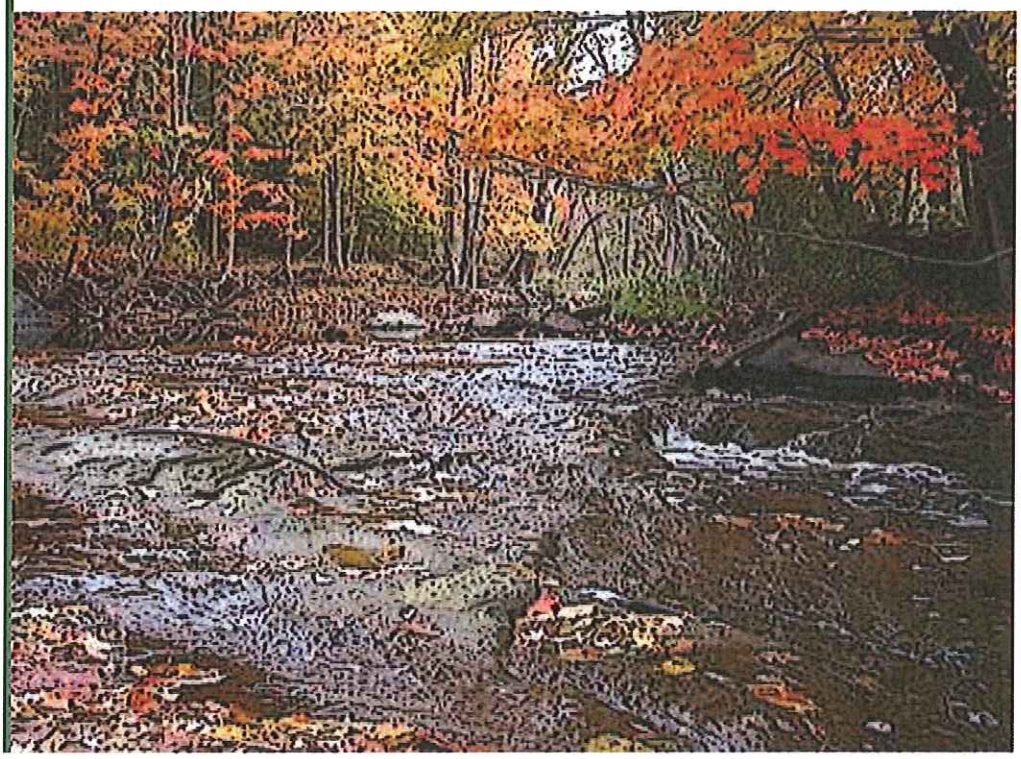
Brandywine Creek
Balanced Growth Initiative
2013

Executive Summary



Executive Summary

Brandywine Creek

BRANDYWINE CREEK is located in Northeast Ohio's Summit County, and drains an area of land into the Cuyahoga River from the east. From its headwaters in Hudson it flows westward for 11 miles and joins the Cuyahoga River in Sagamore Hills within the Cuyahoga Valley National Park. What happens upstream can have serious effects on what is currently one of the highest quality stretches of the Cuyahoga River's main stem.

This watershed is experiencing ever-increasing rates of urbanization - approximately 10% per year - as population sprawls south from Cuyahoga County and brings with it shopping and commercial development. Some of the region's busiest transportation routes pass through the Brandywine Creek watershed. Development of the Route 8/I-271/1-80 (turnpike) corridors places stress on the existing natural systems. The change from rolling hills to paved parking lots, new construction of regional medical centers, and plans for new commercial developments will further reduce the natural infrastructure's ability to manage stormwater and water quality.

WATERSHED CHARACTERISTICS

Brandywine Creek Watershed covers approximately 26 square miles and drains portions of nine communities – Boston Heights Village, Boston Township, Hudson, Macedonia, Northfield Center Township, Sagamore Hills Township and Twinsburg Township, and a small portion of Oakwood Village in Cuyahoga County. It drops from 1072 feet to 662 feet, falling 410ft over its course, which includes the 65-foot-high Brandywine Falls.

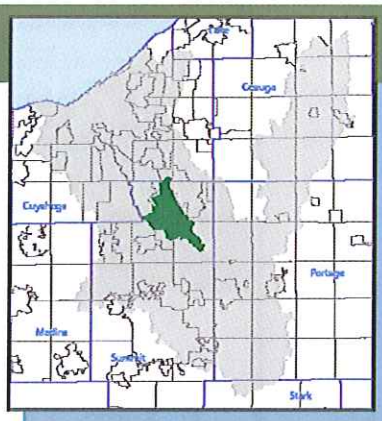
The most well-known geologic formation in the watershed is Brandywine Falls. This 65-foot waterfall drops over bedrock comprised of erosion resistant Berea Sandstone, which settled upon a deep deposit of red Bedford Shale close to 360 million years ago.

The glacial action that dug Lake Erie also had a role in the type of soil deposits in the watershed. Brandywine Creek, along with other streams in the region, flow over loose glacial till and carve many of the spectacular valleys we see today.

The glacial deposits, primarily of silt and clay, are characterized by slow permeability and seasonal wetness, which can present problems for homes that rely on septic systems, and also can cause basement flooding.

More than 40% of the watershed remains undeveloped and these areas are filled with critical natural features, notably some of the last large wetlands in the basin. Suburban development, and the related polluted runoff and stream encroachment, has impacted the headwater streams and biological community.

Downstream of Hudson the creek has been channelized to move water from the community more quickly. Results of removing meanders and riffle/pool sequences creates faster flow, more erosion and sedimentation, and degrades aquatic habitat.



MAJOR ISSUES
in the Brandywine Creek Watershed

- Loss of Wetlands
- Increasing urbanization
- Addressing remaining large tracts of undeveloped land
- Loss and fragmentation of forest canopy and natural areas
- Critical downstream natural resources
- Integrating BGI plans into local master plans and regulations

Further downstream, in the Cuyahoga Valley National Park, the stream suffers from heavy sediment loads and bank erosion.

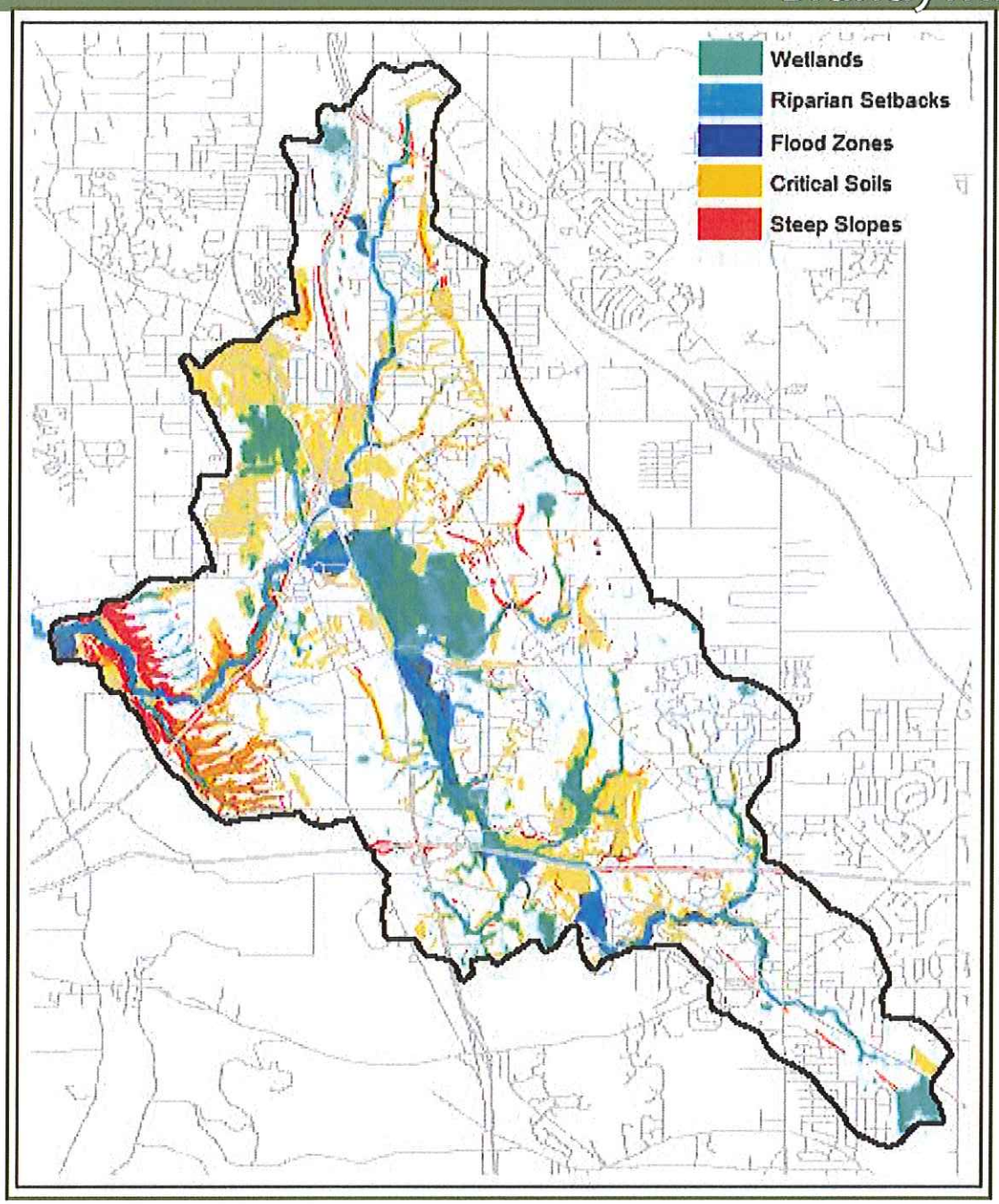
The vegetated protection that the CVNP provides to the last stretch where the creek joins the Cuyahoga has allowed the creek to maintain good water quality, the first Full Attainment Ohio that the EPA has recorded in Brandywine Creek.

It is a goal of the RAP and this Plan that the character of this stream segment be protected from serious threats upstream.

USE-ATTAINMENT

Brandywine Creek is designated a Warm Water Habitat (WWH). This designation means that Brandywine Creek should be able to support a well-balanced population of fish and aquatic insects. The majority of Brandywine Creek does not meet Ohio EPA's water quality standards, but the creek steadily improves as it flows into the Cuyahoga Valley National Park.

Brandywine Creek has decent water quality. However, phosphorous levels just downstream of Hudson remain high, possibly due to fertilizer runoff from lawns, failing septic systems and nutrient-laden lakes in the area.



CRITICAL NATURAL FEATURES

The natural features that are the focus of study when addressing how effectively the watershed functions include:

• soils • slopes • streams and riparian zones • flood plains • wetlands • forests.

Each feature was mapped individually to show where that feature appeared in the watershed, then combined to show the concentration of features in certain areas of the watershed.

This map displays the critical natural features "layered-up". It represents the most important functional elements of the watershed.

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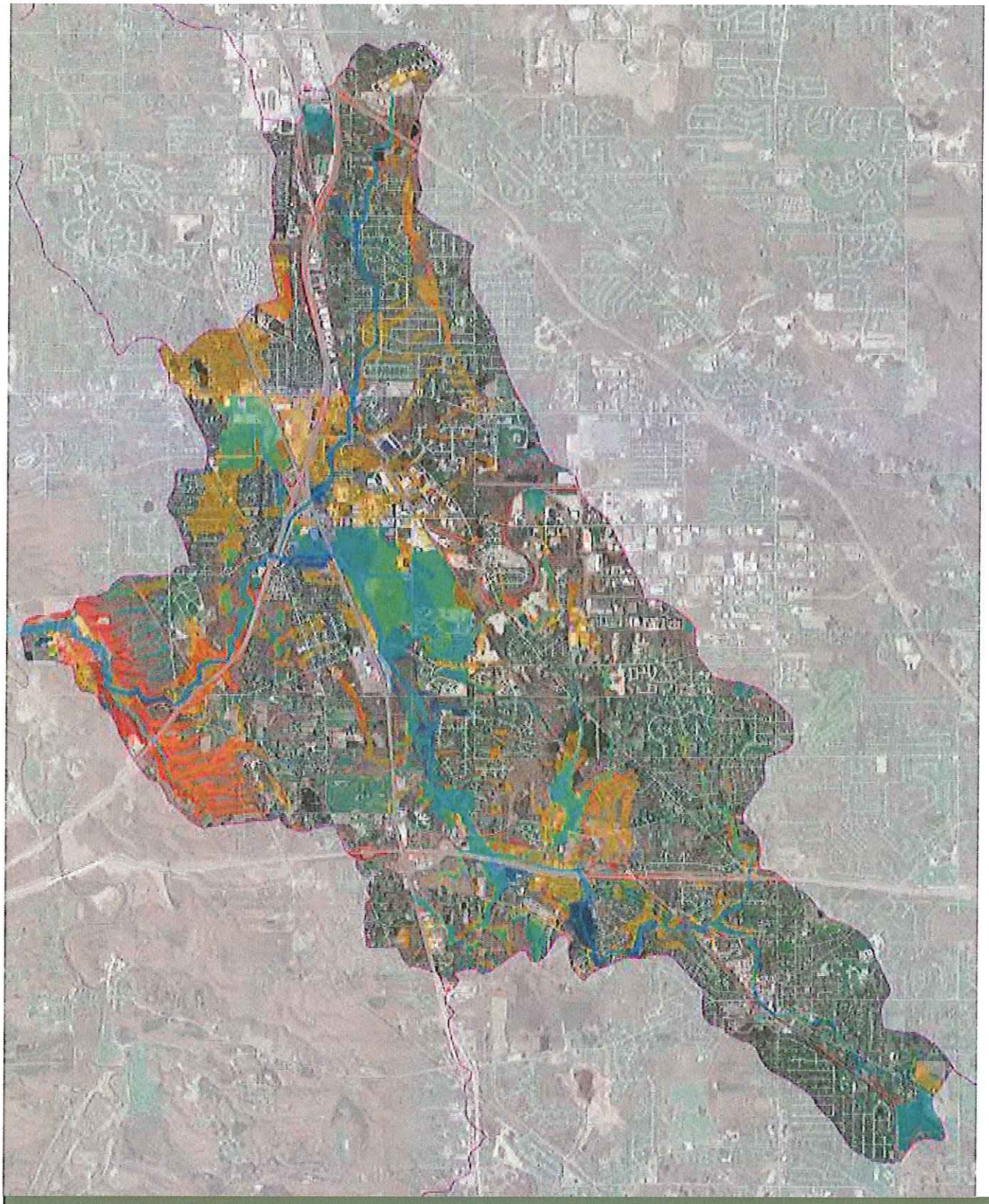

PCA

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.

• STREAMS & NATURAL RIPARIAN AREAS
Recommendation: 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
Recommendation: 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
Recommendation: Wetland areas should be conserved as essential storage and filtration systems. Communities should adopt ample setback ordinances for all wetlands categories.

• CRITICAL SOILS
Recommendation: 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
Recommendation: 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.

• FORESTS
Recommendation: 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.

PDA

Priority Development Areas

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 Brandywine Creek Watershed includes parts of nine municipalities with zoning, water and sewer availability and many other factors deemed important for development.

Priority development areas have been identified tract by tract with community recommendations regarding the suitability of each tract.

PDA characteristics are:

1. Undeveloped land that does not lie within critical watershed features (i.e. list at left) or that will not adversely affect those features when developed in compliance with community regulations.
2. Previously developed areas suitable for redevelopment.

In addition, a number of the large tracts, whether priority development or priority conservation, contain portions that have characteristics of the other. That is, development with conservation elements and vice versa. These tracts are designated as PCA** or PDA** in the table on page 52 and shown on the map in the appendix. The watershed communities believe that their codes and/or review processes afford appropriate controls and protection of sensitive areas should development be pursued in these tracts.

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DEVELOPING EVALUATION CRITERIA for PRIORITY CONSERVATION and PRIORITY DEVELOPMENT AREAS

The Plan seeks to provide guidance on which land is suitable for development and which is a priority for conservation, as well as how such land can be preserved and protected.

The Brandywine Creek prioritization process has gathered community input to identify and prioritize critical areas and features.

The results of scoring priorities identified the most important issues for the watershed planning process. These priorities provide a focus and, in turn, have been used to identify priority conservation areas.

The entries below and on the next page were those that have been identified throughout the watershed partnership meetings and have been prioritized.

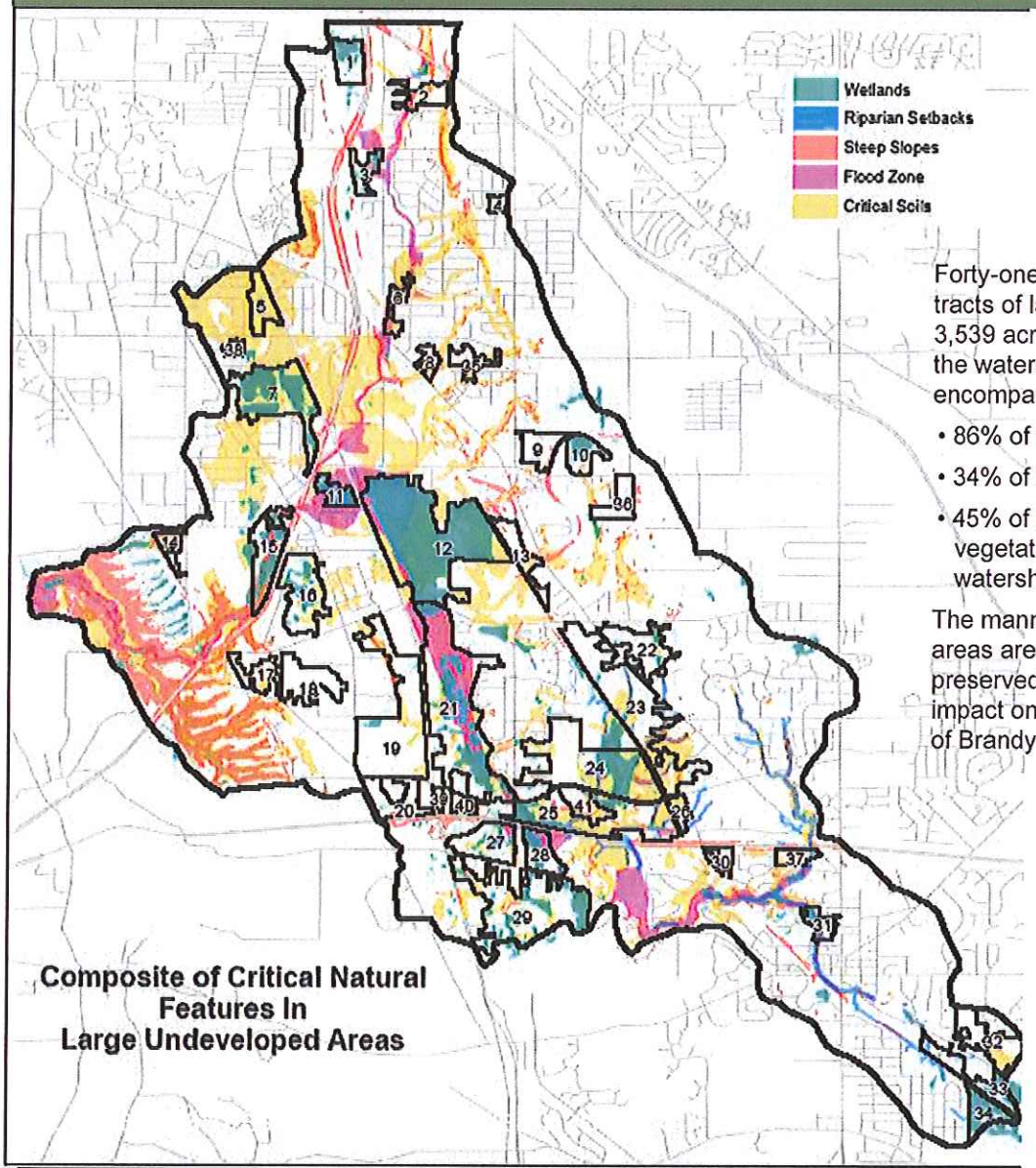
Identifying and Evaluating Community Issues and Desires
Brandywine Creek Priorities for Conservation of Important Watershed Features
(PCA methodology)

Prioritized Criteria for Priority Conservation Areas (PCA)
Areas in imminent danger of property damage or loss from flooding or erosion
Stream banks and adjacent vegetated corridors for erosion prevention
Floodplains for flood water management purposes
Small streams and primary headwater areas for flow management
Steep Slopes for erosion protection
Wetlands for flood water management
Forest corridors for flow and bank stability purposes
Soils which allow high infiltration for storm water
Soils which are highly erosive and fragile
Soils which support wetlands
Wetlands for water quality and filtering
Areas with potential for green space connections and new trails
Areas adjacent or in close proximity to Metropark / CVNP / local parks
Stream banks and adjacent vegetated corridors for habitat benefit
Forest areas which provide significant habitat and connections
Areas with high infiltration for aquifer/ well replenishment
Areas that provide multiple functions and benefits –e.g. trails in riparian corridors
Wetlands for habitat enrichment
Large land tracts for significant vistas / green space
Floodplains for open space/ park purposes
Area providing scenic/tourist value
Steep slopes for vistas
Forested areas for carbon sequestration
Forest areas which provide scenic vistas

Prioritized Criteria for Priority Development Areas (PDA)
Land areas with adequate existing utility services: electric / gas / water/ sewer
Location on adequate primary roads
Land areas already characterized by urbanization
Visual separation from residential / rural settings
Existing areas that can be redeveloped
Land areas that are in close proximity for planned or existing related urban services: retail/ restaurants
Close (within 500 yards) proximity to highway interchanges
Areas which are located away (greater than 100 yards) from critical watershed features
Flat, yet well-drained, terrain
Larger tracts (e.g. greater that 4 acres) capable of optimizing low impact development features
Areas which will not detract from historic sites / vistas
Areas which do not include prime agricultural soils/ areas
Close accessibility to alternate transportation systems
Close proximity to natural areas
Close proximity to recreational corridors

Brandywine Creek

The next step in the analysis is to identify large areas of undeveloped land, where pressures to develop would be greatest.



Composite of Critical Natural Features In Large Undeveloped Areas

Forty-one large undeveloped tracts of land totaling more than 3,539 acres comprise 20% of the watershed, yet these areas encompass at least:

- 86% of the wetlands;
- 34% of the critical soils; and
- 45% of the naturally vegetated areas in the watershed.

The manner in which these areas are developed and/or preserved will have a material impact on the long-term stability of Brandywine Creek.

	Total	Critical Soils	Steep Slopes	Flood Zones	Riparian Corridors	Wetlands	Natural Vegetation
41 Large Undeveloped Tracts acreage	3,539	1,279.4	88.8	373.2	289.3	890.3	2,750.7
Large Tracts as % of Watershed	20%	34%	11%	47%	33%	86%	45%
TOTAL WATERSHED ACRES	17,406	3740.3	848	789.6	876.9	1032.4	6115.8

TOOLS AND PRACTICES FOR WATERSHED MANAGEMENT

The watershed communities are working to more fully understand management tools and strategies that they could implement throughout the watershed. These management tools can help address a wide range of issues through planning measures, design standards, regulations, inter-community cooperation, funding etc.

Throughout the organizing process and discussions, the participants have grown to appreciate Low Impact Development (LID) practices which could be adopted in their own government operations and to encourage those strategies among property holders.

The table below presents a pallete of the tools and practices available to communities and property owners to more effectively control stormwater and manage growth. These tools and practices will be implemented through changes in land development codes, zoning regulations and design standards as well as operational practices by communities and individuals.

TOOLS & PRACTICES
Maximum Impervious lot area
On-Site retention
Tree Mitigation
Forest Canopy/natural area conservation
Traffic Impact Study/Mitigation
Roadway (public land/right-of-way) stormwater BMP
Storm Drain flow reduction/filtration
Pervious paving
Parking lot minimum infiltration areas
Greenspace overlay to Master Plan
Master Plan updates
Conservation Development Zoning
In-Watershed Mitigation
Mitigation Bank
Model Operations for Communities to follow to educate public • no mow areas • "mow high" areas
Prohibition and removal of invasive species
Low impact development options in building/housing codes

INVENTORY OF LAND USE ORDINANCES

Land use activities directly influence the levels of pollution, flooding and erosion problems in the Cuyahoga River. Political fragmentation and uneven implementation and enforcement throughout these communities can lead to uneven protection of environmental and economic quality.

This is a summary of current ordinances in the Brandywine Creek Watershed. Analyzing this inventory can help our partnership more effectively indentify gaps and to promote and educate for consistent protection measures watershed-wide.

PARAMETERS	BOSTON HEIGHTS	BOSTON TOWNSHIP	HUDSON	MACEDONIA	NORTHFIELD CENTER TWP	NORTHFIELD	OAKWOOD	SAGAMORE HILLS	TWINSBURG TWP
1. Flexible Development Options	Y	N	Y	Y	Y	N	Y	Y	Y
1a. Is the Flexible Development permitted "By Right"?	N	--	N	N	Y	N	N	N	N
1b. Minimum of Amount of Open Space (target 40%)	N	--	Y	20	Y	--	--	Y	Y
1c. Are Density Bonuses provided for?	--	--	Y	N	N	--	--	N	Y
1d. Low Impact Development Ordinance	N	N	N	N	N	N	N	N	N
2. Riparian Setbacks Meet Recommended Widths	Y	Y	Y	Y	Y	N	N	Y	Y
2a. Riparian Setback is restricted from any changes (prohibited / permitted uses)	N	--	Y	--	--	--	N	N	N
3. Wetland Setbacks Meet Recommended Widths?	Y	Y	Y	Y	Y	N	N	Y	Y
3a. Isolated and Connected Wetlands are protected?	N	N	Y	N	Y	N	N	N	N
3b.Wetland Setback is restricted from any Changes (prohibited / permitted uses)	N	N	Y	N	Y	N	N	N	N
4. Variance procedures in ordinances	Y	Y	Y	Y	Y	N	N	Y	Y
5. Mitigation Plan for Wetland & Riparian Impacts?	N	N	N	N	N	N	N	N	N
6. Steep Slope Protection?	Y	N	N	N	N	N	N	Y	Y
7. Conserve Floodplains- riparian setback includes floodplain?	Y	Y	Y	Y	Y	Y	N	Y	Y
8. Critical Soils- minimize disturbance to natural features	-	-	Y	Y	-	-	-	-	Y
9. Tree / Forest Management Plan	N	N	Y	N	Y	Y	Y	N	N

In Conclusion:

Continued support by the communities of Brandywine Creek and the Cuyahoga River RAP will be essential for ongoing improvement and stewardship within the watershed.

Status and Recommendations

This Balanced Growth Plan is the product of strong collaboration among the Brandywine Creek communities with substantial and important support of the Cuyahoga River Remedial Action Program organization. There is general recognition that the map of the Brandywine Watershed would be very different had this effort been undertaken 30 years ago. The Plan is a set of strategies that capitalizes on the opportunities and benefits of balancing economic development and growth with protection of the environment. Particularly important derivative benefits of balanced growth are assuring a continuing and abundant supply of high quality fresh drinking water to Northeast Ohio communities whose source is Lake Erie, as well as protecting private and public property from stormwater damage.

A number of short term actions that member communities will consider have surfaced in the process of creating this plan:

- Incorporate the PCA / PDA map and watershed stewardship objectives into local comprehensive plans or similar documents that drive local codes and ordinances. Of course, each community should adhere to its established public comment and review practices.
- Update local ordinances and zoning codes as recommended in the Plan. Jurisdictions should work together on this task as appropriate, particularly where they share portions of targeted PCAs or PDAs.
- Continue to collaborate in the direction of uniform storm water codes throughout the watershed. This is to ensure that watershed protection and site development review processes are fair, consistent and apply evenly to all areas of the watershed as development and plan implementation moves forward.
- Revisit the watershed partnership structure and refresh it. As our watershed communities are gaining in their understanding of balanced growth and its complexities and opportunities, especially funding, a forum or organization will be needed to facilitate continuing community collaboration, education, coordinated action and updating of the Plan. It should also assist individual community initiatives that are undertaken to enhance the watershed improvement objectives. However, the organization needs to be cost effective requiring a critical mass enabling it to be successful, yet not so large as to be distant and unresponsive to local needs. Partnering with other watershed groups may be an option.

Other possibilities exist for community action, but they require additional time for community understanding and commitment:

- Explore developing a Transfer Development Rights / Purchase Development Rights / Density Transfer Program. As a long term goal, development rights programs should be considered as part of the tool box of options to achieve conservation and direct development away from sensitive areas.
- Develop a mitigation banking system for wetlands and streams. Should an unavoidable impact occur, a compensatory mitigation plan needs to be ready to keep these critical resources in the watershed.
- Identify needed restoration and enhancement sites in Brandywine Creek Watershed. Wetland sites in the watershed are currently being analyzed for restoration and enhancement potential. These wetland results, along with stream data, will be shared with the partnership and targeted for funding and remediation.