board of Health	Tim Gourley
NOACA	Andy Vidra John Beeker
Cleveland Metroparks	Patricia Stevens Jim Kastelic Dan Petit Rick Tyler Jeff Sanfillippo Jim Bell Barb Holtz
Lake Soil & Water	Chad Edgar

Conservation District	Brett Rodstrom
NEORSD	Mark Link Dennis Zaharia Betsy Yingling
Ohio Sea Grant	Kelly Reisen Frank Lichtoppler
OSU- Extension	Dana Oleskiewicz
City Administration and Engineers, Service Directors	Jeff Filarski, City of Lyndhurst Andy Blackley, City of South Euclid and Highland Heights Ed Gallagher, City of South Euclid Rick Glady, City of Lyndhurst Thom Evans, City of Highland Heights Chris Courtney/Lee Courtney, City of Richmond Heights Tom Kreczko, City of Beachwood Tom Cappello, City of Mayfield Village Doug Metzung, City of Mayfield Village Tom Hippley, City of Mayfield Heights Tom Marsalis, City of Cleveland Hank Gulich, City of South Euclid Rich Iaefalice, City of Willoughby Hills
City Building Commissioners and Development Directors, Community Development Corps	Cal Caminati, Paul Kowalczyk, City of South Euclid, Tom Kuns, City of Lyndhurst John Korinek, City of Beachwood Frank Petrovoia, John Sonnhalter, City of Euclid Debbie Berry. City of Cleveland Brian Freidman, Northeast Shores Community Dev. Corp
Friends of Euclid Creek	Virginia Aveni Larry McFadden Mary K. Evans Kathy Schaeffer Roy Larick Bob Gibbons Tom Jenkins Anna Gotfried Dorothy Fike
Cleveland Museum of Natural History	Jim Bissel Renee Boronka Joe Hannibal
Cleveland State University	Stuart Schwartz
Public Education Committee	Elaine Kolp Joseph Newman Dorothy Fike Marilyn Wilson John Lincoln Patti Schnell Donetta Conley
Additional Technical and Plan Committee Participants and other local participants	Steve Nagy, Cuyahoga County Airport Paul Blake Frank Skala Wildwood Marina

Appendix C: Local Endorsement of Draft Plan

Euclid Creek Watershed Council Letter of Support
Friends of Euclid Creek Letter of Support.
Euclid Creek Watershed Council Communities Resolutions

Euclid Creek Watershed Council

MISSION

To address common environmental, storm water and development concerns in the Euclid Creek watershed.

CHAIR

Bill Cervenik, Mayor, City of Euclid

MEMBERS

Merle S. Gorden, Mayor, City of Beachwood

Scott Coleman, Mayor, City of Highland Heights

Daniel Ursu, Mayor, City of Richmond Heights

Margaret Egensperger, Mayor, City of Mayfield Heights

Joe Cicero, Mayor, City of Lyndhurst

Bruce Rinker, Mayor, Village of Mayfield

Darnell Brown, Chief Operating Officer, City of Cleveland

Georgine Welo, Mayor, City of South Euclid

June 29, 2005

Ms. Rosida Porter
ODNR , Division of Soil & Water
2045 Morse Road B-3
Columbus, OH 43229 – 6693

Dear Ms. Porter,

The Euclid Creek Watershed Council endorses and supports the Euclid Creek Watershed Action Plan Draft submitted to the State of Ohio by the Cuyahoga Soil & Water Conservation District.

The Council has worked over the past two years with the Cuyahoga SWCD to develop this Draft Plan in protecting, restoring and managing Euclid Creek for the future. This plan is the product of the involvement of many community stakeholders and a high level of public participation.

We look forward to continue to work with the Cuyahoga SWCD and our community partners in the implementation of the plan. We encourage the State's endorsement of this plan and support for its implementation in the coming years.

Bill Cervenik

Mayor Bill Cervenik
Chair of Euclid Creek Watershed Council

Endorsed by: Mayors – Gorden, Ursu, Cicero, Egensperger, COO Brown

friends of
EUCLID
CREEK

June 29, 2005

Ms. Rosida Porter
ODNR Division of Soil & Water Conservation
2045 Morse Road B-3
Columbus, OH 43229-6693

Dear Rosida,

The Friends of Euclid Creek, a non-profit organization advocating for the stewardship and restoration of the watershed, supports and endorses the Euclid Creek Watershed Action Plan Draft submitted by the Cuyahoga Soil & Water Conservation District.

The plan has established a foundation in which to promote watershed stewardship activities and to work closely with the Euclid Creek Watershed Council for its implementation. The Friends of Euclid Creek will continue to work with the Cuyahoga Soil & Water Conservation District and the Euclid Creek Watershed Coordinator to conduct the activities recommended in the Watershed Action Plan.

As our organization's membership continues to grow, the Friends of Euclid Creek will continue to strengthen the watershed stewardship needs of the watershed through the guidance of the Watershed Action Plan.

Sincerely,

Larry McFadden

President
Friends of Euclid Creek

Appendix D. TMDL DRAFT Report/Water Quality Assessment Data Tables

The Euclid Creek TMDL was conducted simultaneously with the development of the Watershed Action Plan. The TMDL completed the public comment period on June 9, 2005 and was federally approved in October, 2005 by USEPA.

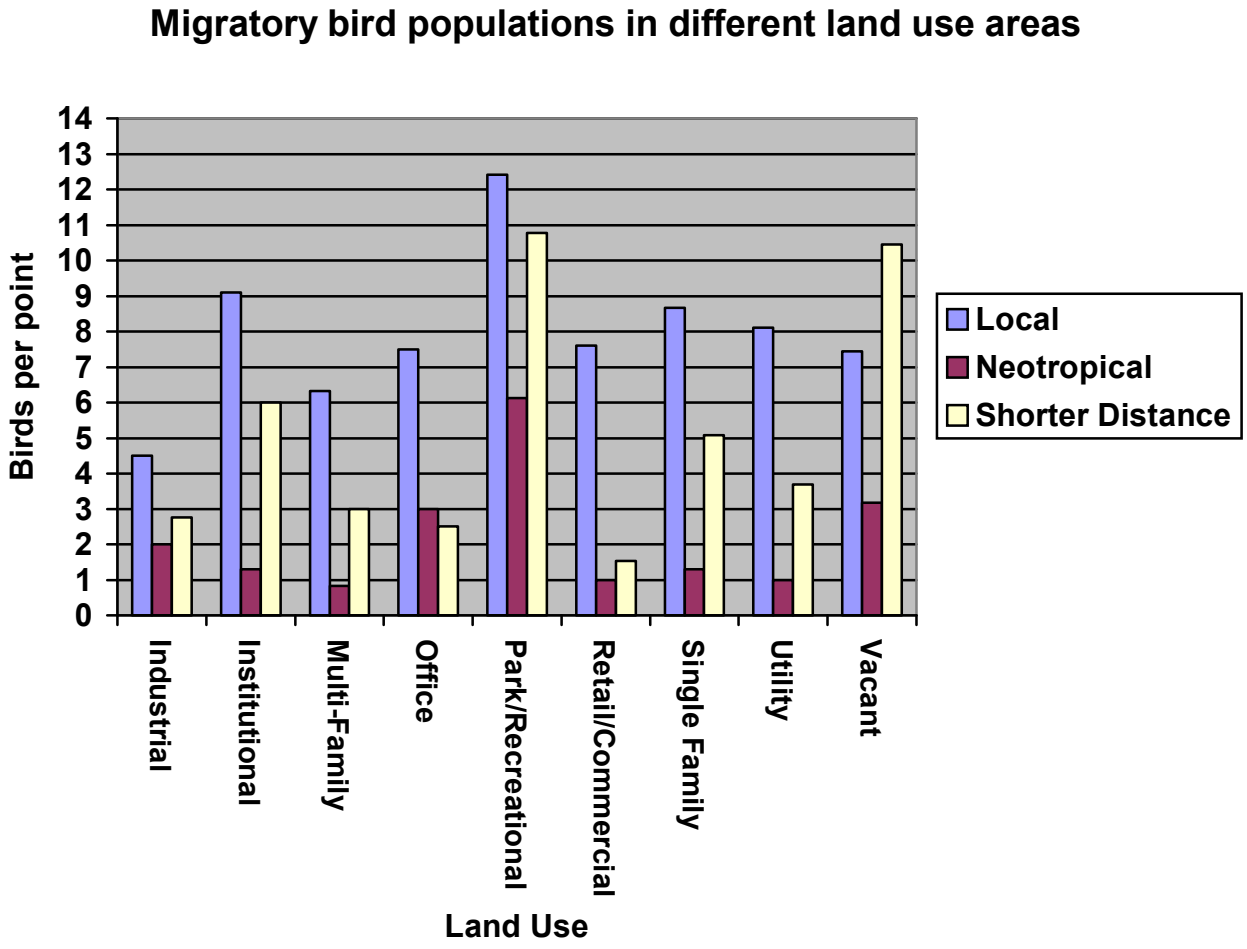
The TMDL Report is provided as a supplement to the Watershed Action Plan through an enclosed CD. The TMDL provides all assessments conducted including QHEI, IBI and ICI scores for the watershed. The recommendations in the Watershed Action Plan are intrinsically linked to the findings of the TMDL. The Euclid Creek Watershed Council , Cuyahoga Soil & Water Conservation District and Friends of Euclid Creek will continue to work closely with Ohio EPA on meeting TMDL targets within its implementation activities.

Appendix E. Bird Migration Inventory Study – Kirtland Bird Club

Migration Type Assignment for birds observed in Euclid Creek watershed in June 2003

MigrationType	Common Name	Amount
Local	American Crow	31
L	American Goldfinch	205
L	Bared Owl	1
L	Black-capped Chickadee	20
L	Blue Jay	57
L	Cooper's Hawk	4
L	Downy Woodpecker	21
L	European Starling	511
L	Hairy Woodpecker	5
L	Herring Gull	9
L	House Sparrow	580
L	Mallard	79
L	Mourning Dove	170
L	Northern Cardinal	141
L	Pileated Woodpecker	1
L	Red-bellied Woodpecker	39
L	Red-headed Woodpecker	1
L	Red-shouldered Hawk	1
L	Red-tailed Hawk	9
L	Ring-billed Gull	65
L	Rock Pigeon	94
L	Tufted Titmouse	9
L	White-breasted Nuthatch	4
L	Wild Turkey	1
Neotropical migrants	Acadian Flycatcher	1
N	Baltimore Oriole	30
N	Barn Swallow	19
N	Blackpoll Warbler	2
N	Bobolink	2
N	Brown Thrasher	1
N	Chimney Swift	146
N	Chipping Sparrow	49
N	Common Yellowthroat	3
N	Eastern Kingbird	4
N	Eastern Wood-Pewee	8
N	Gray Catbird	67
N	Great Crested Flycatcher	14
N	House Wren	11
N	Indigo Bunting	6
N	Northern Rough-winged Swallow	24
N	Ovenbird	1

N	Red-eyed Vireo	34
N	Rose-breasted Grosbeak	2
N	Tree Swallow	3
N	Warbling Vireo	5
N	Willow Flycatcher	4
N	Wilsons Warbler	1
N	Wood Thrush	8
N	Yellow Warbler	20
N	Yellow-bellied Flycatcher	1
Shorter distance migrants	American Robin	350
S	Belted Kingfisher	3
S	Brown-headed Cowbird	54
S	Canada Goose	121
S	Carolina Wren	1
S	Cedar Waxwing	39
S	Common Goldeneye	1
S	Common Grackle	459
S	Eastern Bluebird	1
s	Eastern Meadowlark	2
S	Eastern Phoebe	2
S	Field Sparrow	2
S	Great Blue Heron	7
S	Great Egret	2
S	Green Heron	2
S	Hooded Merganser	1
S	House Finch	105
S	Killdeer	21
S	Northern Flicker	19
S	Northern Mockingbird	7
S	Red-winged Blackbird	70
S	Savannah Sparrow	5
S	Song Sparrow	81
S	Spotted Sandpiper	5
S	Turkey Vulture	7
S	Wood Duck	9



List of volunteers participated in Breeding Bird Survey of Euclid Creek watershed in June 2003

Andy Lihani

Anna Kozlenko

Dolores Coll

Julie West &Gary Neuman

Leo Deininger

Lisa Chapman

Marcia Polevoi

Mary Anne &Tom Romito

Mickey Lewin

Paula Lozano

Steve & Beth Cagan

Suzanne Wagner

Appendix F. ODNR 1993 CREEL Study Results

Data from ODNR, Division of Wildlife Lake Erie Shore Angler Survey 1993.

*Others Category includes:

bluegill	rock bass
carp	suckers
green sunfish	white crappie
largemouth bass	

Table 1. Estimated harvest by location and species.

Area 22 Cleveland Area

Location	Yellow Perch	Walleye	White Bass	Freshwater Drum	Channel Catfish	Smallmouth Bass	White Perch	Salmon	Steelhead Trout	*Others	Total
Wildwood State Park	178	0	19	352	74	0	297	0	45	382	1,349

Table 2. Number of Interviews by Location and Month

Area 22 Cleveland Area

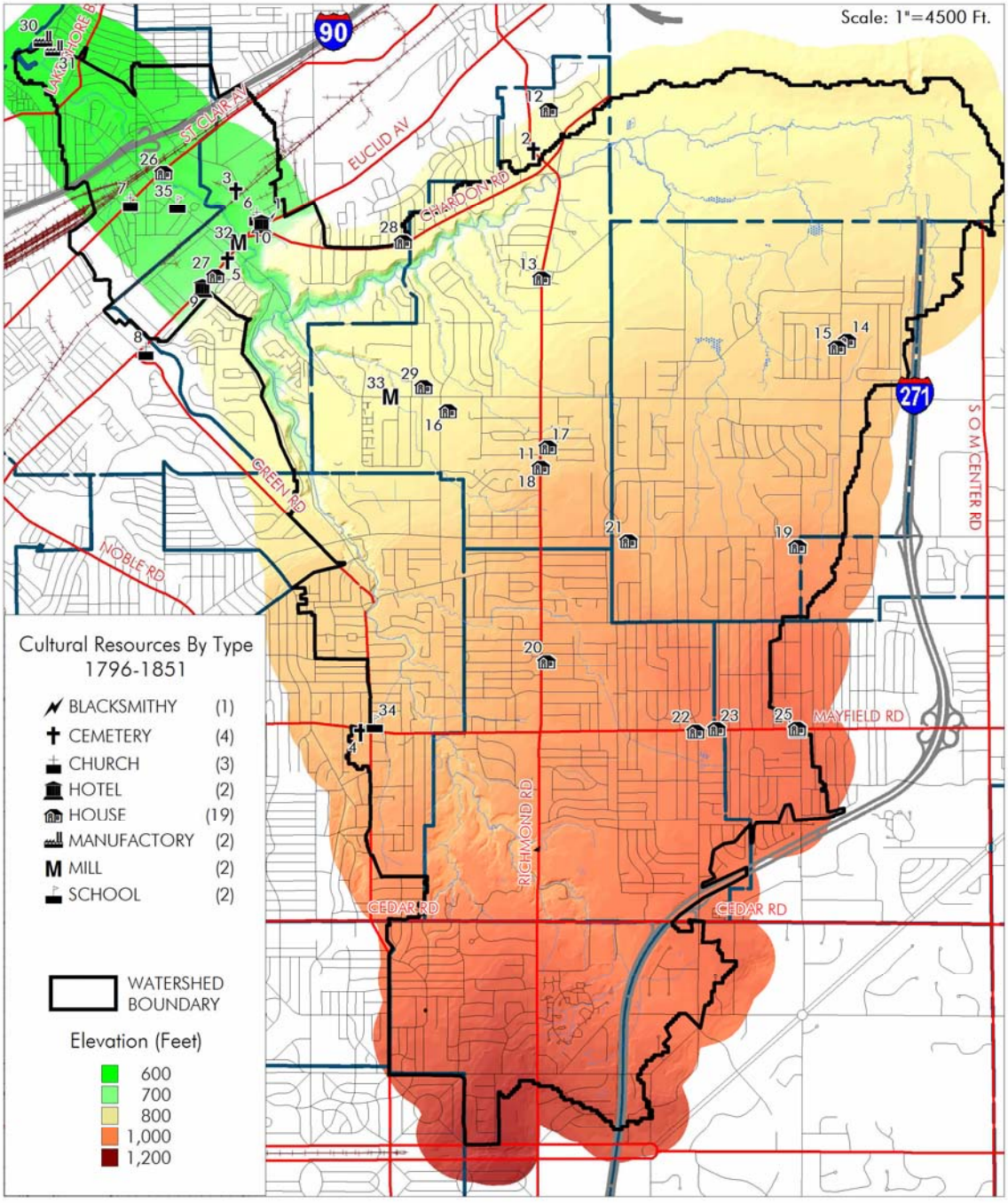
Location	May Number	May % of Area	June Number	June % of Area	July Number	July % of Area	August Number	August % of Area	September Number	September % of Area	October Number	October % of Area	All Months Number	All Months % of Area
Lorain Hot Waters Pier	36	5.12	44	4.44	39	4.27	32	4.77	15	5.21	4	3.08	170	4.60
Lorain Disposal Pier	38	5.41	17	1.71	25	2.74	13	1.94	3	1.04	1	0.77	97	2.62
Lorain E. 1/2 mile Pier	85	12.09	74	7.46	86	9.42	83	12.37	23	7.99	11	8.46	362	9.79
Bay Village Pier	56	7.97	114	11.49	115	12.60	91	13.56	23	7.99	10	7.69	409	11.06
Edgewater I Pier	40	5.69	52	5.24	48	5.26	28	4.17	11	3.82	3	2.31	182	4.92
Edgewater Breakwall	59	8.39	109	10.99	89	9.75	75	11.18	19	6.60	8	6.15	359	9.71
Edgewater Breakwall - East	80	11.38	119	12.00	114	12.49	104	15.50	50	17.36	23	17.69	490	13.25
East 55 th St Pier	143	20.34	200	20.16	132	14.46	70	10.43	48	16.67	32	24.62	625	16.91
East 72 nd St - U Pier	23	3.27	48	4.84	28	3.07	20	2.98	7	2.43	1	0.77	127	3.44
East 72 nd St Pier	47	6.69	100	10.08	124	13.58	73	10.88	18	6.25	14	10.77	376	10.17
Gordon Park Ramp	55	7.82	43	4.33	51	5.59	35	5.22	8	2.78	6	4.62	198	5.36
Wildwood State Park	41	5.83	72	7.26	62	6.79	47	7.00	63	21.88	17	13.08	302	8.17
All	703	100.00	992	100.00	913	100.00	671	100.00	288	100.00	130	100.00	3697	

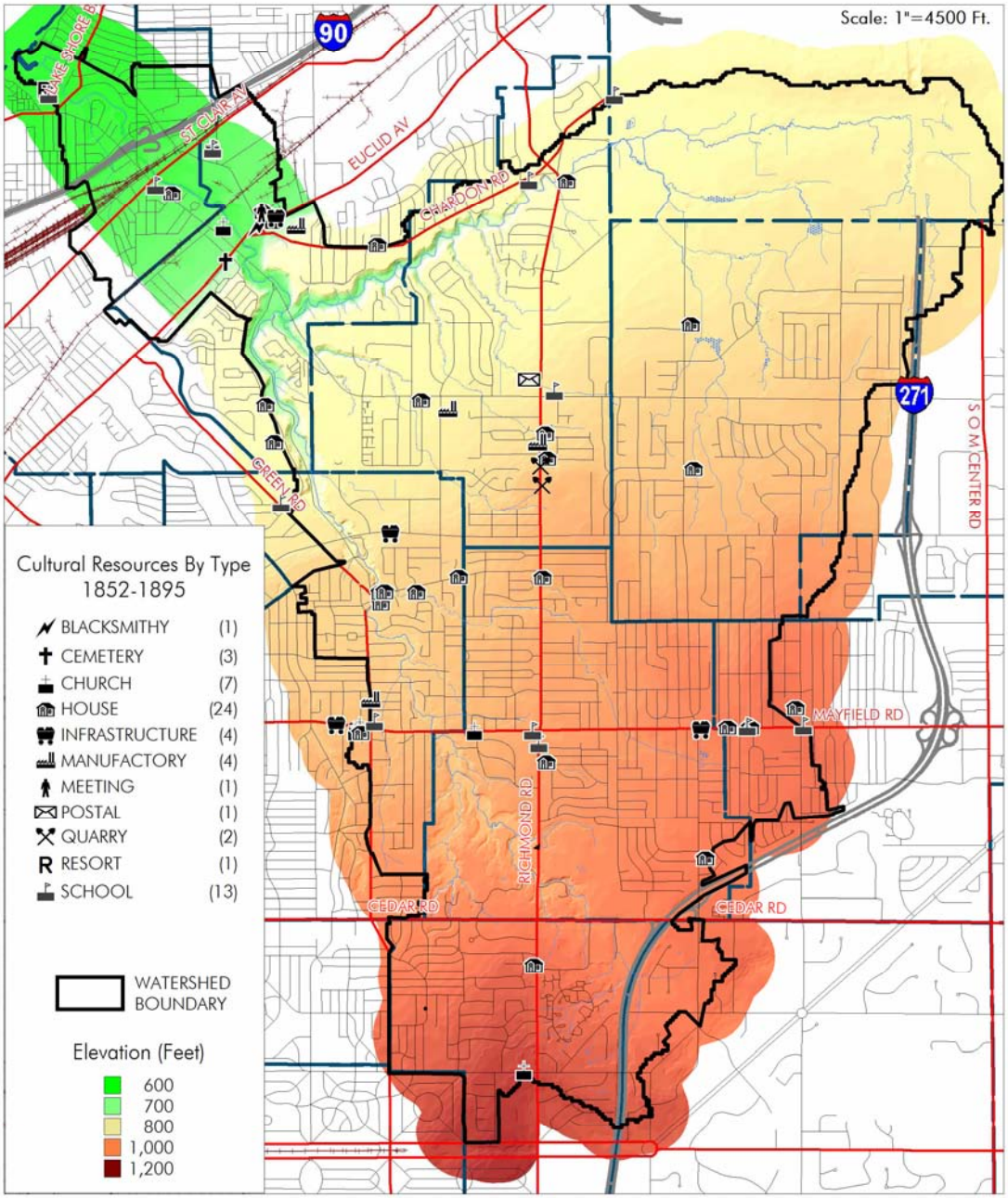
****Increase in Sep and Oct percent due to steelhead fishing in the fall**

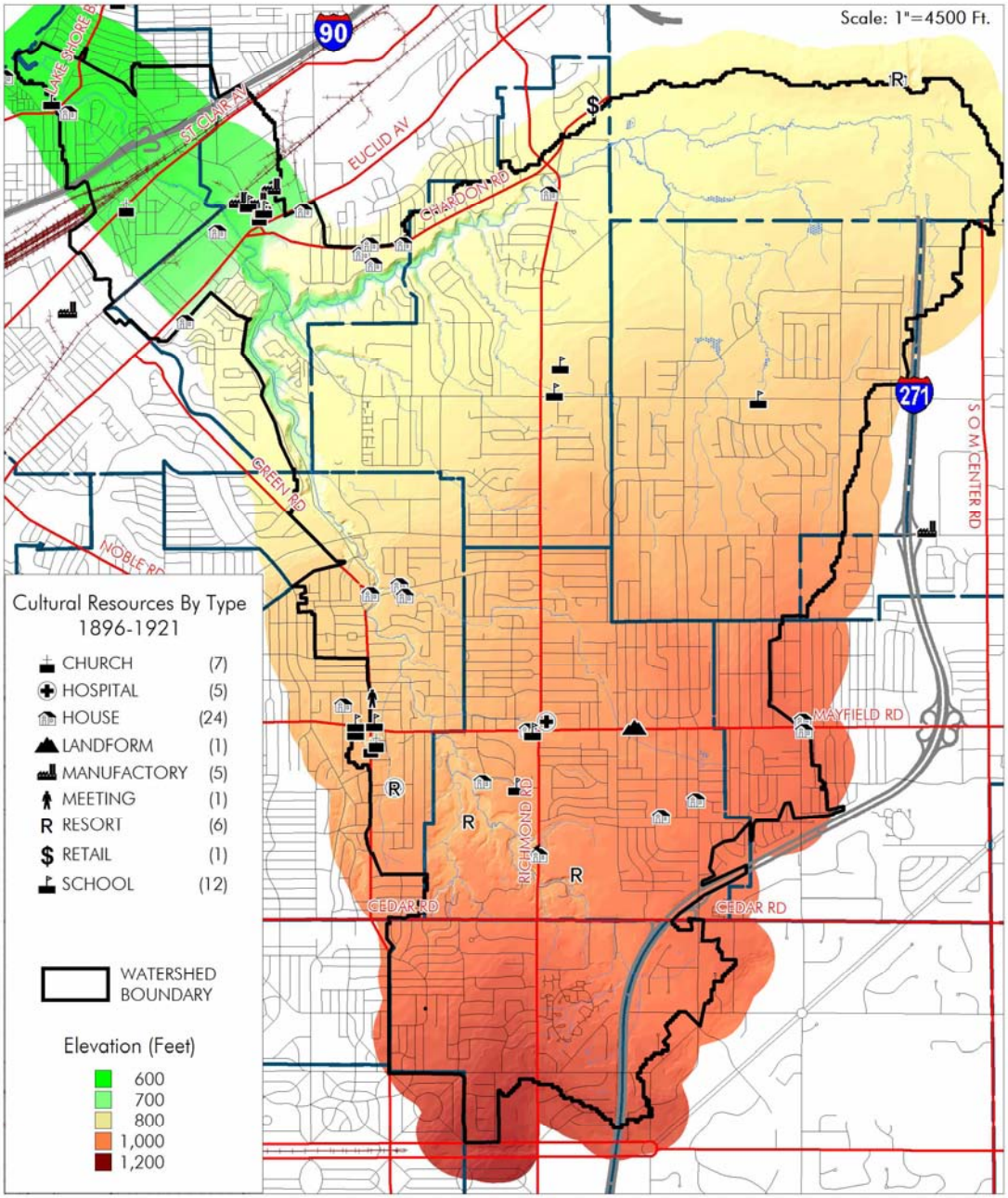
ODNR, Division of Wildlife CREEL Survey, 1993

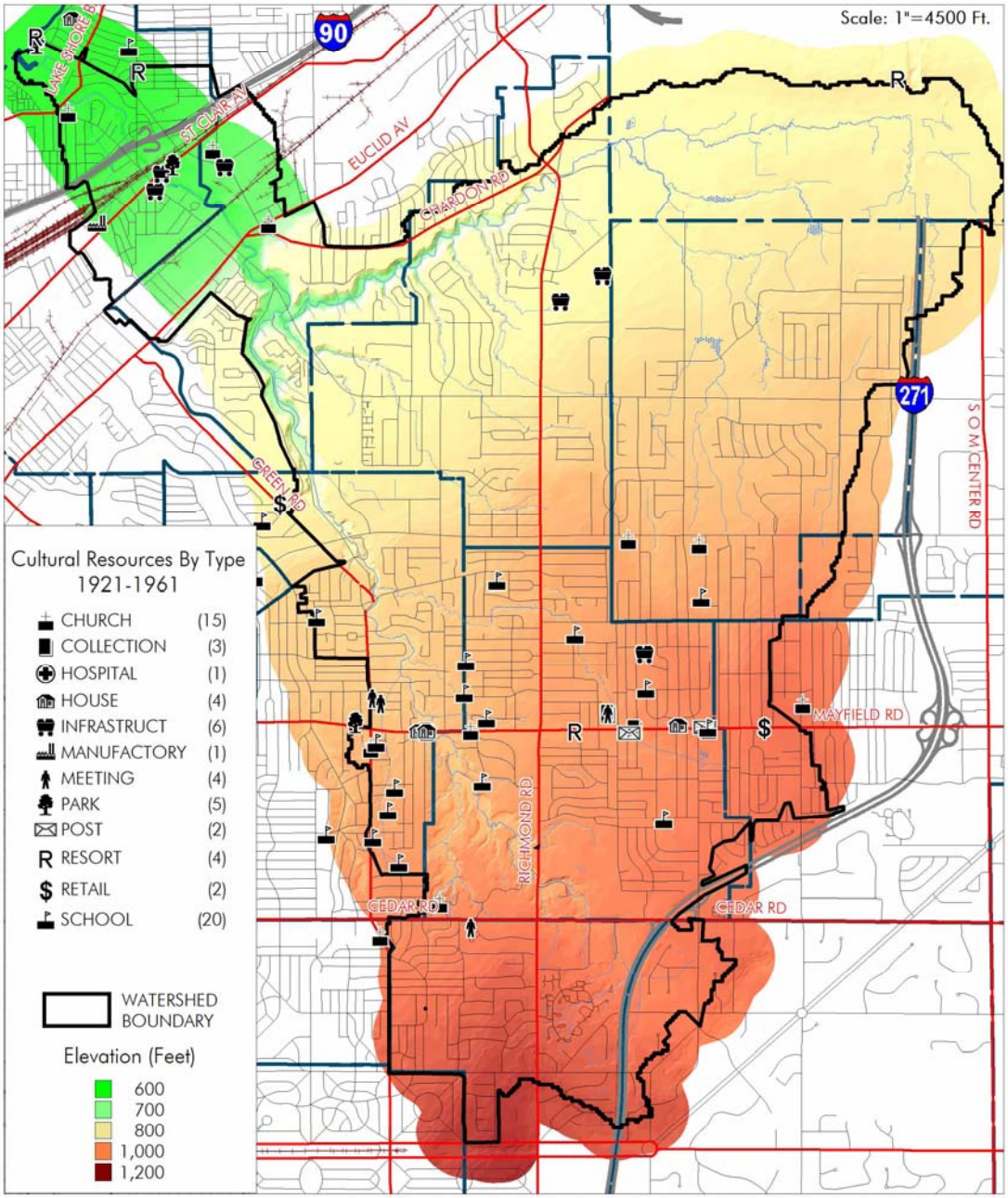
Appendix G. Cultural Resources Survey

These maps were developed by Roy Larick and the Cuyahoga County Planning Commission in 2004.




Scale: 1"=4500 Ft.
90
271
ST CLAIR AV
EUCUD AV
CHARDON RD
GREEN RD
S O M CENTER RD
MAYFIELD RD
RICHMOND RD
CEDAR RD
CEDAR RD
Cultural Resources By Type
1852-1895
BLACKSMITHY (1)
CEMETERY (3)
CHURCH (7)
HOUSE (24)
INFRASTRUCTURE (4)
MANUFACTORY (4)
MEETING (1)
POSTAL (1)
QUARRY (2)
RESORT (1)
SCHOOL (13)
WATERSHED BOUNDARY
Elevation (Feet)
600
700
800
1,000
1,200


Scale: 1"=4500 Ft.
90
271
ST CLAIR AV
EUCUD AV
CHARDON RD
GREEN RD
NOBLE RD
S O M CENTER RD
MAYFIELD RD
RICHMOND RD
CEDAR RD
CEDAR RD
Cultural Resources By Type
1896-1921
CHURCH (7)
HOSPITAL (5)
HOUSE (24)
LANDFORM (1)
MANUFACTORY (5)
MEETING (1)
RESORT (6)
RETAIL (1)
SCHOOL (12)
WATERSHED BOUNDARY
Elevation (Feet)
600
700
800
1,000
1,200


Scale: 1"=4500 Ft.
90
271
ST CLAIR AV
EUCUD AV
CHARDON RD
GREEN RD
SOM CENTER RD
MAYFIELD RD
RICHMOND RD
CEDAR RD
CEDAR RD
Cultural Resources By Type
1921-1961
CHURCH (15)
COLLECTION (3)
HOSPITAL (1)
HOUSE (4)
INFRASTRUCT (6)
MANUFACTORY (1)
MEETING (4)
PARK (5)
POST (2)
RESORT (4)
RETAIL (2)
SCHOOL (20)
WATERSHED BOUNDARY
Elevation (Feet)
600
700
800
1,000
1,200

Appendix H. Organizational Structure Preliminary Recommendations

The organizational structure of the Euclid Creek Watershed Council and Friends of Euclid Creek is fairly established. To further strengthen these existing structures and build their capacity, the following recommendations are to be considered and developed over the next three years.

Organization	Recommendation	Activity Implementation Tasks
Euclid Creek Watershed Council	Establish non-voting advisory members that can facilitate collaborative partnerships and technical expertise. Organizations Recommended: Cleveland Metroparks Cuyahoga County Airport Northeast Ohio Regional Sewer District Ohio EPA, Northeast District	Introduce resolution to Council. Invite organizations to participate.
Friends of Euclid Creek	Build membership and fundraising capacity	Fundraising campaign. Media/public relations.
Euclid Creek Watershed Council Friends of Euclid Creek	Continue to support staff to implement and coordinate efforts.	Through funding/financing development plan.
Euclid Creek Watershed Council/Friends of Euclid Creek	Continue Technical and Public Involvement Committees Establish Finance Development/Grants Committee	Introduce resolution to Council. Request volunteers/participants.
Friends of Euclid Creek	Develop a strategic plan to guide activities and roles	Participate in the Conservation Leadership Development Program.

Appendix I. Funding/Financing Development Strategy Preliminary Recommendations

Financial development is a key element in implementing the recommendations of this plan and to sustain the organizational capacity set forth today. The funding development will require a creative and innovative business plan to meet the financial needs of the local communities and organizations. The following information lays out a preliminary finance development strategy that should be developed in the next two years and established in year three to identify financing needs for the next six years. To accomplish this strategy, involvement and input will be essential to implementation of the finance development plan and ultimately the Watershed Action Plan recommendations.

Funding Development Strategy

The funding development strategy will encompass two arms of work and the funds to acquire and pursue in order to accomplish them; 1) Organizational and staff sustainability and 2) Projects.

1) Organizational Structure and Staff

A funding strategy will be developed to continue to support the two organizations and the staff (Watershed Coordinator) to implement the plan . This funding will be sought through a diversity of funding resources that include but not limited to the following:

- Euclid Creek Watershed Council Communities
- Friends of Euclid Creek Fundraising and Grant Operating Support
- Cuyahoga Soil & Water Conservation District

2) Projects

Projects are the activities outlined in the recommendation tables of Chapter 5 of this report. Project funds will be pursued through grants of various agencies and organizations and in-kind matching resources of local groups and organizations.

Projects will be prioritized based upon funding availability resources, community support and maximum benefits received to the water resources of Euclid Creek.

Each of these project funds may provide administrative and staff support, but not be the reliable source to sustain the organizational structure needs.

It is recommended that a Fund Development Committee be formed with representatives from the Euclid Creek Watershed Council, Friends of Euclid Creek, Cuyahoga Soil & Water Conservation District, philanthropic organizations, and fund development professionals to establish this funding strategy.

Appendix J. Ohio EPA Reported Spills 2001-2005

	DATE REPORTED	ENTITY	LOCATION	CITY	HYDRO	CHEM	OTHER	TYPSPL
05	10/24/2001	BEECHWOOD REFUSE	2515 BUCKHURST	BEECHWOOD	No	No	Yes	UNKNOWN LIQUID
40	2/11/2003	THE PELTZ GROUP	2101 RICHMOND RD. & CEDAR RD.	BEECHWOOD	Yes	No	No	DIESEL FUEL
59	12/4/2001	UNDETERMINE	1201 E. 185 ST.	CLEVELAND	Yes	No	No	SHEEN
49	6/21/2002	UNKNOWN	18931 ST. CLAIR AVE.	CLEVELAND	No	No	Yes	ORPHAN DRUM
44	1/13/2005	UNDETERMINED	VILLA VIEW RD. AT EUCLID CREEK	CLEVELAND	Yes	No	No	GASOLINE
38	5/26/2005	CITY OF CLEVELAND WATER DEPARTMENT	1026 MOZINA DR. NEAR E. 185TH & 90	CLEVELAND	No	No	Yes	SEDIMENT
83	5/6/2004	GLASTIK CORP.	4321 GLENRIDGE RD.	EUCLID	No	Yes	No	CATALYST
59	4/5/2005	UNDETERMINED	185TH ST. (NEFF RD.)	EUCLID	Yes	No	No	GAS
67	6/20/2005	CLEVELAND WATER DEPARTMENT	26500 CURTIS WRIGHT PARKWAY	HIGHLAND TWP.	Yes	No	No	HYDRAULIC OIL
21	1/22/2001	TRW JOSEPH GORMAN	COMMUNITY DR. OFF OF CEDAR RD.	LYNDHURST	Yes	No	No	
16	1/17/2001	JRW	1900 RICHMOND RD.	LYNDHURST	No	No	Yes	
51	8/22/2005	MR. HEFFERMAN	5219 SPENCER DRIVE	LYNDHURST	No	No	Yes	LATEX PAINT
37	6/13/2002	ULLMAN OIL	5994 MAYFIELD RD	MAYFIELD HEIGHTS	Yes	No	No	DIESEL FUEL
17	8/22/2001	MRS. LINDA CIPAS	1628 MALLARD DR.	MAYFIELD HTS.	No	Yes	No	MERCURY
17	1/19/2003	JOSEPH WHITE	1310 LANDER RD.	MAYFIELD HTS.	No	Yes	No	FREON
05	6/9/2003	UNKNOWN	RIHMOND RD. & WILSON MILLS	RICHMOND HTS	No	No	Yes	ORPHAN DRUMS
48	11/12/2005	UNKNOWN	27288 HIGHLAND RD.	RICHMOND HTS	No	Yes	No	MERCURY
50	5/1/2001	UNKNOWN	26260 CHARDONVIEW RD.	RICHMOND HTS.	No	No	No	
05	8/15/2001	UNKNOWN	522 RICHMOND	RICHMOND HTS.	No	Yes	No	MERCURY
72	10/3/2001	UNKNOWN OLD GAS STATION	RICHMOND RD. N. OF WILSON MILL RD.	RICHMOND HTS.	Yes	No	No	GASOLINE
24	1/26/2002	KRK, AUTOWASH	SR 6 & RICHMOND RD.	RICHMOND HTS.	No	No	Yes	WASTEWATER
55	2/24/2003	RICHMOND HTS HIGH SCHOOL	447 RICHMOND RD OFF OF HIGHLAND	RICHMOND HTS.,	No	Yes	No	MERCURY
13	10/11/2005	TERRY LISS	4231 BEXLEY	S EUCLID	No	Yes	No	MERCURY
71	4/12/2005	STAR TRANSPORT	689 S. GREEN RD.	S. EUCLID	Yes	No	No	DIESEL FUEL
07	5/5/2005	MS. JOHNSON	4538 LILAC ST.	S. EUCLID	No	Yes	No	MERCURY

Appendix K. Current Notice of Intent NPDES Phase II Projects In Euclid Creek Watershed- Ohio EPA, December 2005

CITY OF BEACHWOOD	BEACHWOOD MUNICIPAL COMPLEX	WILLIAM GRIWOLD	216 292 1915	25511 FAIRMOUNT BLVD	BEACHWOOD
CITY OF BEACHWOOD	BEACHWOOD SIGNATURE PARK WEST	BILL GRISWOLD	216 292 1944	24625 SHAKER BLVD	BEACHWOOD
DEVELOPERS DIVERSIFIED REALTY CORP	OFFICE BUILDING	MIKE BIRT	216 755 5884	3400 ENTERPRISE PKWY	BEACHWOOD
FRANK H PORTER JR	CENTRAL PARKWAY SUBDIVISION	FRANK H PORTER JR	216 861 5800	CENTRAL PARKWAY	BEACHWOOD
BOB EVANS FARMS INC	BOB EVANS RESTAURANT	STACY CLINE	614 497 4743	3700 ORANGE PL	BEACHWOOD
ODOT DISTRICT 12	CUY-271-10.86	RANDALL OVER	216 581 2100	I 271 NEAR LYNDHURST	BEACHWOOD
FAIRWOOD GLEN LLC	FAIRWOOD GLEN	ALEN MICHAEL	216 831 0774	N WOODLAND RD 400 FT WEST OF ALLEN BLVD	BEACHWOOD
CORAL EDGECLIFF I LLC	SHORES OF EDGECLIFF	ALEXIS BOOTHE	216 765 8822	206TH ST & EDGECLIFF	EUCLID
CITY OF EUCLID	CHATWORTH DRIVE SANTIARY SEWER IMPROVEMENTS	HANK GULICH	216 289 2810	CATWORTH DRIVE	EUCLID
CITY OF EUCLID	HILLTOP RD SANITARY SEWER & WATER LINE	HANK GULICH	216 289 2700	HILLTOP RD & GEORGETOWN RD	EUCLID
LEGENDS BLDG CO	LEGENDS AT ABERDEEN PH 3	WILLIAMS SANDERSON	330 425 8182	ABERDEEN BLVD & MINER RD	HIGHLAND HEIGHTS
RIVER CREEK LLC	RIVER CREEK	RON FISHER	216 464 2000	RICHMOND RD & CEDAR RD	LYNDHURST
ACAIDA DEVELOPMENT CO LTD	ACACIA COUNTRY CLUB ESTATES	PAT CATICCHIO	216 297 0910	WEST OFF OF WINCHESTER RD	LYNDHURST
HAWKEN MIDDLE SCHOOL	HAWKEN MIDDLE SCHOOL	ANTHONY WANNER	440 423 2970	5000 CLUBSIDE DR	LYNDHURST

MAROUS BROS CONSTRUCTION	ACACIA COUNTRY CLUB	RICHARD COOPER	440 951 3904	26899 CEDAR RD	LYNDHURST
CUYAHOGA COUNTY ENGINEER	CEDAR ROAD - BRAINARD ROAD TO LANDER ROAD	MICHAEL DEVER	216 348 4073	CEDAR ROAD BETWEEN BRAINARD & LANDER RDS	LYNDHURST/ MAYFIELD HTS/PEPPER PIKE
GEIS COMPANIES	PROGRESSIVE	FRED GEIS	330 528 1273	651 BETA DR	MAYFIELD
SKODA MINOTTI	SKODA MINOTTI	THERESA CONLEY	440 449 6800	6685 BETA DR	MAYFIELD HEIGHTS
700 BETA LLC	700 BETA DRIVE	NACY PANZICA	440 442 4300	700 BETA DR	MAYFIELD VILLAGE
WAGER & ASSOC	MARRUS WOODS	DAVE WAGER	440 543 6902	RICHMOND RD / HILLARY LN	RICHMOND HEIGHTS
AMICON MEDICAL GRP	RICHMOND HTS HOSP PARKING IMPROVEMENTS	BRUCE BAUM	216 591 0606	27100 CHARDON RD	RICHMOND HEIGHTS
CELESTIA INVESTMENT CO LLC	HIGHLAND PLACE	DAVE HOFFMAN	440 338 3179	SNAVLEY RD / HIGHLAND RD / RICHMOND RD	RICHMOND HEIGHTS
DISANTO ENTERPRISES INC	WOODS OF RICHMOND	JOHN BUCKEY	419 841 4831	CHARDON RD / BELLASTON DR / BEVERLY HILLS	RICHMOND HEIGHTS
GUS MASTRANARDI-NAM PROPERTIES INC	N.A.M. PROPERTIES	GUS MASTRANARDI	440 821 7697	4590 MONTICELLO BLVD	SOUTH EUCLID
GUS MASTRONARDI-NAM PROPERTIES INC	N.A.M. PROPERTIES INC	GUS MASTRONARDI	440 449 1373	LIBERTY & DORSH RDS	SOUTH EUCLID
CITY OF SOUTH EUCLID	VARIOUS STREETS WITHIN CITY OF SOUTH EUCLID	ANDREW BLACKLEY	216 731 6255	VARIOUS STS	SOUTH EUCLID
CITY OF SOUTH EUCLID	VARIOUS STS WITHIN CITY OF SOUTH EUCLID	ANDREW BLACKLEY	216 731 6255	ARGONNE- AVONDALE- WINSTON-BLUESTONE- ADRIAN	SOUTH EUCLID
CITY OF CLEVELAND DEPT PARKS REC & PROP	COLLINWOOD ATHLETIC COMPLEX	NATALIE RONAYNE	216 664 2485	1070 E 152ND ST	CLEVELAND
LINCOLN ELECTRIC CO	LINCOLN ELECTRIC CO	JIM NELSON	216 383 2146	22800 ST CLAIR AVE	CLEVELAND
CLEVELAND MUNICIPAL SCHOOL DISTRICT	MEMORIAL SCHOOL	LESTER CUMBERLANDER	216 781 1313	410 E 152ND ST	CLEVELAND
TOPS MARKETS LLC	TOPS MARKETS LLC	PAUL BECKER	716 635 5844	917 E 185TH ST	CLEVELAND

Euclid Creek Watershed Council By-Laws

BY LAWS
OF
EUCLID CREEK WATERSHED COUNCIL

The Euclid Creek Watershed Council was organized informally, with the assistance of the Northeast Ohio Areawide Coordinating Agency (NOACA), to address common environmental, storm water, and development concerns in the Euclid Creek watershed.

ARTICLE I
NAME AND PURPOSE

Section 1. The name of the organization shall be the Euclid Creek Watershed Council

Section 2. The Euclid Creek Watershed Council is organized "to promote inter-jurisdictional cooperation in addressing watershed issues in the Euclid Creek watershed, including cooperation with the Euclid Creek Watershed Coordinator to develop a watershed plan for the Euclid Creek." (Partnership Agreement (Exhibit A) found in the formal Memorandum of Understanding between the Euclid Creek Watershed Council and Cuyahoga Soil and Water Conservation District, ratified May 12, 2003"

ARTCILE II
STEERING COMMITTEE

Section 1: Membership.
The affairs and business of the Council shall be managed by a Steering Committee, composed of the mayor of each city in the watershed or his/her official designee. The Watershed Coordinator will also be a member of the Steering Committee. Each mayor in the watershed will appoint an official designee, in writing, to the Watershed Council.

Section 2: Election and Term of Office.
The term of each Steering Committee member shall be for as long as he/she is *serving his/her term of office.*

Section 3: The Steering Committee.
The Steering Committee shall have all the powers and duties necessary or appropriate for the administration of the affairs of the Council.

Section 4: Quorum.
Except as otherwise provided by law or these By Laws, a majority of the Steering Committee members of at least 2/3 of the voting members, who have been duly appointed at any given time and whose names and addresses have been recorded by the Secretary of the Council and who have not resigned shall be necessary to constitute a quorum for a meeting of the Steering Committee; provided, if at any meeting of the Steering Committee there shall be present less than a quorum, a majority of those present may adjourn the meeting from time to time without any notice other than by announcement at the meeting of the time and place to which the meeting is adjourned until a quorum shall attend.

Section 5: Meetings.
Regular meetings of the Steering Committee shall be held on such dates and at such times and place within the State of Ohio as the Steering Committee may designate. There shall be at least three (3) Regular meetings per calendar year.

A Special Meeting of the Steering Committee may be called by the Chair, Co-Chair, Secretary, or any three (3) Steering Committee members, on such date and at such time and place within the State of Ohio as shall be specified in the call thereof.

Written notice of each meeting of the Steering Committee, whether regular or special, shall be given to each Steering Committee member by personal delivery or by mail or facsimile, or email at least one week before the time of such meeting. Notice of any meeting may be waived by any Steering Committee member before or after the meeting by a signed writing and shall be deemed to be waived by any Steering Committee member who shall attend such meeting in person without protesting, prior to or at the commencement of the meeting, the lack of proper notice. Any meeting of the Steering Committee member shall be a legal meeting without notice having been given if attended by all the members of the Steering Committee.

A master list of Steering Committee members and all municipal media outlets will be utilized by the Watershed Coordinator; meeting notices will be sent to local media outlets and posted on the Euclid Creek Watershed website, in accordance to the Sunshine Laws.

Section 6: Voting.
The act of a majority of the Steering Committee present at a meeting at which a quorum is present is the act of the Watershed Council, unless the act of a greater number is otherwise required by these By Laws or by law. The Secretary/Watershed Coordinator is a non-voting member of the Steering Committee.

Section 7: Vacancies.
A vacancy in the office of a Steering Committee member shall be filled after consulting with the community where the vacancy occurs, by the Steering Committee for the unexpired portion of such Steering Committee member's term of office.

Section 8: Committees.
The Chair, with the approval of the majority of the Steering Committee, may authorize the delegation to any such committee of any of the authority of the Steering Committee. The powers and duties of such committees shall be such as may be specified by the Chair, with the approval of the majority of the Steering Committee, at the time of appointment to such committees. Vacancies in the membership of any committee may be filled at any time by the Steering Committee.

ARTICLE III
OFFICERS

Section 1: Composition.
The officers of the Watershed Council shall include a Chair, or Co-Chairs, and such other officers as the Steering Committee may consider necessary or appropriate.

Section 2: Term.
The Chair, or Co-Chairs, shall be elected by the affirmative vote of a majority of Steering Committee members present at the first meeting of the year at which a quorum is in attendance, until their respective successors are duly elected and qualified, or until the earlier of their resignation, removal from office or death.

Section 3: Removal.
Any officer elected by the Steering Committee may be removed at any time either with or without cause by the affirmative vote of a majority of the Steering Committee, present at a meeting at which a quorum is in attendance. Any other officer or employee of the Council may be removed at any time by vote of the Steering Committee present at a meeting at which a quorum is in attendance by any committee thereof.

ARTICLE IV
DUTIES OF OFFICERS

Section 1: Chair or Co-Chairs.
The Chair, or Co-Chairs, shall be the Chief Executive officer of the Watershed Council, shall have general supervision of the business affairs and property of the Council and over its several officers, and shall do all acts and execute all documents for and on behalf of the Council, as authorized with the approval of the majority of the Steering Committee, necessary, proper or incidental to all matters relating to the Council. The Chair, or Co-Chairs, shall perform such duties as are prescribed by law, such duties as are usually performed by Chair, or Co-Chairs, of like Councils and such other duties as may be assigned him from time to time by the Steering Committee.

Section 2: Secretary.
When and as required by the Steering Committee, the Secretary, who shall be the Watershed Coordinator, shall attend all meetings of the Steering Committee and shall keep minutes of all the proceedings thereof, and shall record all votes and the minutes of all of the proceedings in a book to be kept for that purpose. He/she shall perform like duties for committees of the Council when so required. He/she shall give, or cause to be given, notice of all meetings of the Steering Committee. The Secretary and Chair, or Co-Chairs, shall sign the records of the Steering Committee's meetings. The Secretary shall execute for or in the name of the Council all endorsements, assignments, transfers, share powers or perform such other duties usually incident to the office of Secretary, and such further duties as shall from time to time be prescribed by the Steering Committee or Chair or Co-Chair. At

any meeting of the Steering Committee at which the Secretary is not present, a secretary pro tempore may be appointed. The Secretary will give notice of all meetings as pursuant to the State Sunshine Laws.

ARTICLE V
NOTICES

Section 1: Notices by mail.
Whenever, under the provisions of these By Laws, notice is permitted to be given to any Steering Committee member by mail or facsimile, it may be given by depositing the same in the post office or letter box addressed to the Steering Committee member or by faxing, at such address as appears on the books of the Council, or in default of such address, at his/her place of residence or usual place of business, last known to the Council; and such notice shall be deemed to be given at the time when the same shall be deposited in the mail or is faxed to the fax address appearing in the books of the Council. Steering Committee members will be asked on an annual basis to submit their preferred method of receiving notice of meetings.

ARTICLE VI
FISCAL YEAR

The fiscal matters of the Council shall be determined by the Steering Committee of the Council.

ARTICLE VII
CONFLICTS OF INTEREST

Section 1: No member of the Steering Committee or officer of the Council shall have any personal financial interest in any contract relating to the operations of the Council, unless authorized by the Steering Committee.

Section 2: Any Steering Committee member having a duality or possible conflict of interest on any matter shall not vote or use his/her personal influence on the matter, shall not contribute to the deliberation, and shall not be counted in determining the quorum for the issue. The minutes of the meeting shall reflect that a disclosure was made, the abstention from voting, and the quorum situation.

ARTICLE VIII
NON-DISCRIMINATION

The selection of Steering Committee members, officers and employees of the Council, and the conduct of its activities, shall be without discrimination based upon sex, sexual orientation, color, race, religion and national or ethnic origin.

ARTICLE IX
AMENDMENTS

The Euclid Creek Watershed Partnership Agreement and By Laws, may be amended from time to time by the affirmative vote of two-thirds (2/3) of the voting members.

Ratified as of January 22, 2004 by the ~~Rocky River~~ Euclid Creek Watershed Council members:

City of Beachwood

Merle S. Gorden

Honorable Merle S. Gorden, Mayor

City of Cleveland

Honorable Jane L. Campbell, Mayor

9/14/04 DW. 9/21/04 MAE 9-23-04 9/23/04 10/8/04 10/21/04

City of Euclid

Honorable Bill Cervenik, Mayor

City Highland Heights

Honorable Scott Coleman, Mayor

City of Lyndhurst

Honorable, Joseph Cicero, Mayor

City of Mayfield Heights

Honorable Margaret A. Egensperger, Mayor

City of Richmond Heights

Honorable Daniel J. Ursu, Mayor

City of South Euclid

Honorable Georgine Welo, Mayor

Village of Mayfield

Honorable Bruce G. Rinker, Mayor