

# Major Issues to Manage in the Big Creek Watershed

CREATING THE PLAN began with reaching out to local governments in the watershed and asking their leadership to appoint representatives – officials, leaders, residents – to the Watershed Planning Partnership.

Those partners met with experts from local agencies involved in watershed management. Following the steps outlined below, and mindful of the issues that present challenges to watershed health, listed at right, the group assembled its data and formulated this Plan.

## Methodology

1. Identify and Evaluate Community Issues and Desires
2. Identify and remediate, where feasible, pollution issues. *Early in the process of evaluating stream and watershed conditions, the Watershed Planning Partnership determined that due to the extreme urban condition of the watershed, coupled with the aged community infrastructure, the planning effort should embrace the techniques and tools of the new Balanced Growth Initiative watershed planning process as developed by the Ohio Lake Erie Commission. The plan development methodology followed OLEC BGI guidelines, including:*
  - A. GIS Data Analysis & Qualitative Assignment of Big Creek's Natural Features to Reflect Community Needs & Watershed Function
  - B. Identify Undeveloped & Developed Land with Relation to Natural Features
3. Analyze Potential Priority Development / Redevelopment Areas
  - GIS Data Analysis of Priority Development / Redevelopment Areas
4. Identify Priority Conservation and Development / Redevelopment Areas
5. Analyze and Identify Priority Areas for Conservation Using Stormwater Retrofit Techniques
6. Review Community Ordinances and Identify Tools, Practices & Strategies for Community Stewardship

- A large, urban watershed with high impervious cover (39%) and one of the densest populations in the region
- Watershed communities are susceptible to flooding, erosion and water quality impacts.
- There is a need for improved stormwater management through retrofits and restoration.
- Remnant greenspaces or natural areas present opportunities for preservation/restoration. These areas have community value as examples of nature in the city.
- Integrating balanced growth recommendations into local community master plans and regulations.

The Big Creek Balanced Growth Plan has been developed to provide a proactive approach to managing development and ensuring the protection of natural resources and watershed function. The Plan provides guidance on which land is suitable for development and conservation as well as, how such land can be preserved and protected.

The process to identify Priority Conservation Areas (PCAs) and Priority Development Areas (PDAs) began with identifying community needs and incorporating these ideas into the planning process. Numerous Watershed Planning Partnership meetings were held. We solicited feedback from the partnership to help shape the evaluation criteria for identifying conservation and development areas. Each community representative received a scoring priority worksheet titled "Scoring Priorities for Conservation of Important Watershed Features". The worksheet listed watershed features and their associated function and each person was asked to rank the importance of each item.

The group analyzed the land and soil features critical to watershed function, and was informed by the Wetlands Analysis that the Cuyahoga River RAP produced as well as mapping done by the Cuyahoga County Planning Commission.

Once the criteria were established, data mapping identified potential sites for conservation, restoration or areas that were appropriate for development. The group chose five priority sites for conservation and twelve sites for conservation/restoration using stormwater retrofit practices.

Finally, a course of action was laid out as short- and long-term recommendations that the Partners will carry out in cooperation with Friends of Big Creek and other supporting organization.

# Big Creek

## Step 1: Identify and Evaluate Community Issues

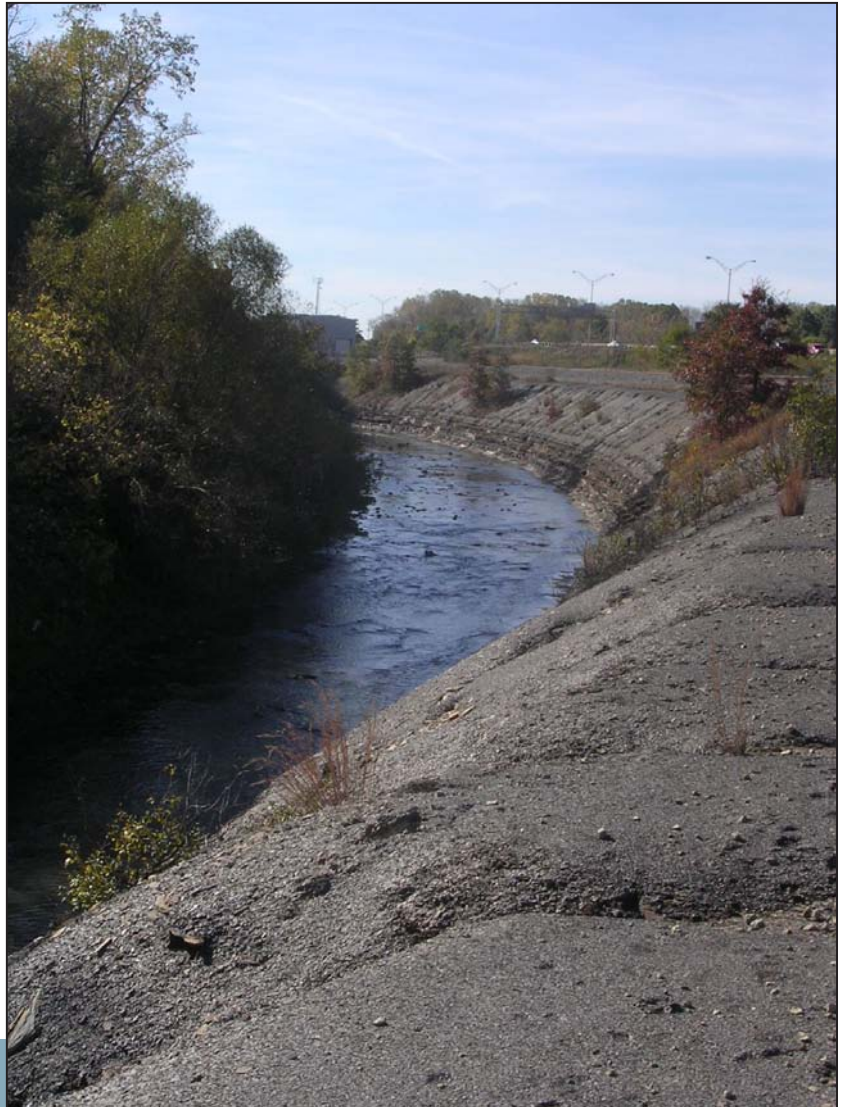
Table #1 includes the list of items and shows the scoring results. The survey determined, by the frequency of responses, which factors mattered most to the communities. The top scoring watershed features and issues will be used to identify areas of the watershed that should be pursued for conservation and conversely, areas without these characteristics should be more suitable for development.

Table 1: Big Creek Scoring Priorities for Conservation of Important Watershed Features

PRIORITIES FOR THE BIG CREEK WATERSHED	Results %
Protect Stream features through Stream and Wetland Restoration	95%
Link Redevelopment with Natural Resource Protection	88%
Improve Water Quality in Big Creek	86%
Flood Hazard Reduction	85%
Improve Community Livability and Appeal	76%
Link Stream Valley to Neighborhoods w/ Green Trail Corridors	75%
Promote Economic cooperation for Community Development	71%
Additional Goals to Pursue	
ID other potential restoration areas	
- Oxbow Area	
- W140th / Manufacturing Wetland area as a possibility	
- Open air some culverts also at W140th	
- Channelized areas ie. along I-71	
NEOPIPE Lawn fertilization program	
Establish riparian setbacks for future developments	
- Focus on remaining headwaters in N. Royalton	
Educate the public w/in the watershed	
- target streamside landowners / citizens overall	
Importance of native plantings	
Health of citizens	



## Step 2: Analyze Critical Natural Features and Land Areas for Potential Priority Conservation Area Designation



## Step 2a: Qualitative Assignment of Natural Features to Reflect Community Needs & Watershed Function

Defining the process for developing evaluation criteria to identify priority conservation and development areas in the Big Creek Watershed was a necessary first step in creating the balanced growth plan.

Based on the results of the scoring priorities, a Geographical Information Systems (GIS) approach was used to identify watershed characteristics that best reflected the community's needs.

Geographical Information Systems (GIS) are some of the most comprehensive tools available for watershed and land use planning. The implementation of GIS can not only reduce time needed for analyzing information about a watershed, but can also ensure a more efficient use of resources. GIS enables users to display large amounts of data graphically to greatly enhance interpretation and analysis.

The Big Creek planning process included numerous data layers from the most current available data sources to map existing landscape features, both natural and manmade. This provides a starting point from which to formulate future land use scenarios.

The key resource data layers were identified and run through a qualitative analysis. Resource layers were measured based on their importance to watershed function and how they matched up to the local community needs (see Table #2 Qualitative Criteria Focus). A qualitative assignment was necessary to prioritize the environmentally sensitive areas in the planning area for their value in maintaining a healthy watershed and to begin to recognize degrees of sensitivity as they relate to proposed future land uses.

### QUALITATIVE CRITERIA FOCUS

1. Water Quantity Management
  - Stormwater & Flood Management
2. Soil Conservation
  - Minimize Erosion
3. Optimizing Green Infrastructure Services
  - Use the natural resources of the watershed to provide stormwater services

### Key Natural Resource GIS Data Layers

- A. Soils-
  - Infiltration Rate
  - Drainage Rate
  - Hydric
  - Erodibility
- B. Steep Slopes
  - Slopes > or = 12%
- C. Streams
  - Headwaters Streams
  - Primary Headwater Streams
- D. Floodplains
  - 100 year flood zone
  - 500 year flood zone
- E. Riparian Corridors
  - 75 ft. width
  - 25 ft. width
- F. Wetlands
- G. Forest Cover
  - Forested Areas (dominated by trees).  
2002 orthophotos by CVNP



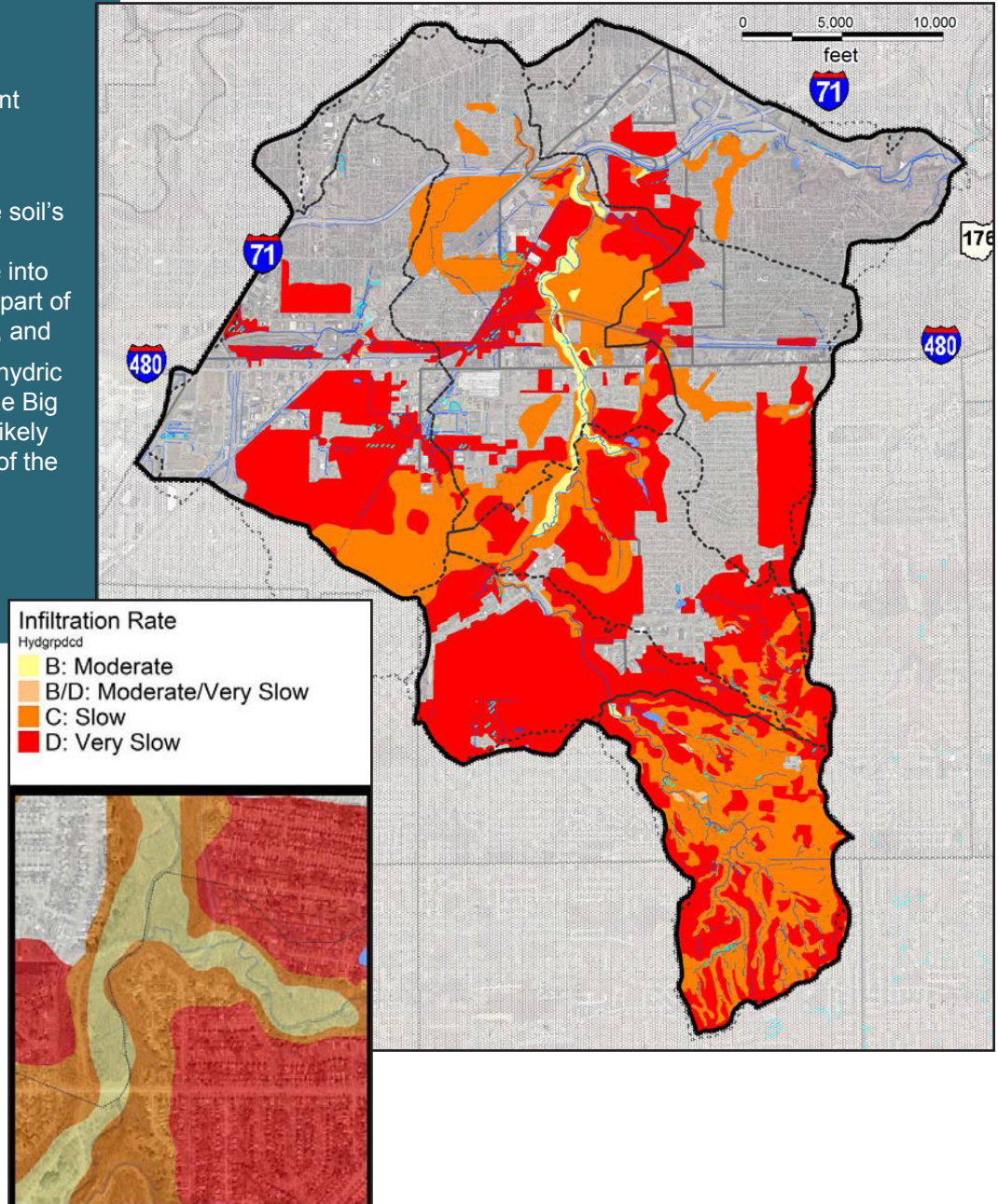
# Natural Feature: Critical Soils

## Infiltration

The composition and characteristics of soils are important for their impacts on water quality.

Soil properties related to this are:

- the ability to store nutrients essential to plant growth,
- erosion potential,
- permeability, which is the soil's ability to allow precipitation to percolate into the ground and become part of the groundwater system, and
- hydric value (NOTE: No hydric soils were identified in the Big Creek watershed, most likely due to the urban nature of the area.)



Soil Infiltration Rate: Rate at which water penetrates the surface of the soil at any given instant. The rate at which infiltration takes place, usually in inches per hour, can be limited by infiltration capacity of the soil.

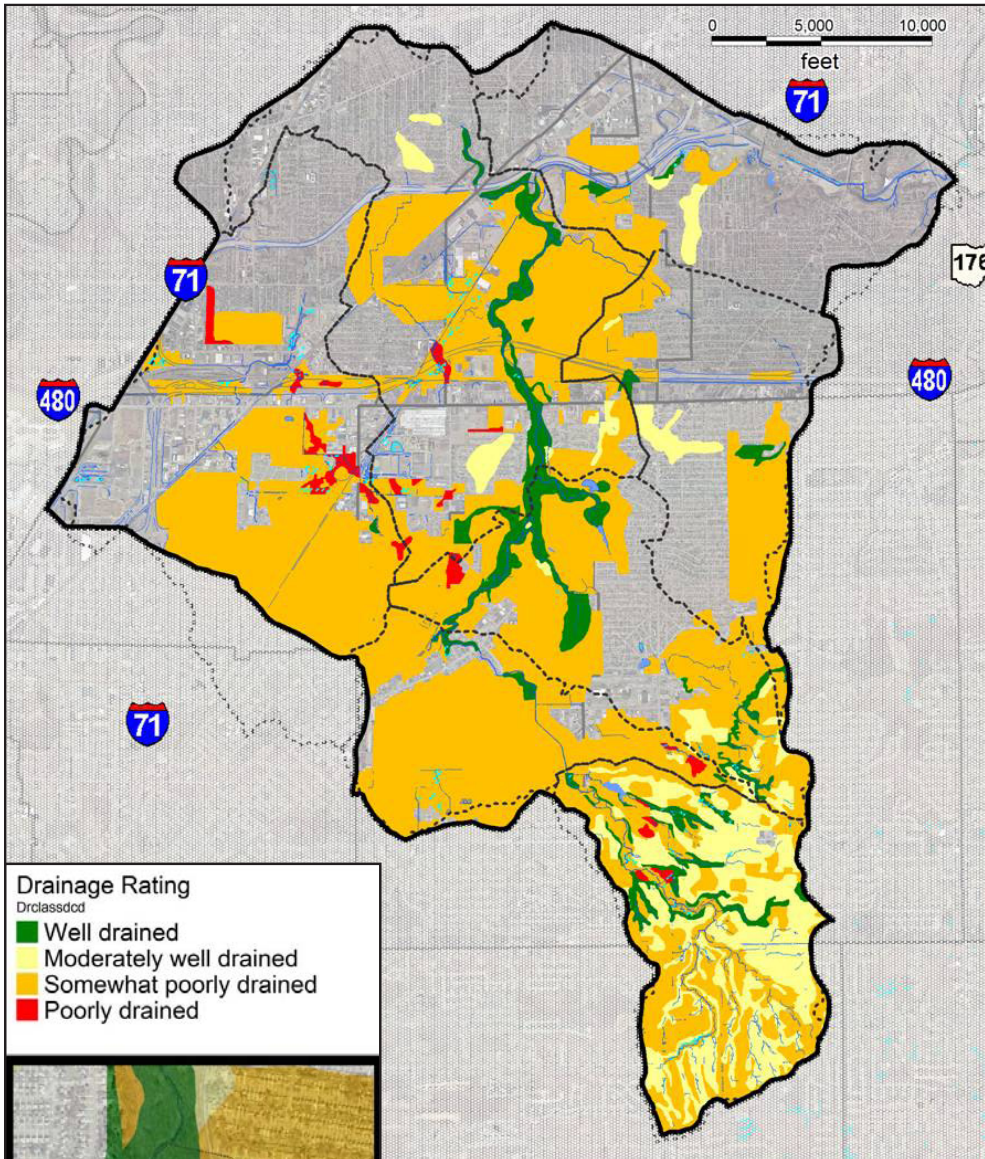
Infiltration Parameters: Unrated / **Moderate** / Slow / Very Slow

Moderate soil infiltration rate was selected. Areas that contain these soil conditions help absorb stormwater more quickly and thereby minimize runoff and erosion rates downstream. These are “working soils” which are providing a valuable function to the communities.



# Big Creek Natural Feature: Critical Soils

## Drainage



Soil Drainage Rate: The relative terms used to describe the rate at which precipitation moves through the soil and into ground sources. The difference between drainage versus infiltration is that drainage measures the rate at which water passes through the soil, while infiltration measures the rate at which water first enters the soil.

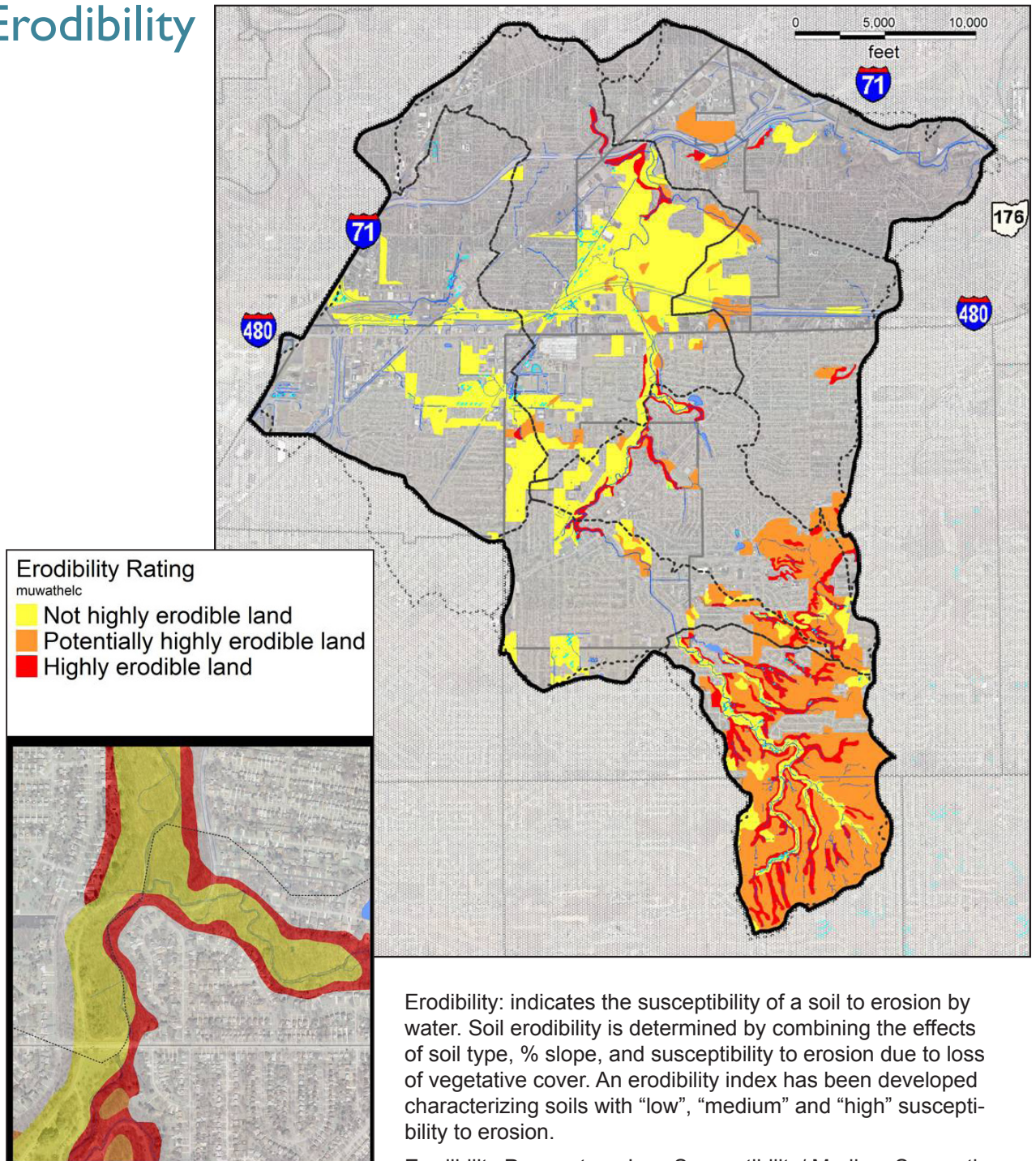
Drainage Parameters: Modified / **Well Drained** / Moderately Drained / Somewhat Poorly Drained / Poorly Drained

Well drained soils were selected. Areas that contain these soil conditions reduce runoff rates by allowing stormwater to filter into groundwater supplies. The groundwater is then slowly released into the streams. These are also “working soils” which are providing a valuable function to the communities.



# Natural Feature: Critical Soils

## Erodibility



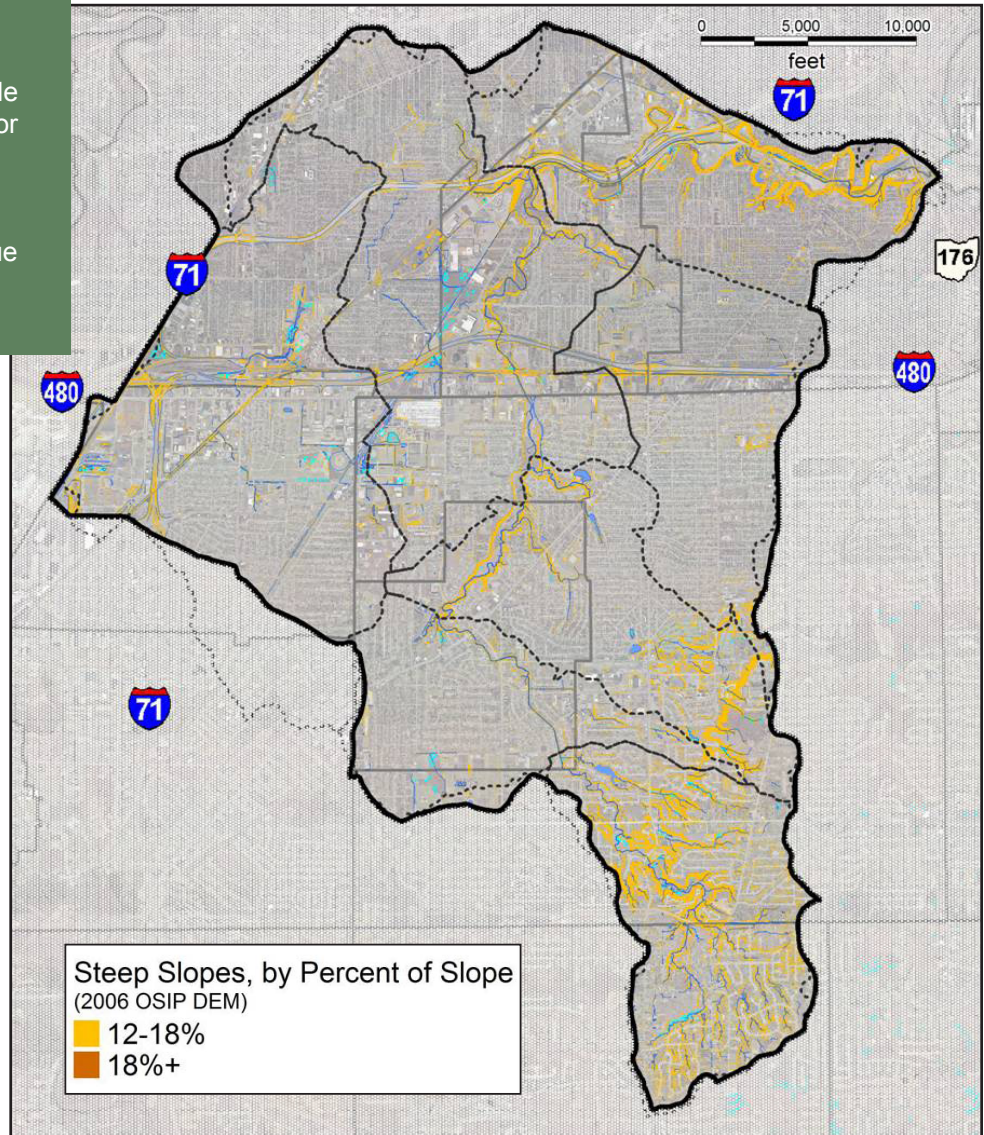


# Big Creek

## Natural Feature: Steep Slopes

Slopes vary greatly within the Big Creek Watershed. They range from steep gorge areas where the creek has cut its way down through the bedrock, to gentle slopes and flat areas.

Slopes are mapped using a scale that ranges from flat to steep. For our analysis, we identified the steeply sloped areas that could contribute to higher erosion potential and offer the most value for sensitive lands and habitat.



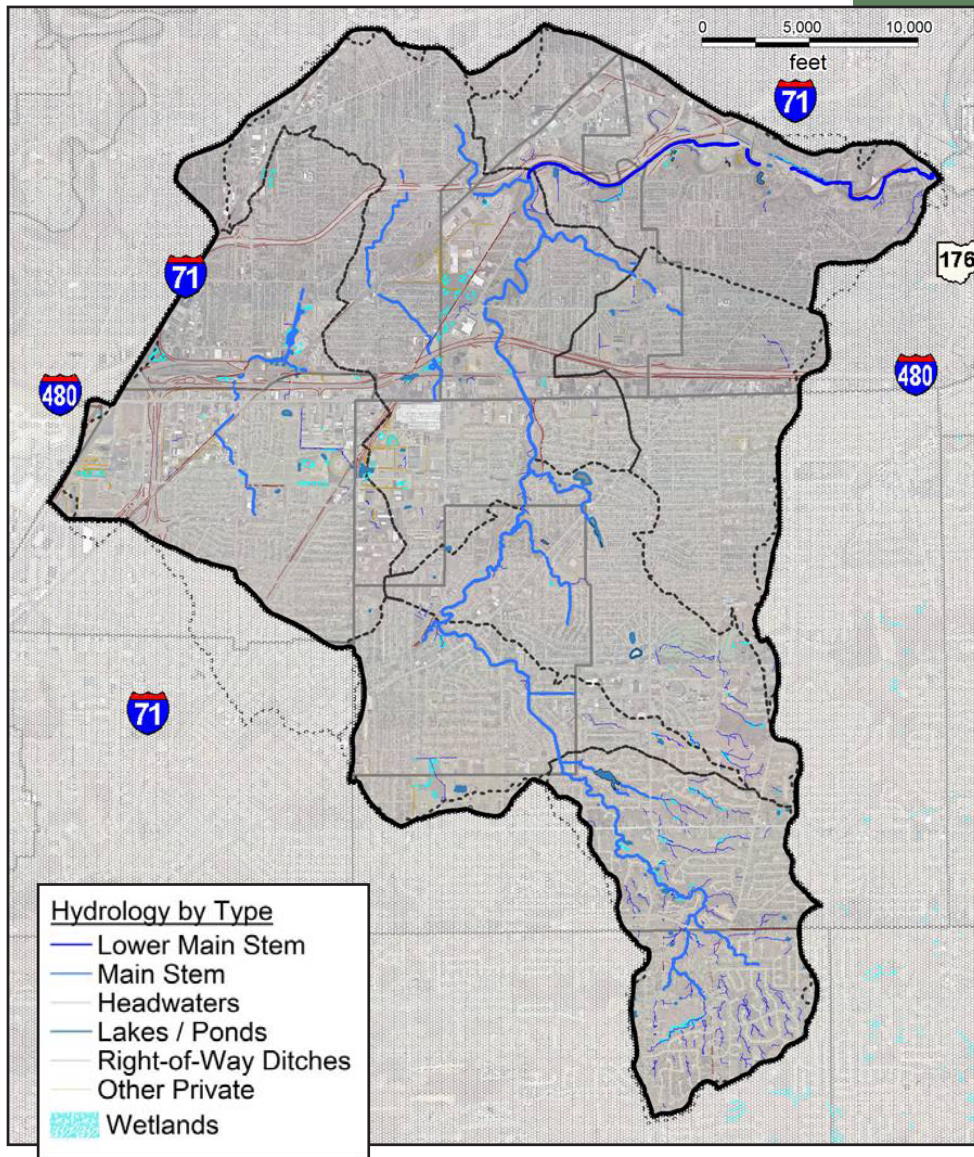
Slopes with a grade of 15% or more are considered steep slopes. Vegetated steep slopes provide an important resource to be preserved because any significant disturbance to the hillside's environment may result in: landslides or land instability, unacceptable alteration in the drainage patterns and loss of scenic value all of which pose risks to local property owners.

Slope Parameters: 0-5%, >5-10%, >10-15%, **>12-18%**, **>18% and up**

Steep slopes with grade of 12% or more were selected. The need to protect these slopes is based on percent and length of slope, the fact that soils in these areas are often easily erodible, and that other important natural resources (ex. streams and wetlands) can be in close proximity.



# Natural Feature: Streams



Streams are the conduits that receive, manage and distribute water. The communities within a watershed drain to a network of streams that transport water through the system, from small streams to larger rivers and eventually to a lake. Water in Big Creek flows into the Cuyahoga River and finally reaches and discharges into Lake Erie.

## STREAM ORDER

Headwater and primary headwater streams provide:

- Sediment control
- Nutrient control
- Flood control
- Habitat corridors

For our analysis, streams with their associated sub-watershed were identified and sorted into two primary groups: Streams that have a drainage area of approximately 0.5-20sq miles and streams that drain approximately <0.5 sq. miles. The streams were organized in this manner to help determine riparian width size.

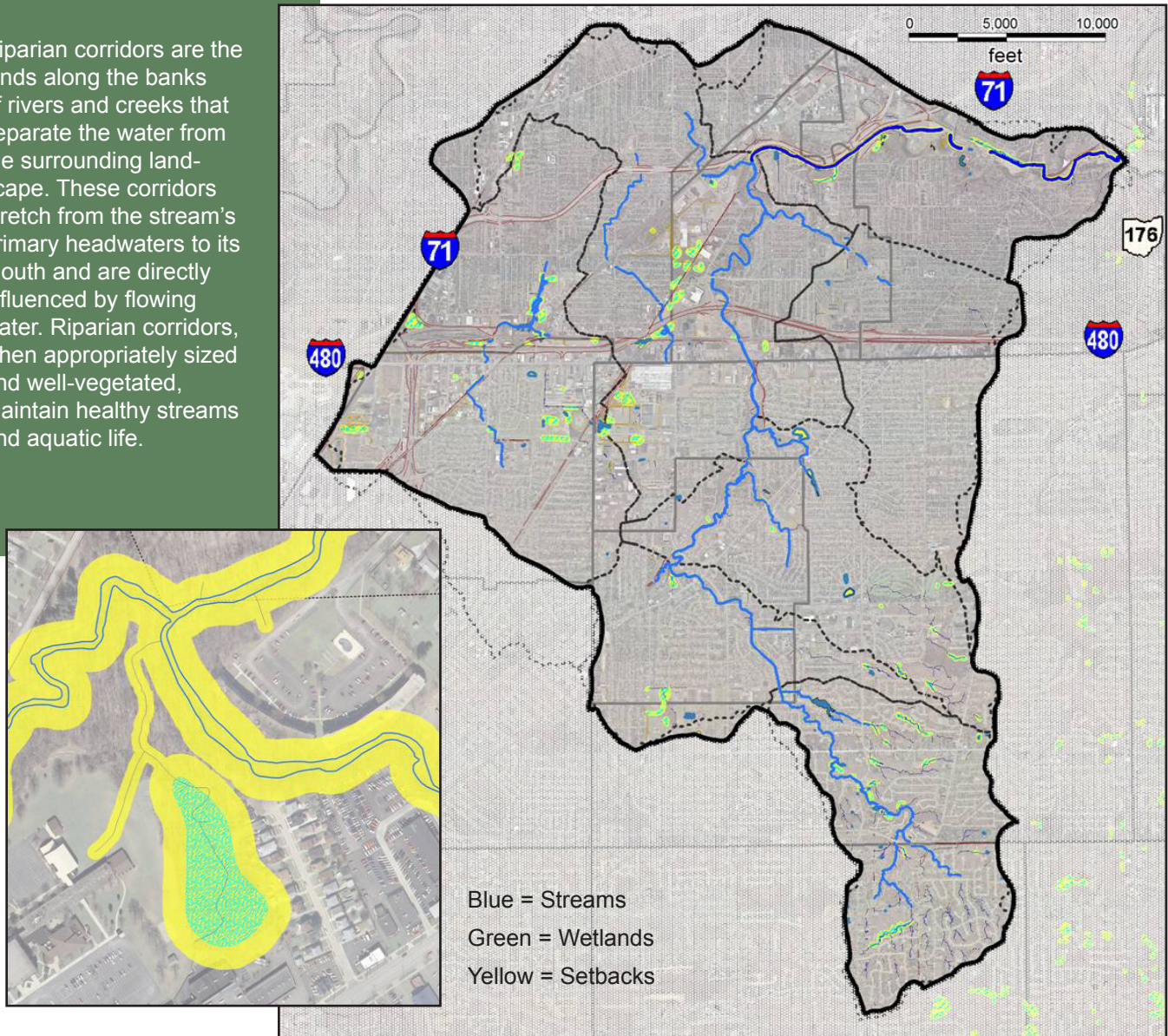
**Headwater Streams-** Streams that drain a watershed of 20 sq. miles or less are called headwater streams. These are the creeks and streams that feed larger rivers. These small streams join together to form larger streams and rivers or run directly into larger streams and lakes. Big Creek, by definition, is a headwater to the Cuyahoga River. When headwater streams become damaged or impaired, the larger, downstream river will suffer as well.

**Primary Headwaters Streams -** Streams that drain a watershed less than 1sq. mile are called primary headwater streams. Every stream begins somewhere. That somewhere is its primary headwaters. Primary headwater streams are like the capillary system of a blood supply network- just as the health of the whole organism depends upon a functioning capillary system, the health of larger streams and rivers depend upon an intact primary headwater stream network.



# Big Creek Natural Feature: Riparian Areas & Wetlands

Riparian corridors are the lands along the banks of rivers and creeks that separate the water from the surrounding landscape. These corridors stretch from the stream's primary headwaters to its mouth and are directly influenced by flowing water. Riparian corridors, when appropriately sized and well-vegetated, maintain healthy streams and aquatic life.

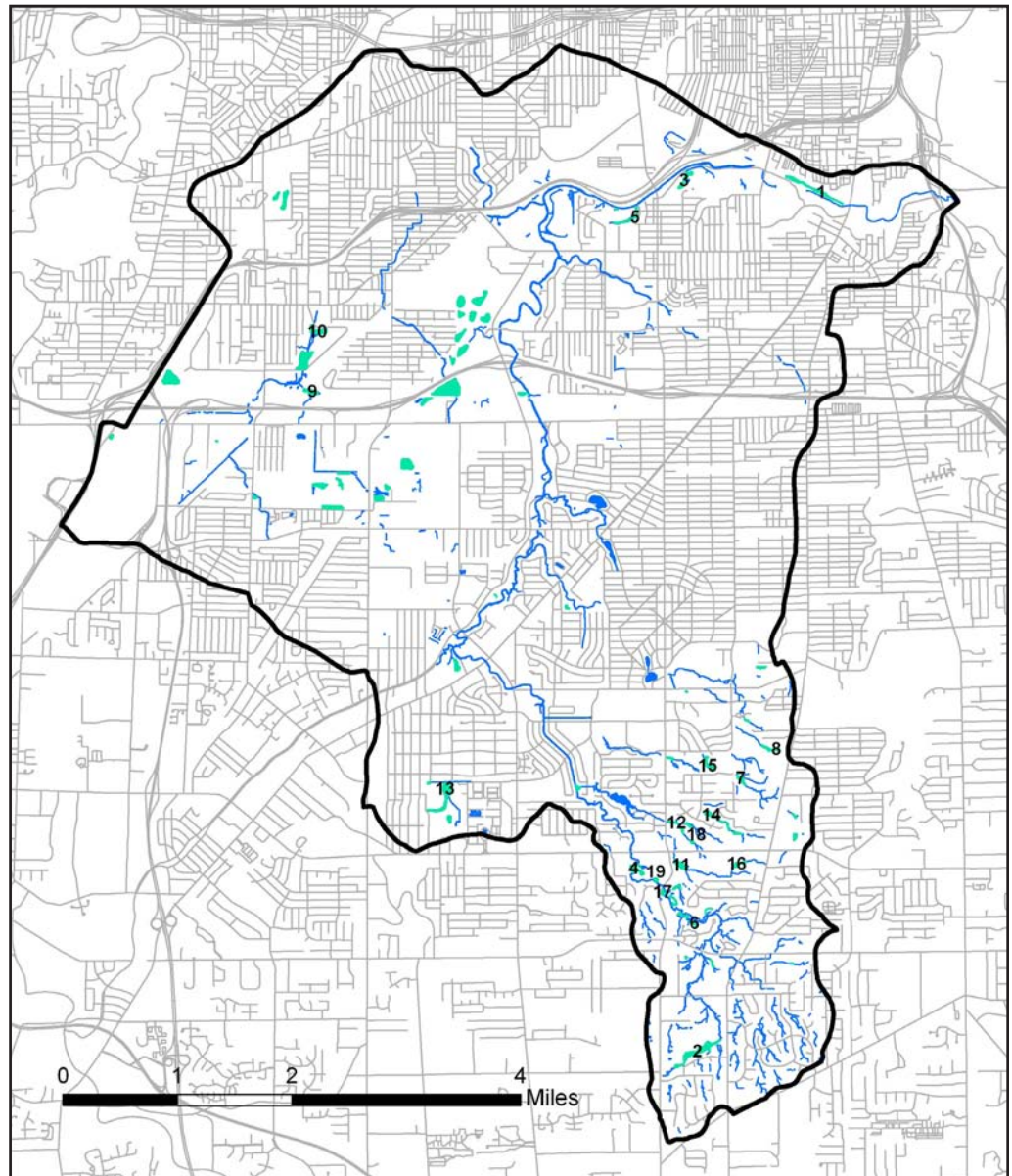


For the riparian corridor analysis, stream drainage areas of 0.5-20 sq. miles and <0.5 sq. miles were incorporated to determine riparian width. Recommended riparian corridor setback distances are based on the analysis of scientific studies that indicate the minimum setbacks required to maintain the functioning of riparian areas. These distances change as streams and their drainage areas get larger.

A 75 ft. riparian setback is recommended for streams that have a drainage area of 0.5-20 sq. miles

A 25 ft. riparian setback is recommended for streams that have a drainage area of <0.5 sq. miles





Wetlands within a watershed serve several purposes that are important to the overall health and function of the watershed system. Wetlands provide for storage of flood waters. Wetlands filter out contaminants and sediment in stormwater runoff, while also providing shelter and breeding habitat for many organisms.

As discussed in more detail in the “Tools for Watershed Stewardship” wetlands require a setback or buffer zone (75ft or 120ft) based on the overall quality of the wetland. For the purposes of this project we placed a 75ft setback on all identified wetlands. (Please see Appendix B for additional Big Creek wetland information.)

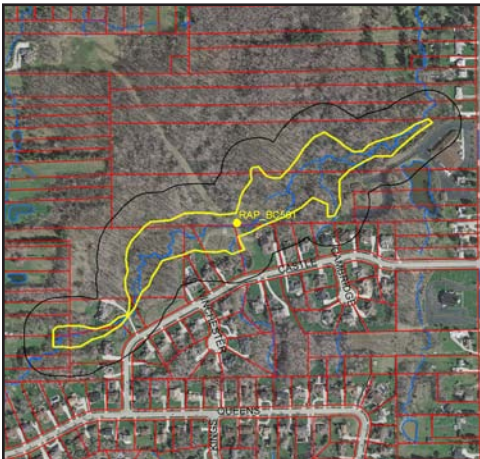
A total of 137.5 acres of wetlands have been identified in the Big Creek watershed through the CRCPO’s wetlands prioritization project. The top ten sites were ranked through analysis of a combination of traits including size, impact on watershed function, potential for improvement or restoration, stressors and potential for acquiring the property for conservation, among other criteria. Those ten sites, featured on the following page and in Appendix B, range in size from .75 acres to 9 acres and total 28 acres, or nearly 20% of the total wetland acreage in the Big Creek watershed.



# Big Creek Wetlands



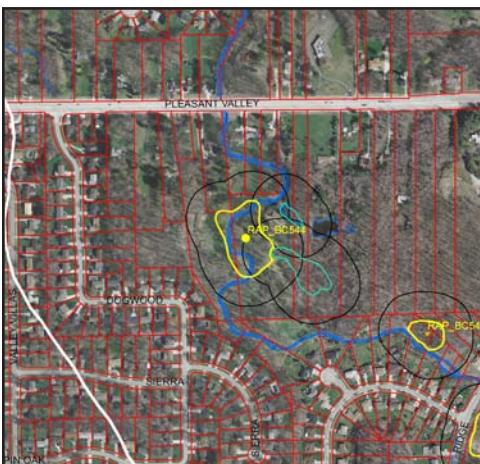
BIG CREEK WETLAND #1 is located in Cleveland, just upstream of the confluence with the Cuyahoga River.



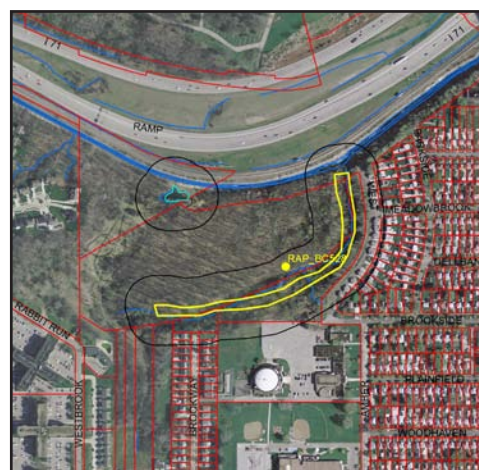
BIG CREEK WETLAND #2 is a 9-acre forested shrub/scrub wetland in North Royalton.



BIG CREEK WETLAND #3 is a 2-acre forested wetland in Cleveland, along a tributary of Big Creek near I-71 and Ridge Road.



BIG CREEK WETLAND #4 is almost two acres of emergent wetland in Parma, connected to riparian corridor and near other wetlands.



BIG CREEK WETLAND #5 is a 2-acre forested wetland in the "Oxbow" area in Brooklyn.





BIG CREEK WETLAND #6 is a bit over an acre in Parma, near other wetlands and streams.



BIG CREEK WETLAND #7 is approximately 1.5 acres of forested wetland on a tributary just upstream from Stearns Farm Homestead.



BIG CREEK WETLAND #8 is a 1.82-acre forested wetland just northeast of #7 in Parma.



BIG CREEK WETLAND #9 is a 1.29 emergent and forested wetland in Cleveland, near an industrial park and south of the Puritas stormwater basin.

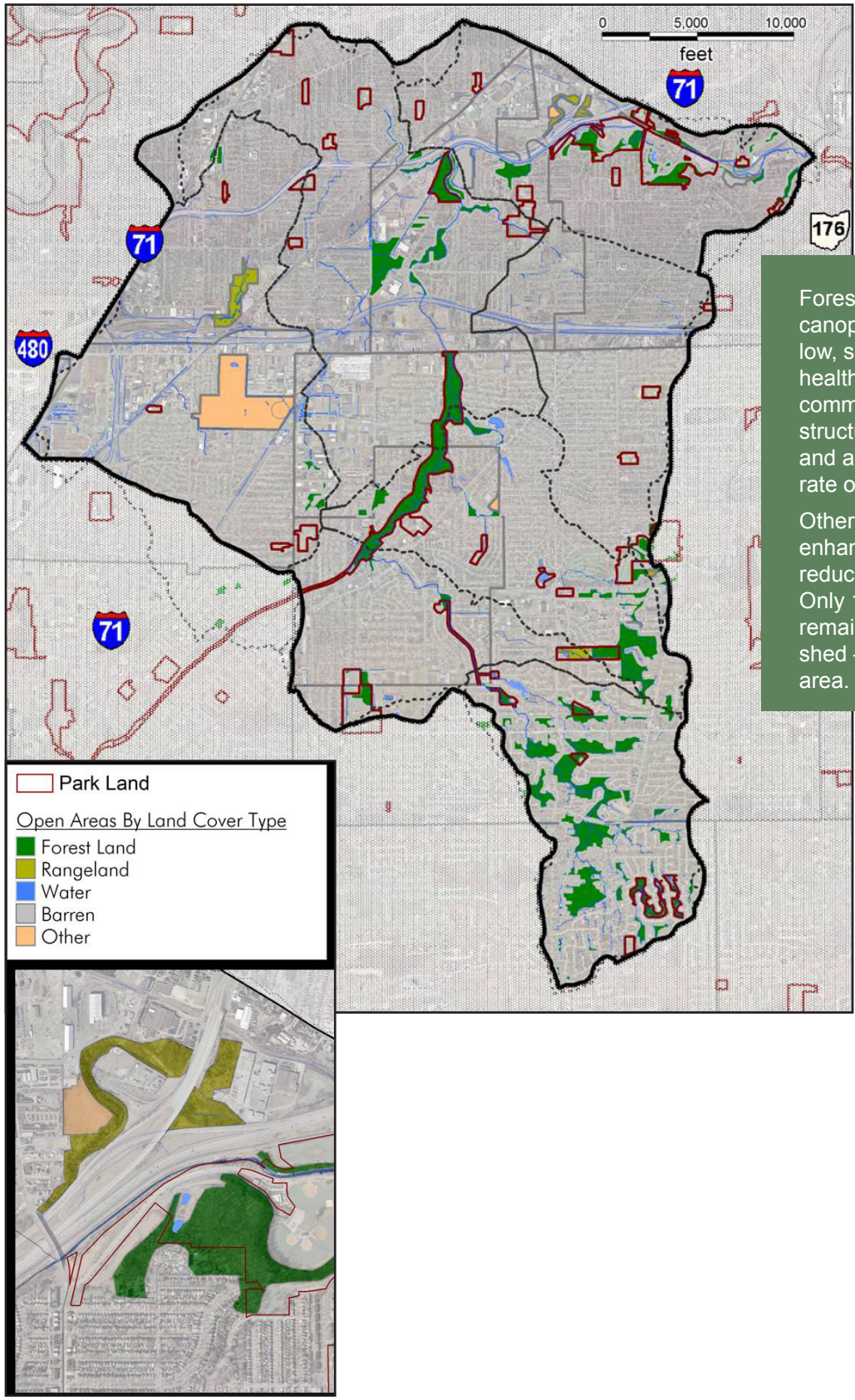


BIG CREEK WETLAND #10 is a 3-acre emergent wetland within the Puritas basin of the West Branch of Big Creek.





# Big Creek Natural Feature: Forest Cover



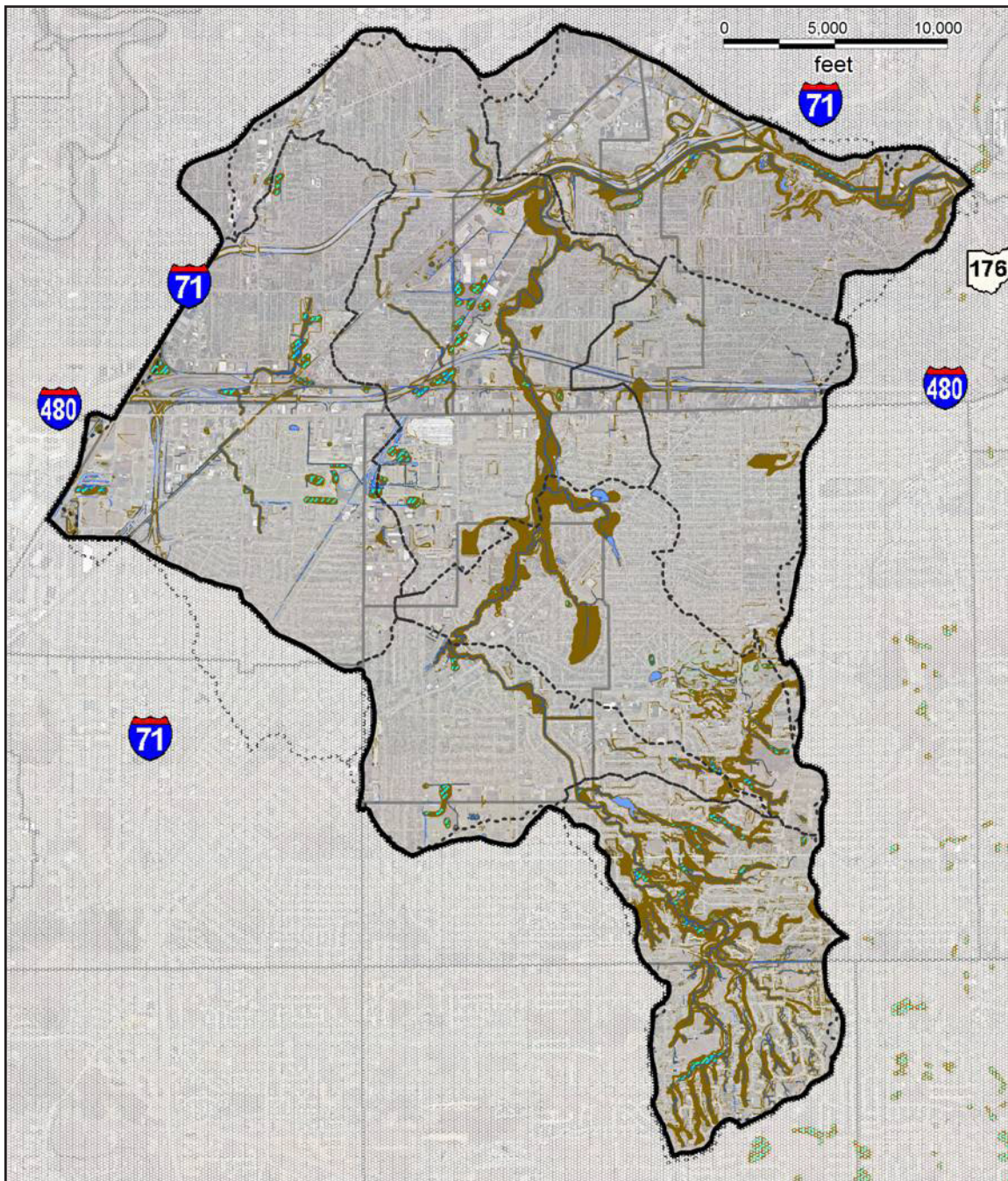
Forest cover consists of tree canopy, understory plants and low, surface vegetative cover. A healthy forest system can save communities storm water infrastructure costs by intercepting and absorbing rain, slowing the rate of runoff and stabilizing soils.

Other community benefits include enhancing property values and reducing household energy costs. Only 1,833 acres of forest cover remain in the Big Creek Watershed – that is 7.5% of the total area.



# Composite of Critical Natural Features

The composite map embodies all the critical natural features “layered-up” in the Big Creek Watershed. This map represents the values the watershed partnership expressed and the necessary functional aspect of the Big Creek Watershed.



### Priority Conservation Areas

Priority conservation areas are locations where land use change is predicted to have a high impact on the watershed in terms of flooding, erosion, and water quality, based on the analysis of several data sets representing criteria that the watershed planning partners determined were of interest.

The GIS land cover data and field investigations identified 1,570 acres of undeveloped land, comprising 6.4% of the watershed, that are non-park-related and are therefore unprotected. These areas have value to each community as examples of nature the city and many present excellent prospects for conservation, restoration and enhancements.

The characteristics of these large undeveloped and unprotected tracts vary and include

- flat, heavily-forested upland areas that may have high development pressure;
- land adjacent to creek gorges, with steep terrain that could present difficulties for developers; and
- back lots of “bowling alley”-shaped parcels that could be consolidated

Priority Conservation Areas have one or more of the following characteristics:

#### • CRITICAL SOILS

In critical soil areas, communities should develop soil compaction limitations to help conserve this resource during construction. Conservation and low impact design standards are recommended.

#### • STEEP SLOPES

In steep slope areas, communities should conserve these resources to the maximum extent possible for health, safety, property and environmental concerns. Setbacks should be implemented on slopes of 12% or more.

#### • STREAMS & NATURAL RIPARIAN AREAS

Stream and riparian corridor areas should be protected from encroachment at all costs. Communities should adopt riparian setback ordinances to protect both headwater and primary headwater streams. Where impacts occur in these areas, mitigation within the immediate drainage area should be required .

#### • FLOODPLAINS

Communities should conserve flood plains to accommodate excess flow, protect health and property. Community regulations need to maintain current flood plain maps and adequately protect floodplains from development to reduce future damages.

#### • WETLANDS

Wetland areas should be conserved as essential storage and filtration systems. Communities should adopt ample setback ordinances for all wetlands categories.

#### • FORESTS

Communities should conserve forested areas within riparian corridors and minimize the loss of existing forested areas throughout the entire watershed, through conservation development and tree preservation regulations.





### PCA Analysis by Subwatersheds

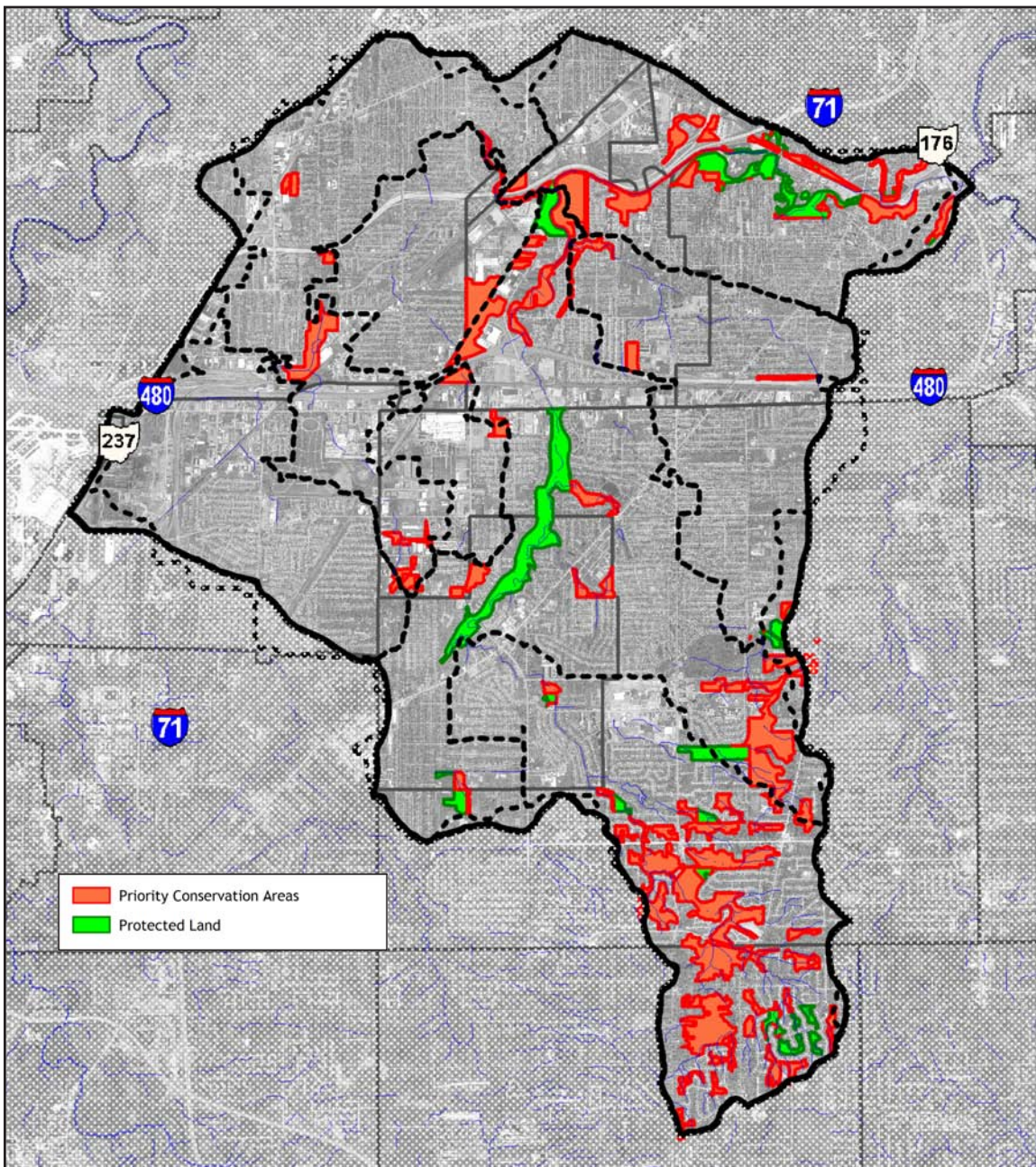
SUBWATERSHED	TOTAL UNDEVELOPED LARGE TRACT ACRES	TOTAL CRITICAL WATERSHED FEATURES (ACRES)	% OF WATERSHED'S TOTAL CRITICAL FEATURES
East Branch (BCBE)	466.4	437.3	3.5%
Lower (BCBG)	288.9	222.1	1.8%
West Branch (BCBW)	122.2	98.0	0.8%
Colleda Branch (BCCD)	0.0	0.0	0.0%
Chevy Branch (BCCH)	28.3	34.6	0.3%
Stickney Creek (BCST)	41.3	22.6	0.2%
Upper Big Creek	623.8	614.1	4.9%
<b>Total</b>	<b>1570.9</b>	<b>1428.7</b>	<b>11.5%</b>

### PCA Analysis by Community

CITY	TOTAL LARGE TRACTS (ACRES)	TOTAL CRITICAL FEATURES (ACRES)	% OF CRITICAL FEATURES THAT ARE IN PCAs	REPRESENTS % OF WATERSHED'S TOTAL CRITICAL FEATURES
BROOKLYN	326.1	258.4	18.1%	2%
BROOK PARK	0.0	0.0	0.0%	0.0%
CLEVELAND	282.1	241.4	16.9%	1.9%
LINNDALE	0.0	0.0	0.0%	0.0%
NORTH ROYALTON	275.4	272.0	19.0%	2.2%
PARMA	641.9	617.5	43.2%	5.0%
PARMA HEIGHTS	45.1	39.5	2.8%	0.4%
<b>TOTAL</b>	<b>1570.6</b>	<b>1428.8</b>	<b>100%</b>	<b>11.5%</b>



## Priority Conservation Areas



Taking into account the GIS data and analysis of the location, characteristics and quality of the critical natural watershed features on the Big Creek watershed, and aligning that with the community's desires as stated in the community priorities process, the areas above, marked in red, were identified as Priority Conservation Areas (PCAs.)



## Step 2b: Identify Undeveloped and Developed Land in Relation to Natural Features

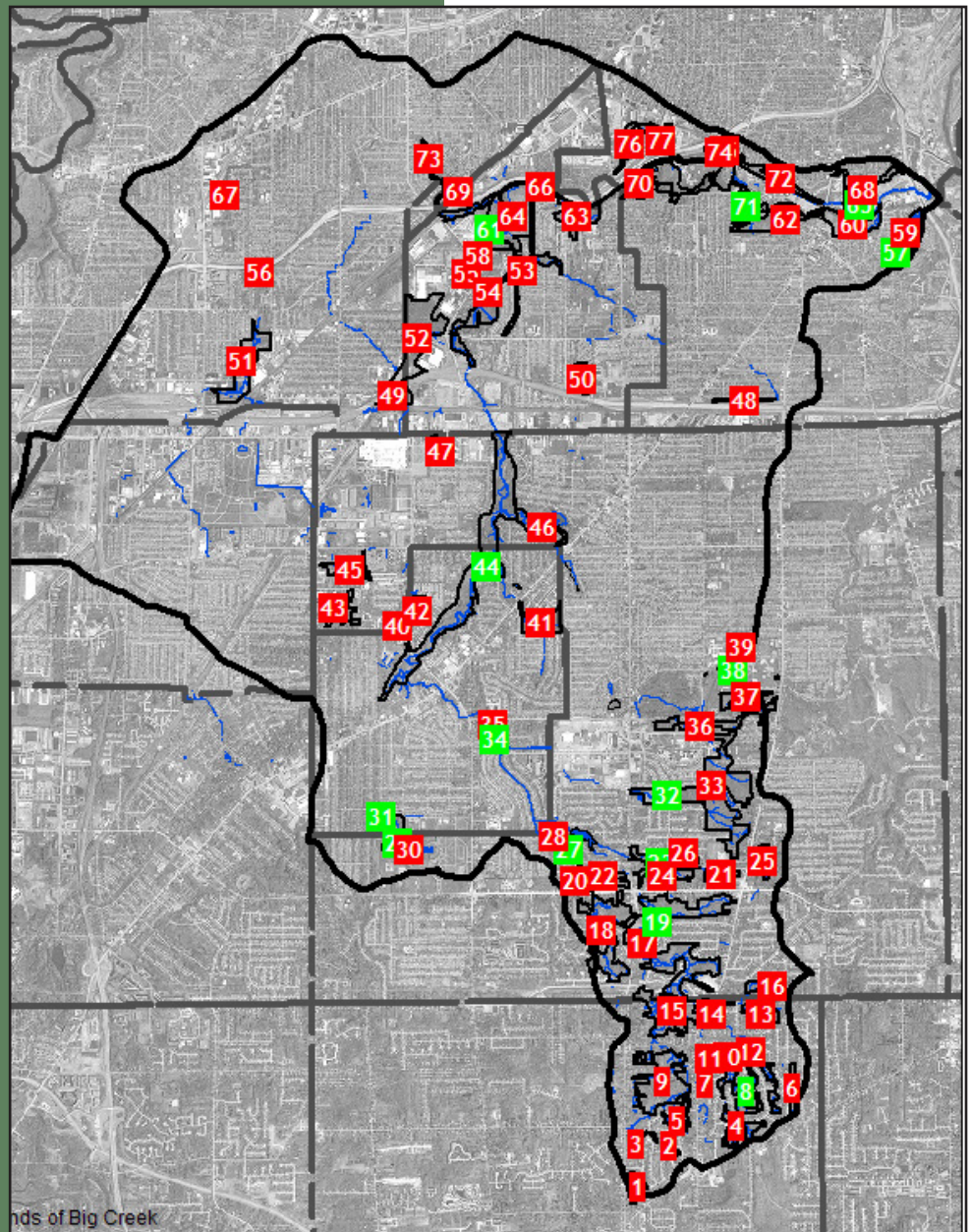
The GIS land cover data and field investigations identified 1,570 acres of undeveloped land, comprising 6.4% of the watershed, that are non-park-related and are therefore unprotected.

The characteristics of these 63 large undeveloped and unprotected tracts vary and include

- flat, heavily-forested upland areas that may have high development pressure;
- land adjacent to creek gorges, with steep terrain that could present difficulties for developers; and
- back lots of “bowling alley”-shaped parcels that could be consolidated

These parcels, shown in **red** on the map, hold considerable amounts of wetlands, streams, steep slopes and critical soils.

Parcels shown in **green** are park-owned lands and their proximity to critical features could mark them as valuable assets for land assembly for conservation.



### Critical Features in Large Undeveloped Land Areas

	Total	Critical Soils	Steep Slopes	Flood Zones	Forest Cover	Wetlands & Streams
Total Unprotected Land in Large Tracts (acres)	1,570	814	486	not calculated*	297	914.7
Represents % of Features Remaining in Watershed	6.40%	7.70%	25%	not calculated*	71.90%	52.20%

\* data unavailable from FEMA

## Step 3: Analyze Potential Priority Development / Redevelopment Areas

### PDA

**Priority Development Areas** are locations where land use changes are predicted to have minimal impact on the watershed and where conditions suggest that additional development may be appropriate.

The Big Creek watershed includes seven municipalities that are largely complete with zoning, water and sewer availability and many other factors deemed important for development.

Priority Development Areas were analyzed and have the following characteristics:

- **High Density Zoning**- lie within areas zoned for high density commercial, industrial or residential.

*We relied on the community's underlying zoning to encourage development and redevelopment in these areas. These areas typically followed business and industrial corridors and town centers. Directing development to these areas can bring businesses back to inner-ring suburbs where infrastructure currently and minimizes urban sprawl.*

- **Highway & Major Interchanges**- lie within 500-foot radius of a major intersection or half mile radius of a highway interchange.

*Interchanges act as service centers that are important to commercial, industrial and residential development. Interchanges have high passenger volumes, multi-modal forms of transportation and are typically near town centers planned around these areas. Major intersections and highway interchanges were based on U.S. census classifications.*

- **Vacant Parcels**- lie within parcels that are undeveloped and are zoned for high density commercial, industrial and residential development

*The vacant parcel locations can provide additional guidance in prioritizing future development. Directing development to these areas can bring businesses or mixed use residential growth back to inner-ring suburbs where infrastructure currently and minimizes urban sprawl.*

- **Do not lie within Critical Watershed Feature**- the priority conservation areas should be excluded from future development.

*Critical watershed features play an important role in managing stormwater. These features are already scarce and the remaining acreage should be protected for the benefit of the communities. Parks, restoration projects and greenway systems can be implemented in many of the areas.*

The Ohio Lake Erie Commission Balanced Growth Program established a development suitability technical advisory committee to determine which factors were most important to the development community.

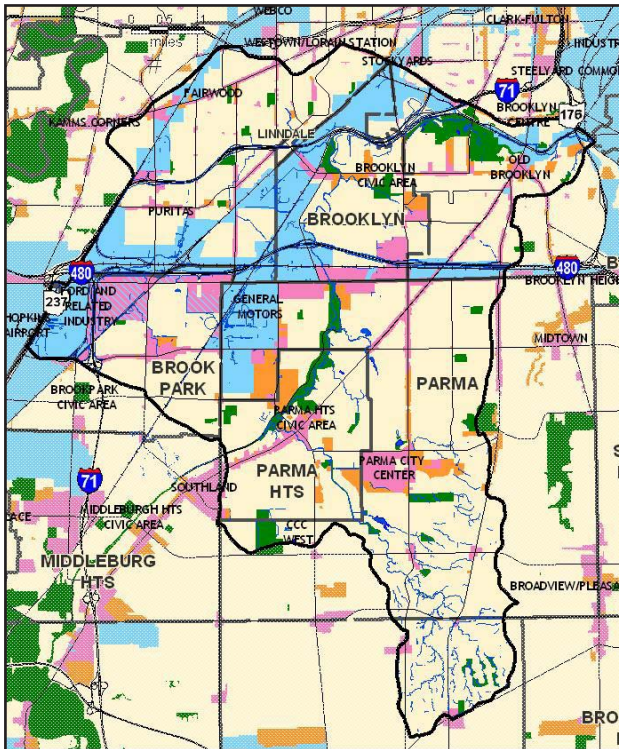
#### TOP TEN DEVELOPMENT SUITABILITY FACTORS

RESIDENTIAL	COMMERCIAL	INDUSTRIAL
1. Public water availability	1. Public water availability	1. Proximity to highway
2. Public sewer availability	2. Public sewer availability	2. Public sewer availability
3. Pro-development community attitude	3. Median household income in community	3. Public water availability
4. School quality	4. Community population density	4. Land availability
5. Land cost	5. Proximity to highway	5. Proximity to highway interchange
6. Median household income in community	6. Community growth characteristics	6. Pro-development attitude of community
7. Land availability	7. Land availability	7. Proximity to employees.
8. Community growth characteristics	8. Pro-development community attitude	8. Land cost
9. Proximity to highway	9. Proximity to highway interchange	9. Soil type / stability
10. Proximity to highway interchange	10. Proximity to other commercial development	10. Median household income

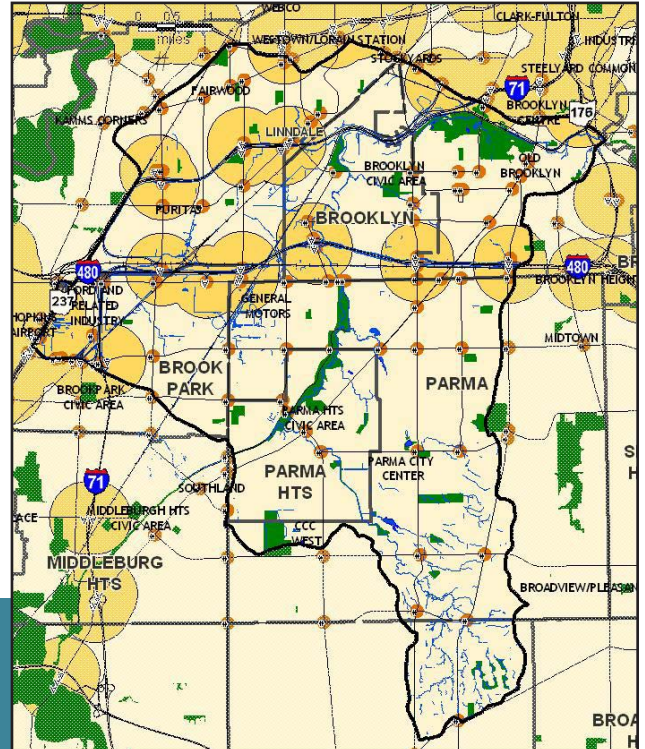


# Priority Development / Redevelopment Areas

## High Density Zoning



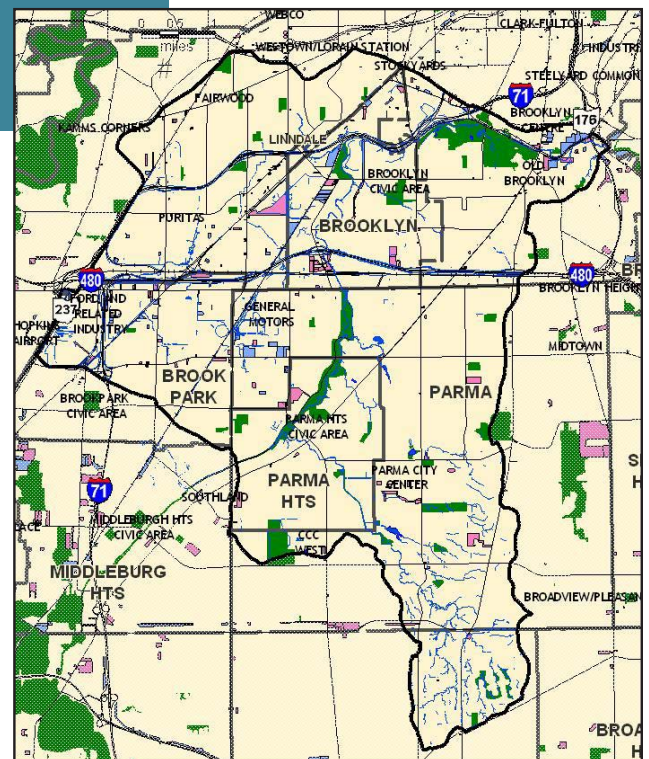
## Highway Interchanges



In looking at the potential for development in this virtually fully-built-out watershed, the planning groups agreed that redevelopment of existing hard space was paramount. Infill development not only serves as a deterrent to urban sprawl, it can bring new businesses and jobs to the area, and it offers opportunities to include sustainable practices in the building design and surface treatments.

*The Partnership decided that, rather than identifying any of the vacant land or undeveloped tracts for new development, it would instead treat any unused area as a potential Priority Conservation Area. This opens more spaces for siting stormwater retrofits, moving them out of the development inventory and into the stock of conservation assets.*

*In the end, using Highway Interchange areas and Vacant Lots, and converting hard surfaces to stormwater management facilities, expands the bank of land to be conserved and raises the value of underused built assets.*



## Vacant Land

## PDA Analysis by Subwatershed

Tributary	Net Area (Total minus PCAs)					Total PDA Acres (minus PCA)	% PDA Area Remaining
	COMMERCIAL	INDUSTRY	MIXED	MULTI-FAMILY			
East Branch	464.0	356.9	-	355		856.4	89.6%
Lower	191.3	541.7	-	29.7		762.7	89.9%
West Branch	288.2	628.0	97.4	5.7		1,019.2	91.1%
Colleda Branch	177.8	611.4	348.1	27.7		1,165.0	99.8%
Chevy Branch	167.3	449.4	16.4	81.1		714.3	90.1%
Stickney Creek	314.6	190.2	-	5.7		510.5	94.3%
Upper Big Creek	330.3	-	-	81.5		411.8	98.9%
No Designated Tributary	43.4	129.0	0.1	11.7		184.2	97.7%
<b>TOTAL</b>	<b>1,977.1</b>	<b>2,906.5</b>	<b>462.0</b>	<b>278.6</b>		<b>5,624.2</b>	<b>93.3%</b>

The Colleda and West Branch subwatersheds have the largest acreage of potential Priority Development Areas, each with over 1,000 acres. East Branch and the Lower Branch followed closely behind with 856 acres and 762 acres.

## PDA Analysis by Community

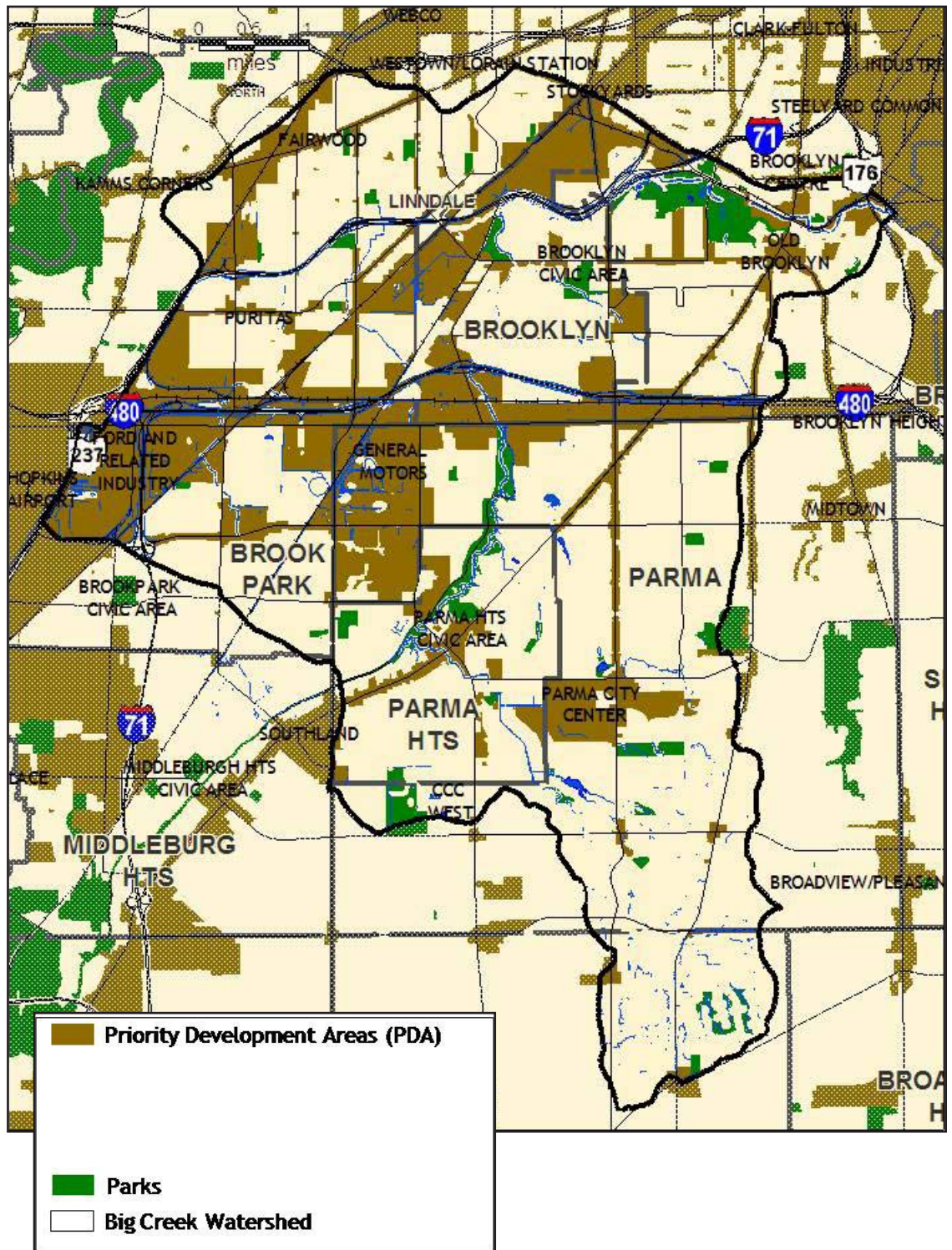
CITY	ACRES	ZONING				TOTAL
		COMM'L	INDUST	MIXED	MULTI-FAMILY	
BROOK PARK	Total	259.1	455.0	462.0	27.7	1,203.7
	PCA	10.6	17.5	20.3	0.8	49.2
	<b>Net PDA</b>	<b>248.5</b>	<b>437.5</b>	<b>441.7</b>	<b>26.8</b>	<b>1,154.5</b>
BROOKLYN	TOTAL	346.4	946.7	0.0	121.2	1,414.3
	PCA	32.9	196.8	0.0	29.9	259.6
	<b>NET PDA</b>	<b>313.5</b>	<b>750.0</b>	<b>0.0</b>	<b>91.3</b>	<b>1,154.7</b>
CLEVELAND	TOTAL	570.1	1,965.0	0.0	181.6	2,716.6
	PCA	66.1	344.8	0.0	13.9	364.7
	<b>NET PDA</b>	<b>563.9</b>	<b>1,620.2</b>	<b>0.0</b>	<b>167.7</b>	<b>2,351.9</b>
NORTH ROYALTON	TOTAL	35.5	0.0	0.0	0.0	35.5
	PCA	2.8	0.0	0.0	0.0	2.8
	<b>NET PDA</b>	<b>32.7</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>32.7</b>
PARMA	TOTAL	646.4	630.3	0.0	348.6	1,625.3
	PCA	29.8	60.7	0.0	12.0	102.5
	<b>NET PDA</b>	<b>616.6</b>	<b>569.5</b>	<b>0.0</b>	<b>336.6</b>	<b>1,522.8</b>
PARMA HEIGHTS	TOTAL	165.2	0.0	0.0	217.8	383.0
	PCA	9.7	0.0	0.0	24.4	34.2
	<b>NET PDA</b>	<b>155.5</b>	<b>0.0</b>	<b>0.0</b>	<b>193.3</b>	<b>348.8</b>
TOTAL WATERSHED	TOTAL	2,024.6	3,997.0	462.0	896.8	7,380.4
	PCA	92.0	619.7	20.3	81.0	813.0
	<b>NET PDA</b>	<b>1,930.7</b>	<b>3,377.3</b>	<b>441.7</b>	<b>815.8</b>	<b>6,565.5</b>

PCA = overlapping acres of priority conservation areas

NET PDA = Total acreage meeting Priority Development Area criteria minus Priority Conservation acreage



# Priority Development / Redevelopment Areas



# Big Creek

## Step 4: Identify Priority Conservation and Development / Redevelopment Areas

Each of the large tracts was analyzed for conservation and/or restoration opportunities. The large tracts were prioritized by the quantity of critical watershed features. A summary description is provided of the top large tract in each subwatershed.

### Upper Big Creek Priority Conservation Area – Large Tract #17

#### Summary

Large tract #17 is 168 acres and the largest of the greenspaces identified in Big Creek. This openspace is entirely located in the city of Parma between W. Pleasant Valley Rd. and W. Sprague Rd. The land contains approximately 30 parcels under various ownerships. Major property owners are Busch Development Corp and the cities of Cleveland and Parma. Sandy Brook Park is an adjacent greenspace.

This large tract is a significant contiguous piece of land that encompasses the upper reaches of Big Creek. It contains large areas of forest, critical soils and steep slopes. It also contains 44 acres of stream (and buffer) and 25 acres of wetlands (and buffer).

#### Conservation / Restoration Options

Efforts to preserve this site should receive the utmost attention. As noted above, this large tract contains nice headwaters streams, wetlands and forested areas. Two of the major parcels are publicly owned. Parcel #45425001 is owned by the Shiva Vishnu Temple and parcel # 45415001 is owned by the city of Parma. In 2009, West Creek Preservation Committee bought 13 acres of the Busch property and, along with 42 acres already owned by the city of Parma, placed 55 acres under a conservation easement. Other parcels to conserve need to be further explored.

The Cuyahoga River RAP identified a wetland restoration opportunity in a separate study. Preservation and enhancements of a 1.16 acre forested wetland totaled over \$30,000. (See Appendix B: Big Creek Watershed Wetlands Analysis, Wetland Ranked #6)

The Northeast Ohio Regional Sewer District's (NEORS) RIDE Study identified debris and erosion problems in this area. Opportunities for stream channel restoration exist with cooperation from the city, NEORS and local watershed group.

### Large Tract #17 – Upper Big Creek: Remaining Open Space Analysis

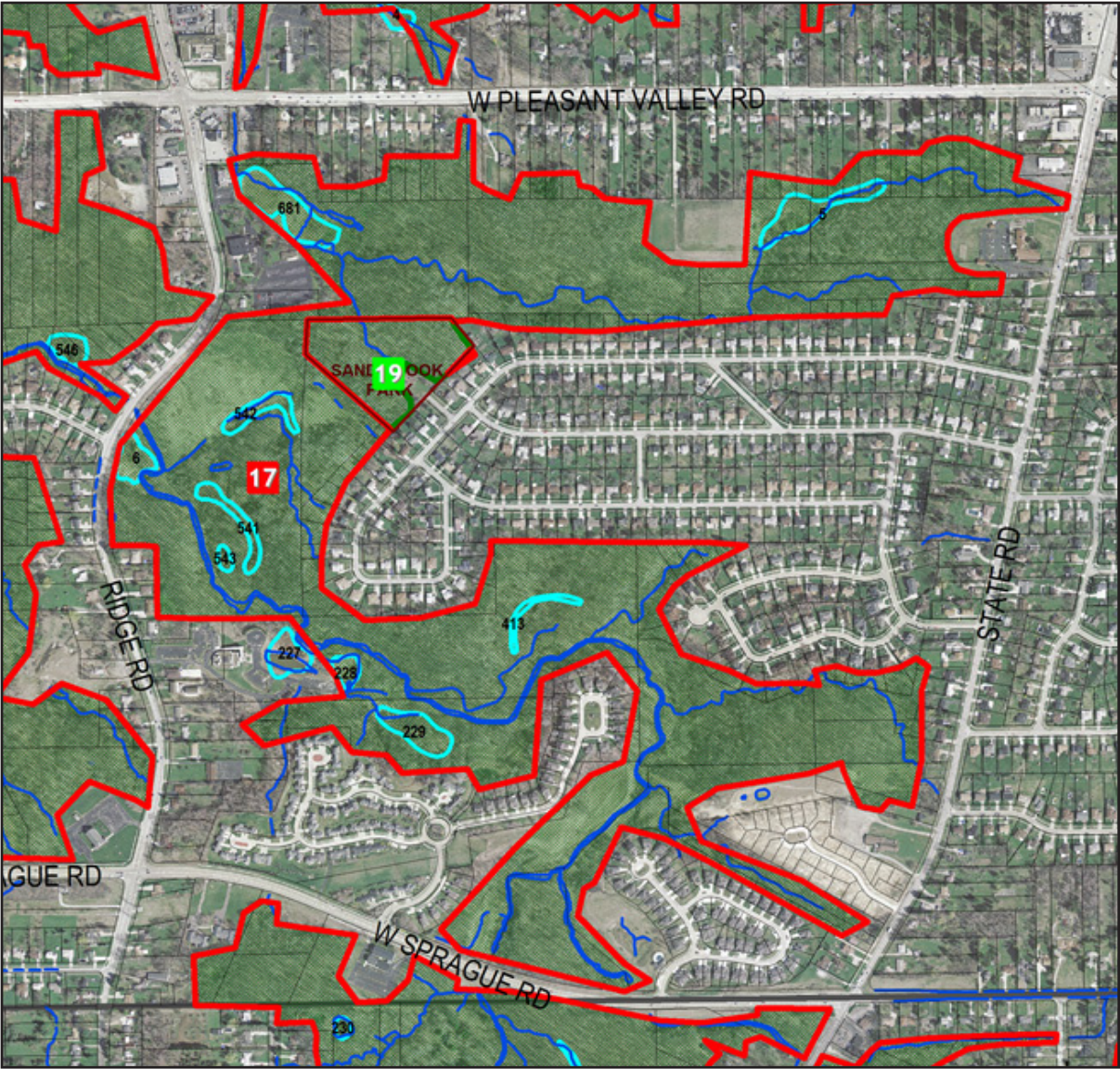
Map ID#	Acres	Percent Remaining Acres	Percent Remaining Open Forest	Percent Remaining Open Critical Soils	Percent Remaining Open Riparian	Percent Remaining Open Steep Slope	Percent Remaining Critical Areas
17	168.9	8.10%	9.60%	11.00%	11.10%	11.40%	8.70%

### Large Tract #17 – Upper Big Creek: Watershed-wide Analysis

Map ID#	Acres	Percent Watershed Acres	Percent Watershed Forest	Percent Watershed Critical Soils	Percent Watershed Riparian	Percent Watershed Steep Slope	Percent Watershed Critical Areas
17	168.9	0.70%	9.50%	1.20%	7.40%	4.00%	1.40%



Upper Big Creek Priority Conservation Area – Large Tract #17



## East Branch Priority Conservation Area – Large Tract #33

### Summary

Large tract #33 is 134 acres and the second largest greenspace identified in Big Creek. This openspace is entirely located within the city Parma between State and Ridge roads. The land contains approximately 29 parcels under various ownerships. Two of the major parcels are privately owned by Scripps Howard and Citicasters. Stearns Farm Homestead is adjacent to this large tract and West Creek Reservation is nearby to the east.

This is a large contiguous openspace contains nice forests, steep slopes, critical soils, multiple stream networks and several wetlands. Streams (and buffer) totaled nearly 12 acres and wetlands (and buffers) totaled nearly 10 acres.

### Conservation / Restoration Options

This is a prime openspace in Big Creek and should be preserved. It contains a lot of important watershed resources and could be an asset to other nearby park systems. The two major parcels, #450-26-002 and #450-27-001, are both very costly and may prohibit conservation. Adjacent properties also provide an opportunity to preserve headwater tributaries and should be further explored.

The Cuyahoga River RAP identified two wetland restoration opportunities in a separate study. Preservation and enhancements of a 1.46 acre wetland and 1.82 acre wetland totaled over one million due to property costs. Other alternatives to collaborate with the property owners should be explored. (See Appendix B: Big Creek Watershed Wetlands Analysis, Wetlands Ranked #7 & #8)

There are proposed greenway trails system plans that run through this large tract. The trails would link Stearns Farm Homestead with the West Creek Reservation and ultimately down to the Cuyahoga River. Partnerships should be developed to ensure that future projects are multi-objective and integrate trails and watershed preservation.

## Large Tract #33 – East Branch: Remaining Openspace Analysis

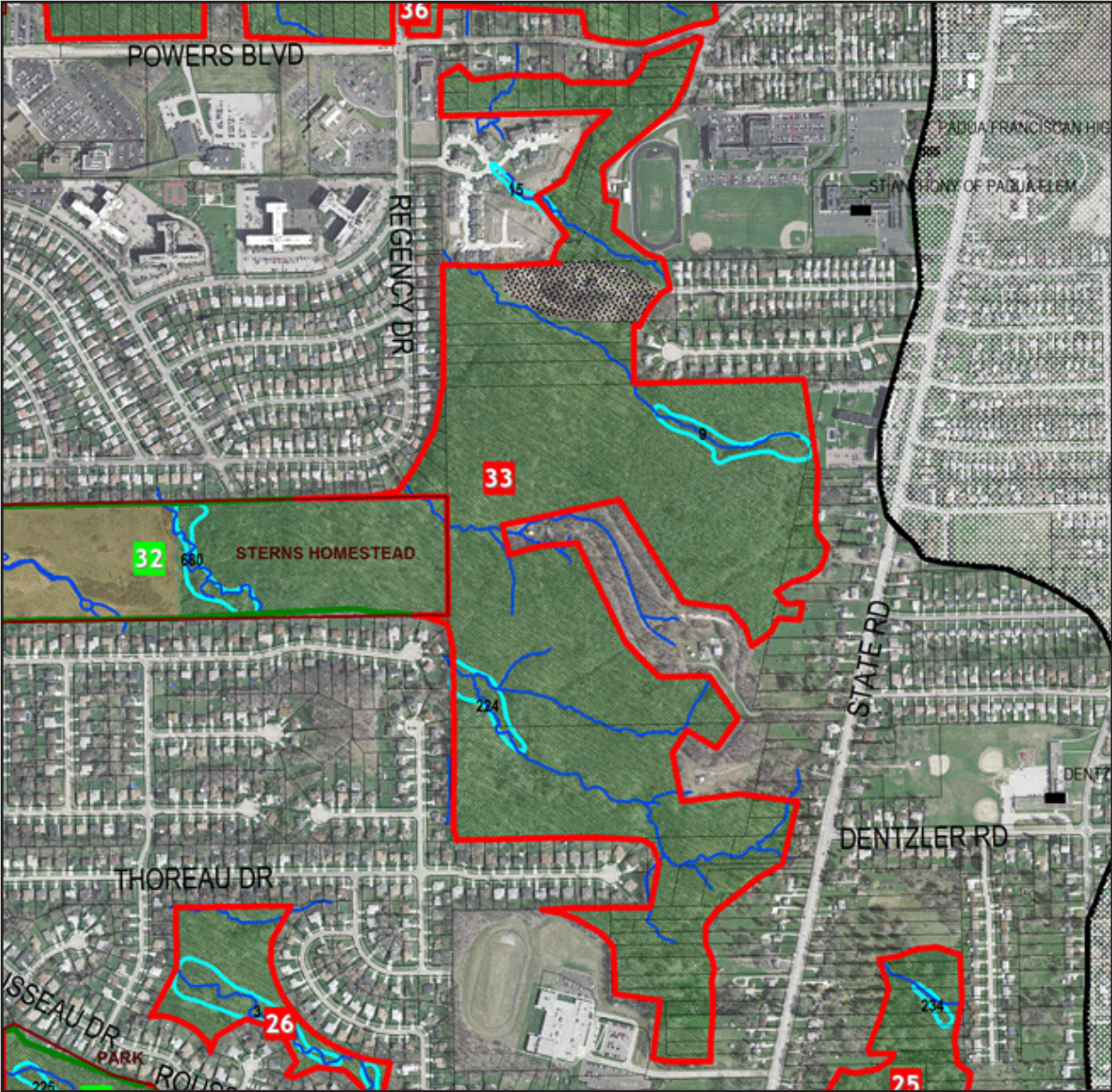
Map ID#	Acres	Percent Remaining Open Acres	Percent Remaining Open Forest	Percent Remaining Open Critical Soils	Percent Remaining Open Riparian	Percent Remaining Open Steep Slope	Percent Remaining Open Critical Areas
33	134.7	6.4%	7.4%	7.1%	3.4%	6.7%	6.9%

## Large Tract #33 – East Branch: Watershed-wide Analysis

Map ID#	Acres	Percent Watershed Acres	Percent Watershed Forest	Percent Watershed Critical Soils	Percent Watershed Riparian	Percent Watershed Steep Slope	Percent Watershed Critical Areas
33	134.7	0.5%	7.3%	0.8%	2.3%	2.3%	1.1%



East Branch Priority Conservation Area – Large Tract #33



## Lower Big Creek Primary Conservation Area – Large Tract #63

### Summary

Large tract #63 is one of the largest openspaces in the Lower Big Creek subwatershed. This openspace is located within Brooklyn but borders the cities of Linndale and Cleveland. This land contains approximately 7 parcels under various ownerships. The major parcel onsite is publically owned by the city of Brooklyn. This site is located between Big Creek and Brookside Reservations.

This site, often referred to as “the oxbow” is part of the lower Big Creek valley that features the original channel alignment of the creek before it was rerouted when I-71 was constructed. The oxbow site contains forests, steep slopes, critical soils, portion of Big Creek mainstem and nearly 8 acres of wetlands.

### Conservation / Restoration Options

This is an important and popular open space in Big Creek. It contains a number of watershed resources and should be preserved and restored as an asset to the city of Brooklyn and the nearby park system. The major parcel, #01330004, is publicly owned and should be targeted first. There are also three other parcels that should be pursued for conservation.

The Cuyahoga River RAP identified a wetland/stream restoration opportunity in a separate study. The report identified approximately 2 acres of forested wetland for enhancement and 1,150 linear feet of stream restoration, equally \$372,600. This project would restore the oxbow stream creating an inlet and outlet, which would provide stormwater management. (See Appendix B: Big Creek Watershed Wetlands Analysis, Wetland Ranked #5) The Northeast Ohio Regional Sewer District’s RIDE study identified flooding and erosion problems along this reach of Big Creek. Flood control options were explored for this site.

A Big Creek Trail Alignment & Neighborhood Connector Plan also identified this area for trail connections. There are proposed trail systems that run through this site and connect Brookside and Big Creek Reservations

Partnerships should be developed to ensure that future projects are multi-objective and integrate trails, flood control, parks and watershed preservation.

## Large Tract #63 – Lower Big Creek: Remaining Openspace Analysis

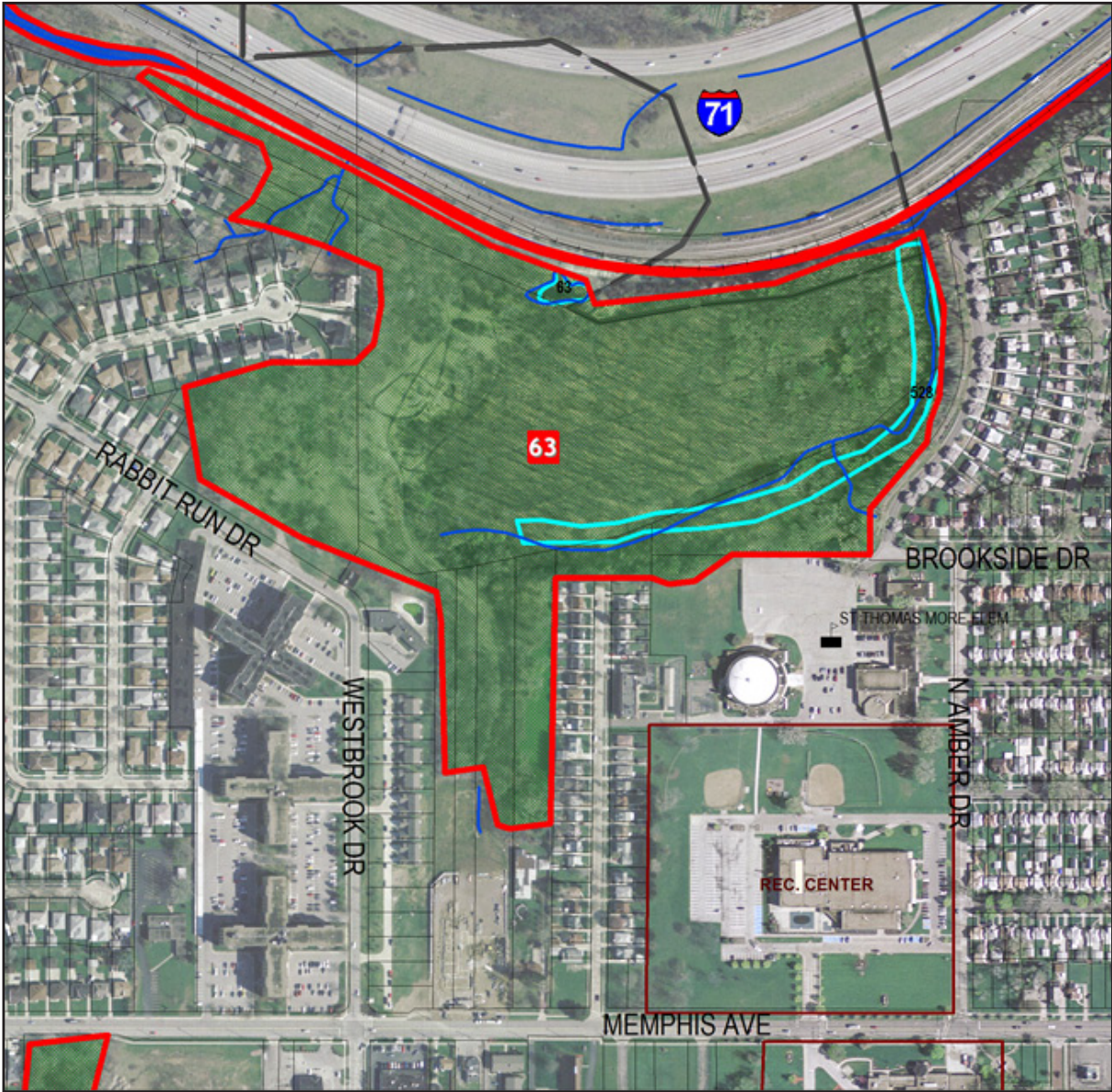
Map ID#	Acres	Percent Remaining Acres	Percent Remaining Open Forest	Percent Remaining Open Critical Soils	Percent Remaining Open Riparian	Percent Remaining Open Steep Slope	Percent Remaining Critical Areas
63	37.2	1.8%	2.1%	2.8%	2.3%	1.4%	1.9%

## Large Tract #63 – Lower Big Creek: Watershed-wide Analysis

Map ID#	Acres	Percent Watershed Acres	Percent Watershed Forest	Percent Watershed Critical Soils	Percent Watershed Riparian	Percent Watershed Steep Slope	Percent Watershed Critical Areas
63	37.2	0.2%	2.1%	0.3%	1.5%	0.5%	0.3%



Lower Big Creek Primary Conservation Area – Large Tract #63



## West Branch Priority Conservation Area – Large Tract #73

### Summary

Large Tract #73 is one of the larger openspaces in the West Branch of Big Creek. However, when compared to the overall watershed, Large Tract 73 is relatively small in acreage and watershed features. This openspace is located within the city of Cleveland, near Linndale and contains approximately 8 parcels under various ownerships. The openspace is located near Halloran Park and West 117<sup>th</sup> and Bellaire Road.

This site encompasses the lower reach and the confluence of the West Brach and the Big Creek mainstem. Watershed features include: forested corridor, critical soil, steep slopes and approximately 8 acres of the lower reach of the West Branch.

### Conservation / Restoration Options

Openspace and natural streams (not culverted) is at a scarcity in the West Branch, making this large tract an important site. There is close proximity and possible greenspace connections to the Big Creek Reservation, Halloran Park and large tracts #69 and #66. There are many obstacles to overcome including multiple private property and the railroad and interstate highway.

The Northeast Ohio Regional Sewer District’s RIDE study identified erosion problems along this stream near I-71. No restoration suggestions were included in the RIDE study. Addressing the erosion problems may be best targeted through multi-stakeholder cooperation and integrating this project into a larger municipal or state construction project.

## Large Tract #73 – West Branch: Remaining Openspace Analysis

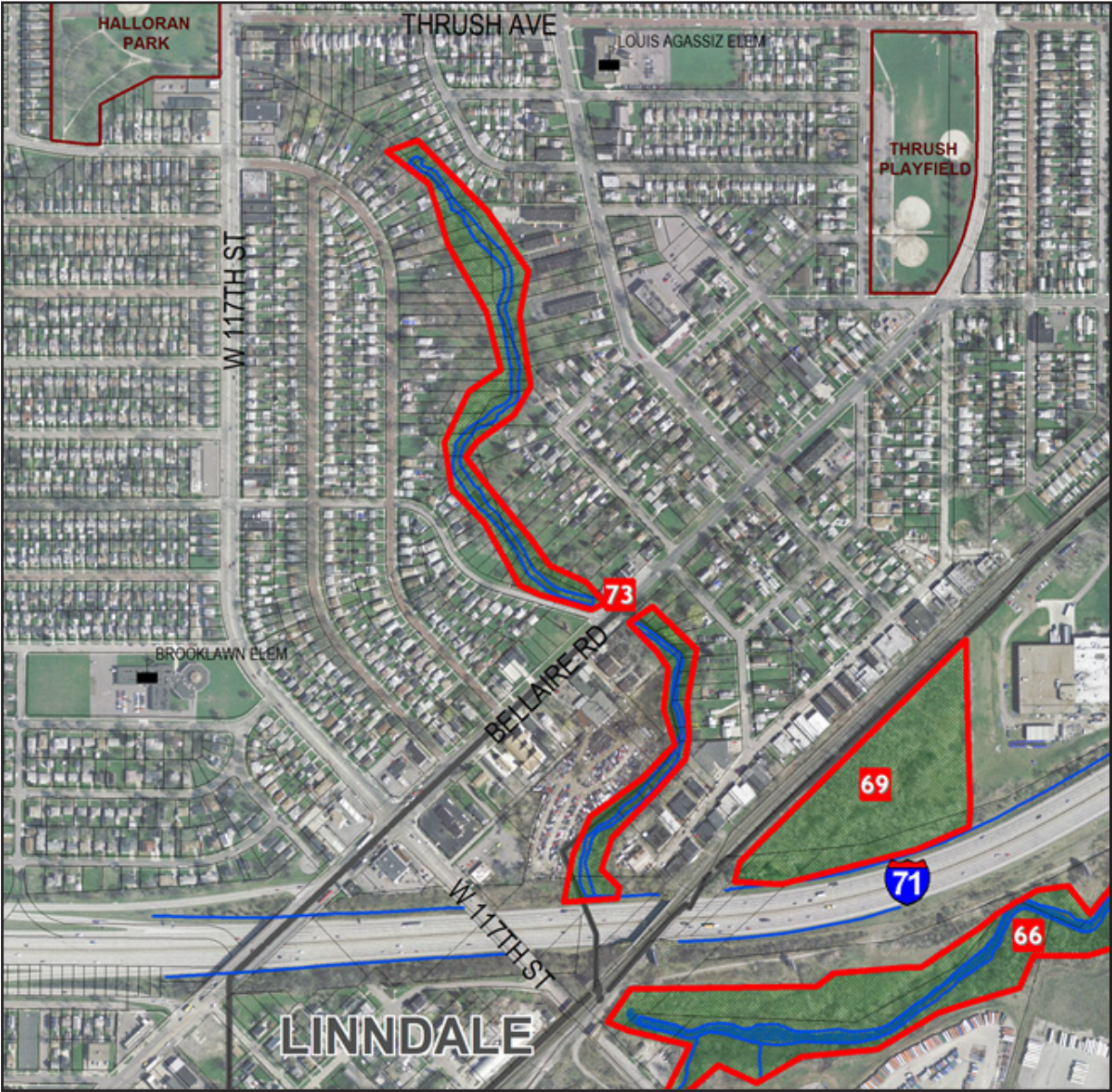
Map ID#	Acres	Percent Remaining Acres	Percent Remaining Open Forest	Percent Remaining Open Critical Soils	Percent Remaining Open Riparian	Percent Remaining Open Steep Slope	Percent Remaining Critical Areas
73	8.8	0.4%	0.5%	0.7%	1.3%	1.0%	0.5%

## Large Tract #73 – West Branch: Watershed-wide Analysis

Map ID#	Acres	Percent Watershed Acres	Percent Watershed Forest	Percent Watershed Critical Soils	Percent Watershed Riparian	Percent Watershed Steep Slope	Percent Watershed Critical Areas
73	8.8	0.0%	0.5%	0.1%	0.9%	0.4%	0.1%



West Branch Priority Conservation Area – Large Tract #73



## East Branch & Stickney Creek Priority Conservation Area – Large Tract #54

### Summary

Large tract #54 is a large openspace that follows portions of the East Branch and Stickney and includes the confluence between the two streams. This openspace is located within the city of Brooklyn and contains approximately 31 parcels under various ownerships. The openspace is a long contiguous site located along Tiedeman Rd and situated between Biddulph Rd and Memphis Avenue.

This is a nice, centrally located openspace between the Big Creek Reservation, Memphis Picnic Area and Veterans Memorial Park. Watershed features include: Forested areas, critical soils, steep slopes and approximately 39 acres of streams (and buffer).

### Conservation / Restoration Options

This is a key openspace in Big Creek watershed. It contains a lot of nice watershed resources and should be preserved and restored as an asset to the city of Brooklyn and the nearby park systems. Two key anchor parcels include parcel #43209004 along the East Branch, and parcel #43221001 along Stickney Creek.

The Northeast Ohio Regional Sewer District's RIDE study identified erosion problems in this area. Suggested restoration options include 700 LF of channel restoration, which includes options of rerouting, and 500 SY of stream bank stabilization.

A Big Creek Trail Alignment & Neighborhood Connector Plan also identified this area for trail connections. There are proposed trail systems that run through this site and connect the Big Creek Reservation and Veterans Memorial Park.

Partnerships should be developed to ensure that future projects are multi-objective and integrate trails, stormwater control, parks and watershed preservation. Addressing the erosion problems may be best targeted by integrating this project into a larger municipal construction project. Other options include directing mitigation needs to this area for preservation and restoration.

### Large Tract #54 – East Branch & Stickney Creek: Remaining Open Analysis

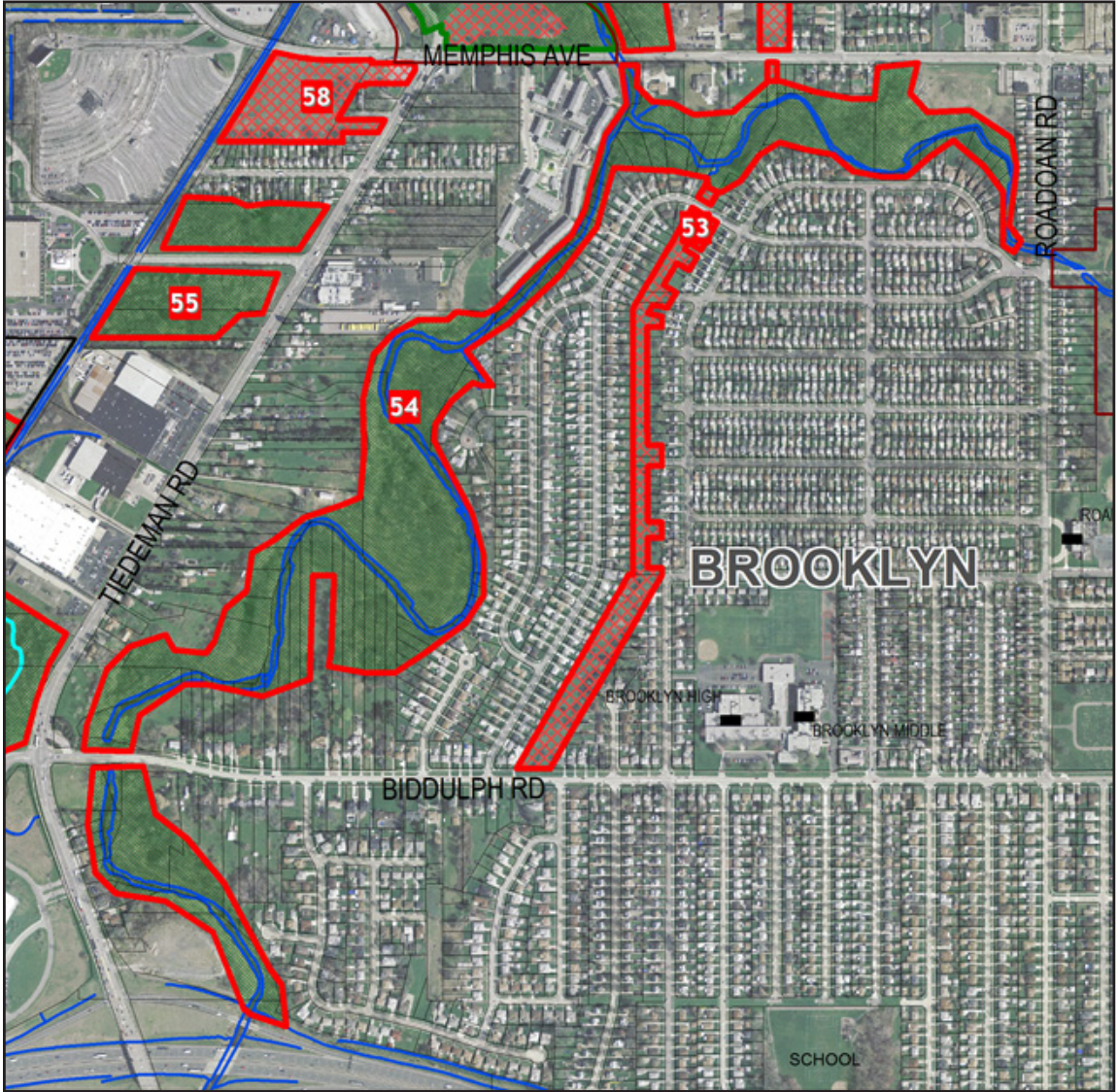
Map ID#	Acres	Percent Remaining Acres	Percent Remaining Open Forest	Percent Remaining Open Critical Soils	Percent Remaining Open Riparian	Percent Remaining Open Steep Slope	Percent Remaining Critical Areas
54	66.4	3.2%	3.8%	5.4%	6.1%	4.2%	3.4%

### Large Tract #54 – East Branch & Stickney Creek: Watershed-wide Analysis

Map ID#	Acres	Percent Watershed Acres	Percent Watershed Forest	Percent Watershed Critical Soils	Percent Watershed Riparian	Percent Watershed Steep Slope	Percent Watershed Critical Areas
54	66.4	0.3%	3.7%	0.6%	4.1%	1.5%	0.5%



East Branch & Stickney Creek Priority Conservation Area – Large Tract #54



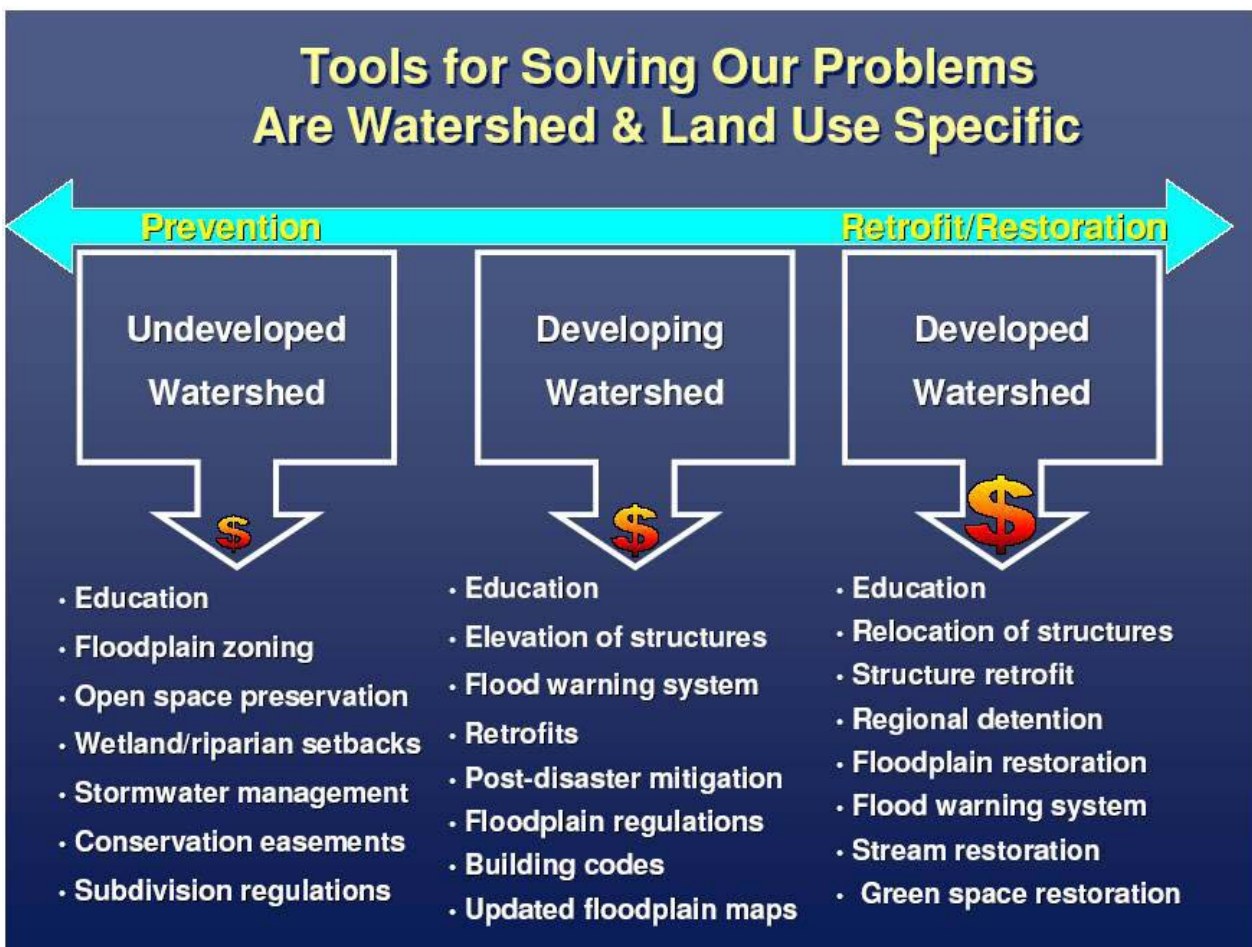
# Big Creek Watershed Restoration Practices

When analyzing areas for conservation or restoration, the variety of options and array of restoration practices must be considered in order to form a meaningful plan. Practices can include the implementation of structural (ex. stormwater basin) and non-structural (ex. preservation) practices within a watershed to improve stream health and reduce erosion and stormwater runoff.

The choice of which combination of restoration practices depends on the community's goals and needs along with the restoration potential of the subwatershed. Restoration potential often depends on the amount of impervious cover or the intensity of development in the surrounding subwatershed. .

In general, non-structural restoration practices such as preservation or riparian and wetland setbacks are more effectively implemented in rural or developing watersheds. These practices are more preventive and less expensive than built remedies. In developed or urban watersheds, preventive measures are limited and it is more effective to implement structural restoration practices such as stormwater retrofits.

The percent of impervious cover in the watershed provides a general sense of restoration potential and options. A basic relationship is presented in this table, to show how impervious cover can influence the effectiveness and viability of certain restoration practices.





## Best Management Practices (BMPs) Relative to Percent Impervious Cover

Restoration Practices	Subwatershed Impervious Cover			
	10 to 25%	25 to 40%	40 to 60%	60 to 100%
<b>Stormwater Retrofit Practices</b>				
Storage Retrofit	Yes	Maybe	Rarely	No
On-site Non-Residential Retrofits	Yes	Yes	Maybe	Rarely
On-site Residential Retrofits	Yes	Yes	Maybe	Rarely
<b>Stream Repair Practices</b>				
Stream Clean-ups	Yes	Yes	Maybe	No
Stream Repairs	Yes	Maybe	Maybe	Rarely
Comprehensive Restoration	Maybe	Rarely	Rarely	No
<b>Riparian Management Practices</b>				
Site Preparation	Yes	Maybe	Rarely	No
Active Reforestation	Yes	Yes	Maybe	No
Park/Greenway Plantings	Yes	Maybe	Maybe	No
Natural Regeneration	Yes	Maybe	Maybe	No
Riparian Wetland Restoration	Yes	Maybe	Rarely	No
<b>Discharge Prevention Practices</b>				
Illicit Sewage Connections	Yes	Maybe	Yes	Yes
Other Illicit Connections	Maybe	Yes	Yes	Yes
Failing Sewage Lines	Yes	Yes	Yes	Yes
Industrial and Transport Spills	Maybe	Yes	Yes	Yes
<b>Watershed Forestry Practices</b>				
Land Reclamation	Yes	Yes	Maybe	Rarely
Upland Revegetation	Yes	Yes	Maybe	Rarely
Natural Area Remnant	Yes	Yes	Maybe	Rarely
<b>Pollution Source Control</b>				
Residential Source Controls	Yes	Yes	Yes	Maybe
Hotspot Source Controls	Maybe	Yes	Yes	Yes
<b>Municipal Practices and Programs</b>				
Street and Storm Drain Cleaning	Maybe	Maybe	Maybe	Yes
Best Practices for Redevelopment	Yes	Yes	Yes	Yes
Stewardship of Public Land	Yes	Yes	Maybe	Rarely
Municipal Stewardship Programs	Yes	Yes	Yes	Yes
Education and Enforcement	Yes	Yes	Yes	Yes
<p><b>Key</b></p> <p>Yes = Technique is normally feasible and can be widely applied across subwatershed.</p> <p>Maybe = Technique is often feasible, depending on subwatershed characteristics.</p> <p>Rarely = Individual sites can be found, but widespread implementation across subwatershed is limited.</p> <p>Technique is generally not feasible in the subwatershed.</p>				

From the Center for Watershed Protection