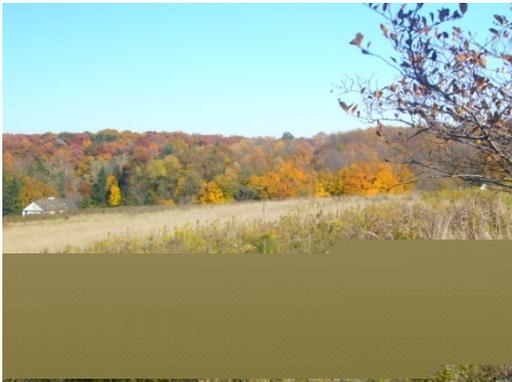


OUR RIDGES, OUR VALLEYS, OUR STREAMS AND OUR RIVER

THE SEWICKLEY VALLEY RIVERS CONSERVATION AND MANAGEMENT PLAN



FEBRUARY 2011

The Sewickley Valley Communities Partnership

Environmental Planning & Design, LLC



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**BOROUGH OF SEWICKLEY
RESOLUTION NO. 2011-005**

**A RESOLUTION CLOSING OUT COMMUNITY CONSERVATION
PARTNERSHIPS GRANT PROJECT (BRC-RCP-12-16)**

WHEREAS, the Borough of Sewickley has prepared a Rivers Conservation and Management Plan for the Sewickley Valley's Little Sewickley Creek and Ohio River Watersheds; and

WHEREAS, the purpose of the Plan is to identify water and resource conservation issues and challenges, and to provide participating municipalities with a "blueprint", and recommendations for addressing those identified issues and challenges; and

WHEREAS, the Plan was financed in part by a Community Conservation Partnerships Program grant under the administration of the Pennsylvania Department of Conservation and Natural Resources, Bureau of Recreation and Conservation, under contract number **BRC-RCP-12-16**.

NOW THEREFORE, BE IT HEREBY RESOLVED by the Borough Council of the Borough of Sewickley that:

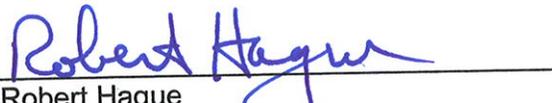
- a. The project was completed in accordance with the Grant Agreement.
- b. All project expenditures have been made and were in accordance with the Grant Agreement.
- c. The Plan and related materials are acceptable to the Borough of Sewickley, PA.
- d. The Plan and related materials will be used to guide future rivers conservation decisions.
- e. The Borough of Sewickley requests that rivers, river segments or tributaries defined in the Plan above be listed on the Pennsylvania Rivers Registry.

THIS RESOLUTION ADOPTED by the Council of the Borough of Sewickley at a duly assembled public meeting held this 21st day of March, 2011.

ATTEST:



Kevin M. Flannery
Borough Manager Sewickley



Robert Hague
Borough Council President

EXAMINED AND APPROVED on this 21st day of March, 2011.



Brian F. Jeffe
Mayor

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I. ACKNOWLEDGEMENTS

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Emsworth Borough
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Borough Secretary

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Franklin Park Borough
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Glenfield Borough
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Leet Township
Anna Lee Oswald
Township Secretary

Leetsdale Borough
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Ohio Township
Thomas R. Beatty
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Sewickley Borough
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Sewickley Hills Borough
Renee Musser
Borough Secretary

Sewickley Heights Borough
William Rohe
Borough Manager

B. Project Manager

A special thanks to Kevin Flannery of Sewickley Borough for initiating and leading this cooperative planning effort and for his on-going commitment to improving the quality of life of the Sewickley Valley through the implementation of planning and development projects which leverage the exceptional human and natural resources of the region.

C. Pennsylvania Department of Conservation and Natural Resources
Bureau of Recreation and Conservation

Kathy Frankel, PA DCNR, Region 5
Tracy Stack, PA DCNR, Region 5
Terry Hough, PA DNCR Central Office

Environmental Stewardship Funding:

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D. Sewickley Valley Community Fund

The Sewickley Valley Community Fund has been an important funding partner in the preparation of the Sewickley Valley Rivers Conservation and Management Plan.

E. Pennsylvania Department of Environmental Protection

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II. PREFACE

A. Overview

The Pennsylvania Department of Conservation and Natural Resources (PA DCNR) has provided funding for this Plan as a provision of the Pennsylvania Rivers Conservation Program. PA DCNR grant monies support the intent to develop recommendations and define methods to conserve, enhance and restore project area streams and rivers

with respect to their value as natural recreational resources.¹ Key issues to be addressed in the Plan are water quality, storm water discharge, stream bank erosion, the provision of passive recreation areas, riverfront-oriented trail opportunities, boating/canoeing access, fishing access, and wildlife conservation.



Photograph 1: The Ohio River with the Sewickley Bridge in the distance.

A typical Rivers Conservation Plan is a comprehensive document that outlines all of the resources of a watershed, or watersheds, and identifies its issues/challenges. Then the Plan presents alternative recommendations/actions for preserving and protecting the watershed resources. The recommendations/actions typically are focused on physical, or “bricks and mortar”, projects such as stream restoration. The Sewickley Valley Rivers Conservation and Management Plan take these recommendations to the next level. Recognizing that the Region’s water conservation issues cross political boundaries, this Plan includes watershed management strategies which lead to a battery of land use and policy recommendations. By addressing land and water conservation issues at a regional level, the Sewickley Valley partner communities can not only address current issues, but can also implement measures to prevent future problems.

The importance of the continued availability of clean water resources, resident enjoyment of the Commonwealth’s natural systems and the avoidance of

¹ (<http://www.dcnr.state.pa.us/brc/rivers/riversconservation/>).

flooding, erosion and landslides are basic tenants of the Pennsylvania Rivers Conservation Program. The Sewickley Valley partner communities believe they will most effectively address their key challenges by combining their strengths/efforts to create a multi-faceted management plan for the natural resources of the Sewickley Valley.

B. Conservation of Natural Resources and Management of Regional Storm Water

Storm water planning is an integral component of the Sewickley Valley Rivers Conservation and Management Plan. The Plan will therefore address threats to watershed health and develop shared strategies among adjoining municipal governments for managing the lands within the region's watersheds for sound land development and water management practices. The Plan will provide protocols to manage future conservation and development activities in the Sewickley Valley. These protocols will be based on technical evaluations of overall watershed conditions and relationships to natural resources rather than on individual development sites within individual municipalities. The intent of this approach is to preserve and enhance the natural storm water runoff regimes as well as to protect and conserve ground waters. The implementation of Plan recommendations and actions by the partner communities will support and uphold the preservation of natural, economic, scenic, aesthetic, recreational and historic values of the Sewickley Valley environment.

C. Cooperative Watershed Based Planning – Value and Need

A watershed is a drainage basin where water from rainfall is collected and directed into a body of water (lake, stream, river etc.) according to the existing topography. A watershed includes both the land from which the water drains and the waterways which carry the water. Watersheds can vary in size from very large (millions of square miles) to very small (a few acres or less) and are usually linked to other watersheds forming a hierarchical system of watersheds and sub-watersheds.



Photograph 2: Davis Run tributary and culvert along Waterworks Road, Sewickley Borough.

Understanding the inter-connectivity of watershed systems is essential to the success of planning for conservation and storm water control in any size watershed. Storm water issues may be localized in one community or another but often will adversely affect many surrounding communities. Uncontrolled storm water run-off causing erosion and flooding in one area is very likely to impact the water quality and flood potential of downstream areas. Regulatory measures enacted in one community will not protect that community from problems originating elsewhere in the watershed, and hence the recognized need for communities within a watershed to act cooperatively in their mutual recreation, conservation and storm water mitigation efforts.

The watersheds of the Sewickley Valley consist of the rivers and streams and the wooded hills and valleys which they drain. These lands are notable for their ample natural habitat areas and for their scenic and recreational value. They are also significant because of their role in the collection and drainage of the region's storm water into the Ohio River as it flows in a northwest direction away from metropolitan Pittsburgh. Municipalities participating² in this Plan agree that the health of their shared drainage basin and the conservation of its natural resources are important to each municipality within the watershed. They also agree that working collaboratively to address common land planning issues is the most effective and cost efficient way to fulfill current national and state water quality and storm water legislative mandates.

D. State Designated Watersheds

In 1980, the PA DEP designated 353 watersheds for which storm water plans should be prepared. Between 1981 and 1985 model ordinances and detailed storm water management guidelines were made available to all counties within the Commonwealth. Approved by the Pennsylvania General Assembly in 1985, these ordinances and guidelines are now legal documents which can be utilized by counties and municipalities to create and enforce storm water management programs.

² Appendix A: Existing Resolutions contains copies of the signed agreements that are currently being enacted by partner communities in support of a Rivers Conservation and Storm Water Management Plan for the Sewickley Valley.

Allegheny County has more than 130 separately governed municipalities and twenty-six (26) Act 167 designated watersheds. To date, seventeen (17) of the County's designated watersheds do not have an Act 167 plan. Four (4) watersheds have a completed Act 167 Plan and four (4) of the watersheds have plans in the process of being updated. The fifteen (15) partner communities of this Plan comprise the lands of two (2) Act 167 designated watersheds, namely, Little Sewickley Creek and the Ohio River. The delineation of the project study area to coincide with the boundaries of these designated watersheds supports the future creation of Act 167 plans for the Sewickley Valley watersheds. The completion of the Plan will additionally support the goals of completed and ongoing Act 167 plans to the west (Flaugherty Run and Montour Run) and the east (Pine Creek, Girtys Run, Deer Creek and Squaw Run) of the project area.

Other storm water management programs applicable to the Sewickley Valley are the Municipal Separate Storm Sewer Systems (MS4) NPDES Program requirements, PA Chapter 102 requirements and the NPDES Construction Permitting requirements. All or portions of thirteen (13) of the fifteen (15) communities are PA DEP designated MS4 communities and are required to obtain an NPDES permit and to develop a storm water management program. The Environmental Protection Agency's National Pollutant Discharge Elimination System (NPDES) program established by the federal government and PA Chapter 102 Erosion and Sediment Control established as per PA Title 25 Environmental Protection were created to control point-source discharges of water pollution. Permitting requirements include the mitigation of erosion and sedimentation impacts of disturbance related to construction activities.

E. Plan Participants Overview

The current project stems in part from the *Sewickley Valley Visioning and Economic Development Study (Visioning Study)* which recommends the preparation of a plan which integrates protocols for regional watershed management, storm water controls and land use within the Sewickley Valley. The eleven (11) *Visioning Study* partners, comprising the area politically defined by the Quaker Valley School District, have been expanded to include four (4) additional communities located outside of the School District who have joined in the Plan because of their shared watershed boundaries with the school district.

The fifteen (15) communities differ substantially in size, population, settlement patterns and topographic features. Population and land area in the Plan communities range from a low of 78 people and 138 acres in Haysville Borough to almost 12,000 people and over 8,000 acres in Franklin Park Borough. The region is mainly residential in nature, but density of development ranges from narrow lot older homes on traditional “Elm Streets” to wooded estates tucked in the hills and valleys above the Ohio River floodplain. Notwithstanding the varied economic, cultural and physical character of these autonomous districts, they are linked to one another geographically, and more specifically geomorphologically, by their hydrologic patterns. As is typical for Pennsylvania, municipal boundaries within the Sewickley Valley do not coincide conveniently with watershed limits. Consequently, more often than not more than one community contributes to the drainage patterns within a given watershed and vice-versa. The partner communities have demonstrated throughout the planning process their support of cooperation and community partnerships which super-cede political jurisdictions.

Map Exhibit 1: Project Study Area

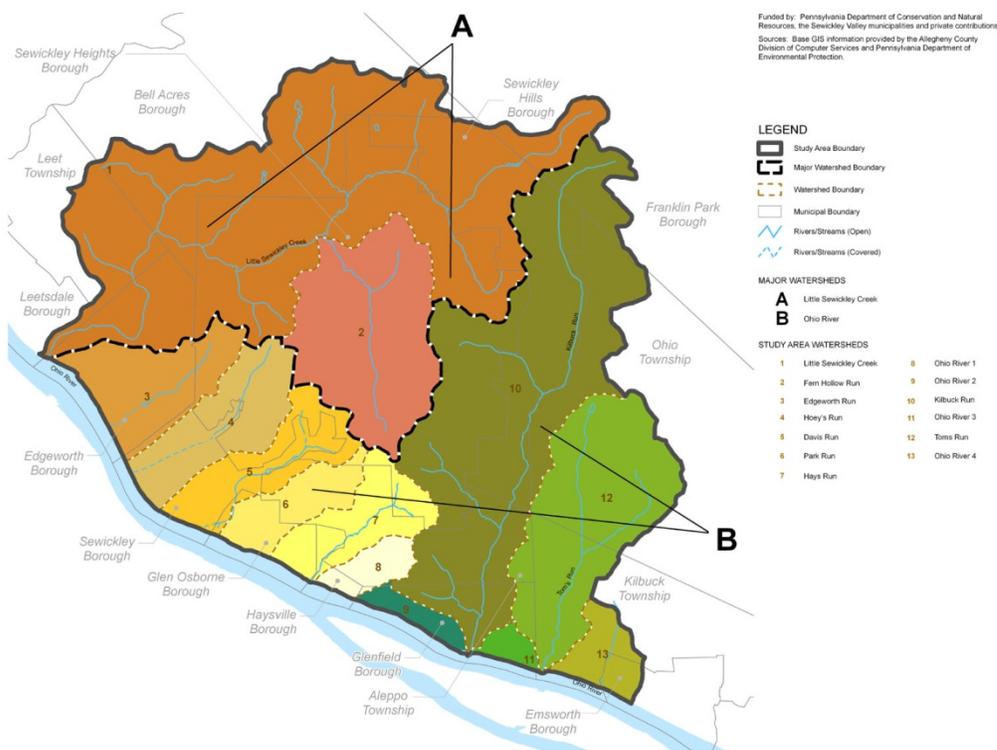


Table 1: Watershed Summary

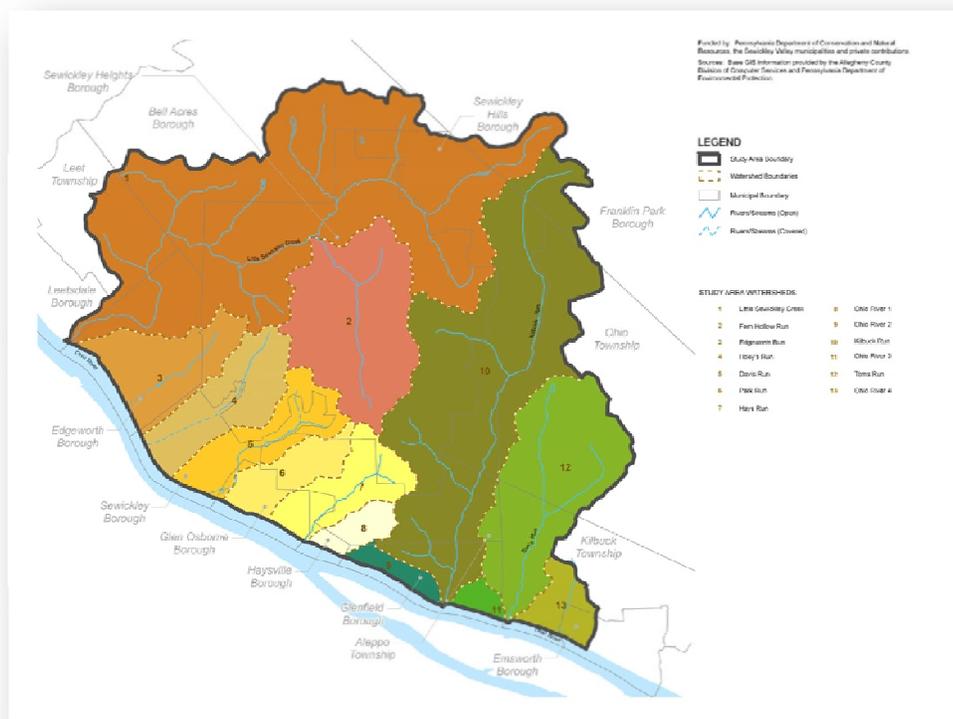
Map No.	Little Sewickley Creek Watershed
A. Little Sewickley Creek	
1	Little Sewickley Creek
2	Fern Hollow
B. Ohio River	
3	Edgeworth Run
4	Hoey's Run
5	Davis Run
6	Park Run
7	Hayes Run
8	Ohio River 1*
9	Ohio River 2*
10	Kilbuck Run
11	Ohio River 3*
12	Tom's Run
13	Ohio River 4*

(*) Represent unnamed tributaries of the Ohio River

Sewickley Valley Rivers Conservation and Management Plan

Sewickley Valley Communities Partnership

Phase I Inventory & Analysis



Allegheny County, Pennsylvania

August 2009

This project was financed in part by a grant from the Community Conservation Partnerships Program, Keystone Recreation, Park and Conservation Fund, under the administration of the Pennsylvania Department of Conservation and Natural Resources, Bureau of Recreation and Conservation.

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PURPOSE, GOALS AND OBJECTIVES**III. PHASE I PURPOSE, GOALS AND OBJECTIVES****A. Purpose**

In order to begin to address the Sewickley Valley Regions threats to watershed degradation, Phase I lays the foundations for the long term conservation of Sewickley Valley's watershed resources and for the continued collaboration among municipal governments in the successful management of storm water runoff in the region. Through the collection and analysis of mapped physical, demographic and geographic features, Phase I findings will be utilized to guide future multi-municipal conservation policies and development decisions in the Sewickley Valley.

B. Goals and Objectives

Goals are defined as the general results toward which all efforts will be directed. Objectives are the specific attainable results pursuant to each goal. The following goals and objectives form the framework for Phase I planning direction and activities. The goals are evaluated; the objectives are outlined in the bulleted text.

1. Collect, compile and analyze resource data related to the Region's physical, demographic and geographic features.
 - Compile a geographic information systems (GIS) database of existing conditions within the Region, and assess the current condition of the Region's watersheds and natural resources.
 - Analyze existing data to identify high value/sensitive natural resources.
 - Project future land use and populations trends, and analyze their affect on resource conservation issues.
2. Engage Municipal Officials in the conservation planning process and encourage inter-governmental cooperation.
 - Identify specific water conservation and quality issues within the region.
 - Assess the major contributing factors to water conservation and quality issues, and identify methods to address those factors.
 - Build consensus to prioritize the Region's water conservation issues.

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PLANNING APPROACH

IV. PLANNING APPROACH

A. Work Tasks

The Phase I approach emphasizes the value of collaboration and cooperation among the Plan participants and the importance of transcending municipal boundaries to assess storm water issues. General work tasks included:

1. Defining a project study area boundary according to PA DCNR / PA DEP defined watersheds in the Sewickley Valley and garnering the support and participation of municipalities within that boundary;
2. Review of regional context and applicable previously completed planning studies/efforts.
3. Collecting relevant hard copy and digital data and compiling a Geographical Information Systems (GIS) database; and
4. Creating a GIS Map Atlas based on the data compiled.

The products of these initial tasks combined with the input gathered from municipal review / discussion sessions provided the foundation for remaining Phase I work tasks including:

1. Assessment of current conditions;
2. The development and completion of Municipal Officials Survey and mapping activities;
3. The identification of shared community water resources issues; and
4. The definition and prioritization of actions needed to undertake the Phase II Recommendations Plan

B. Defining the Project Study Area

The Project Study Area Map (Map Exhibit 1) (an 11" x 17" foldout is contained in Appendix B) displays the boundary of both Phase I and II of the Rivers Conservation and Management Plan. The project study area contains more than 14,300 acres and includes, as stated previously, the outer boundaries of the Little Sewickley Creek and Ohio River watersheds (outlined in "red" and labeled as "A" and "B" respectively) and their intersection with the northern edge of the Ohio River. Thirteen (13) sub-watersheds have been identified, and have been designated according to their streams or tributaries, general drainage patterns and surrounding topography. The sub-watersheds are delineated or separated by the network of ridge tops and highpoints at their outermost boundaries.

The (13) project study area streams and subsequent sub-watersheds are named (and numbered on the map) as follows:

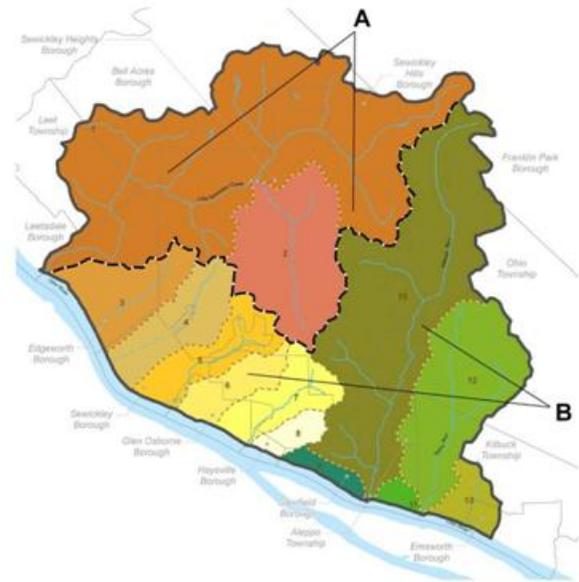


Figure 1: Project Study Area

PLANNING APPROACHTable 2: Watershed Summary

Map No.	Name
A. Little Sewickley Creek	
1	Little Sewickley Creek
2	Fern Hollow
B. Ohio River	
3	Edgeworth Run
4	Hoey's Run
5	Davis Run
6	Park Run
7	Hayes Run
8	Ohio River 1*
9	Ohio River 2*
10	Kilbuck Run
11	Ohio River 3*
12	Tom's Run
13	Ohio River 4*

(*) Represent unnamed tributaries of the Ohio River

C. Geographic Information Systems (GIS) Database

The Planning Team created a GIS database of “raw” geographic data using existing digital and hard copy data, as well as information collected from “windshield” surveys and municipal representatives with first-hand experience of the region’s manmade and natural systems. GIS data sources included the municipalities within the project study area, the GIS Group of the Allegheny County Division of Computer Services, PA DEP, the Pennsylvania Spatial Data Access (PASDA), the Western Pennsylvania Conservancy (WPC) and prior plans and studies conducted by Environmental Planning and Design, LLC as well as by others. The GIS database was used to create an inventory of existing conditions maps grouped into five (5) broad categories which include:

- Project Area;
- Demographics;
- Green Infrastructure;
- Grey Infrastructure; and
- Habitat and Land Use.

The Mapping and Analysis Summary section provides a summary of the GIS mapping activities. Appendix B of this Report presents this information in detail as a series of ledger size fold-out maps accompanied by descriptions of the relevant project data and the information which they have provided. The Appendix B materials are grouped according to the five (5) general categories listed above. Text descriptions of each map within the categories are followed by the fold-out maps for that category.

D. Public Participation

Public Input

1. Role of the Steering Committee

- Monitor, review and provide guidance throughout the process
- Take responsibility for the business issues associated with the project.
- Resolve project conflicts

2. Other Agencies/Stakeholders

- Provide resources to project team
- Educate project team about their business
- Set requirement priorities

3. Municipal Officials Survey

- Identify key storm water and water quality issues along the region's streams and river
- Prioritize the threat specific problem areas may have on water resources

THE SEWICKLEY VALLEY REGION**V. THE SEWICKLEY VALLEY REGION****A. Project Study Area Location/Characteristics****1. Overview**

Located along the northern shore of the Ohio River approximately 20 miles west of the City of Pittsburgh, the Sewickley Valley project study area includes more than 14,300 acres of urbanized and rural lands, the southern portion of which is bordered by a 6.6 mile stretch of the Ohio River. Existing landforms and vegetation reflect the hydrologic patterns of the area. There is a distinct break in the topography and development patterns along the edge of the Ohio River's generally flat lowlands, and the steep wooded slopes bordering the major streams and their many tributaries which characterize the uplands. The character of the individual communities reflects the lay of the land. Communities located on the level lands adjacent to the Ohio River are typically older, smaller, and more urbanized, whereas communities situated on the wooded ridge tops more distant from the River are generally larger, more rural, and more topographically varied.

The natural features of the region are exceptional and the acreage of natural lands far out numbers the 1,780 acres of developed lands. The project study area contains over fifty (50) miles of streams and 2,000 acres of undeveloped prime agricultural lands located mainly on the more gentle slopes or ridge top areas. Almost 5,000 acres of the region's lands [more than one third (1/3) of the total land area] are characterized by steep slopes, specifically slopes exceeding twenty five percent (25%). Aerial photographs show that over 10,000 acres, or more than seventy-five percent (75%) of the region, is forested to some degree. These wooded areas largely maintain the stability of the many acres of steep slopes within the Sewickley Valley Region.

The waterways, drainage basins and flow of water through the partner communities to reach the Ohio River connect these diverse landscapes and populated centers to make each community within the project study area part of a single hydrologic system. The communities are also linked culturally and physically by their orientation to the Ohio River, their business

districts, their parks and open space, their health, educational and religious institutions, and their connection to regional road systems and to the City of Pittsburgh.

2. Climate

The Sewickley Valley gets an average of 35 inches of rain per year. The US average is 37. Snowfall accumulations total an average of 22 inches per year. The average US city gets 25 inches of snow per year. The average number of days with any measurable precipitation is 102.

On average, there are 162 sunny days per year in the Sewickley Valley. The July high is around 85 degrees. The January low is 22. The comfort index, which is based on humidity during the hot months, is a 48 out of 100, where higher is more comfortable. The US average on the comfort index is 44.

3. Air Quality

Air quality in the Sewickley Valley is an average of 6 on a scale of 1 to 100 (higher is better). This is based on ozone alert days and number of pollutants in the air, as reported by the EPA. The American Lung Association's 2007 "State of the Air" report lists the City of Pittsburgh (located approximately 20 miles east of the Sewickley Valley) as the second-most polluted metropolitan area in America, behind only Los Angeles. However, The American Lung Association's 2010 survey results show that the air in the surrounding Pittsburgh areas is the cleanest it's been in the last decade. This is primarily due to the decrease in pollution and better controls and regulation of the area's industry sector.

4. Topography / Landform

Existing landform and vegetation reflect the hydrologic pattern of the area. There is a distinct break in the topography and development patterns along the edge of the Ohio River lowlands and the steep wooded slopes bordering the major streams and their many tributaries which characterize the uplands.

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5. Hydrology / Drainage

The general flow of the Sewickley Valley's hydrologic system initiates from precipitation that falls within the upland communities, gradually flows downhill as surface water or groundwater into receiving streams and converges into the watershed "outlet" at the Ohio River.

6. Ponds and Wetlands

While the Region's streams and river are the predominant water features, there are several ponds and wetlands. These ponds and wetlands are scattered throughout the region, and cover approximately 11 and 24 acres respectively. The majority of these water features are located in close proximity to Little Sewickley Creek, while most of the remaining ponds and wetlands are near to either Fern Hollow or Davis Run.

7. Flora / Fauna

Aerial photographs show that over 10,000 acres, or more than seventy-five percent (75%) of the region, are forested to some degree. These wooded areas contribute considerably to the stability of the many acres of steep slopes of the Sewickley Valley. A diverse number of plant and animal communities can be found within the region, and in and around streams, ponds, fields, meadows and forests. Notable habitats include the Campmeeting Woods and Tom's Run Valley biodiversity areas which exhibit quality native dry-mesic acidic and mesic central forests, as well as the Ohio River biodiversity area which is focus of the reintroduction of the paddlefish. While there are diverse species of flora and fauna within the Region, according to the Pennsylvania Natural Diversity Inventory Environmental Review Tool (PNDI), there are currently no significant threatened or endangered species in the region.

Typical Native Flora

<u>Trees</u>	<u>Shrubs</u>	<u>Herbaceous Plants</u>
American Beech	Blueberry	Black Snakeroot
Basswood	Flowering Dogwood	Bloodroot
Chestnut Oak	Maple-leaf Viburnum	Christmas Fern
Hickory	Mountain Laurel	Hepatica
Ironwood	Sassafras	Jack-in-the-Pulpit
Red Oak	Spicebush	Lady Fern
Sugar Maple	Witch-hazel	Large Flowered Trillium
Tulip Poplar		Marginal Shield Fern
White Ash		May Apple
White Oak		Violets
		Wild Geranium
		Wild Ginger
		Wild Leek

Figure 2: A List of Common Vegetative Species Native to the Sewickley Valley.

Typical Native Fauna

<u>Mammals</u>	<u>Birds</u>	<u>Reptiles and Amphibians</u>
Chipmunk	American Black Duck	11 Species of Frog/Toads
Eastern Cottontail	American Kestrel	2 Species of Lizards
Opossum	American Woodcock	16 Species of Salamanders
Red Fox	Barred Owl	10 Species of Snakes
Squirrel	Canada Goose	6 Species of Turtles
White-tailed Deer	Cooper's Hawk	
	Eastern Screech Owl	<u>Fish</u>
Several species of rodents and small mammals	Great Horned Owl	6 Species of Bass
	Mallard	2 Species of Muskellunge
	Northern Goshawk	Paddlefish
	Northern Harrier	5 Species of Panfish
	Red-tailed Hawk	Sauger
	Sharp-shinned Hawk	Walleye
	Several species of Songbirds	

Figure 3: A List of Common Animal Species Native to the Sewickley Valley.

THE SEWICKLEY VALLEY REGION

8. Conclusions

In general, climate is not a major contributor to the region's storm water, erosion and water quality issues. Rather it's the combination of the region's geology, typography, resources and land use patterns.

B. Prior Plans and Studies

A number of prior plans and studies have provided a data base of information as well as impetus for the Phase I Plan.

1. Sewickley Valley Visioning and Economic Impact Study

This study was a multi-phased Visioning and Economic Impact Study, funded in part by the Pennsylvania Department of Community and Economic Development (PA DCED) which evaluates and identifies ways in which Sewickley Valley Communities [the eleven (11) municipalities of the Quaker Valley School District] can collectively optimize their physical and fiscal resources to improve their competitiveness within the Greater Pittsburgh market.

The Visioning Study provides a comprehensive view of the Sewickley Valley Region as well as detailed technical studies and key actions needed to address critical issues (including those pertaining to storm water management) in the region.

2. The Natural Infrastructure Project of Southwestern Pennsylvania (NI)

Striking a balance between the region's four key natural infrastructure uses – ecology, cultural heritage, human use and economics – and developing a strategic implementation framework was the primary focus of the Natural Infrastructure (NI) comprehensive policy plan. The project's main products include:

- Regional Case Studies which establish the relationships between natural infrastructure planning and economic vitality in Raleigh, Boston and Minneapolis as well as Southwestern Pennsylvania;

- The NI Atlas which defines and documents the state of “green” infrastructure of Southwestern Pennsylvania based on a comprehensive Geographic Information Systems (GIS) analysis using GIS both as a mapping and analytical tool; and
- The NI Framework which establishes a blueprint for prioritizing and optimizing natural infrastructure uses within the region based on a sustainable balance between resource availability, carrying capacity and economic significance.

The NI project, funded in part by PA DCNR, provides a wide range of information and analyses about natural resources in the Sewickley Valley and furnished a solid stepping off point for much of the base and analysis data collected for the Phase I Plan.

3. Aleppo-Sewickley-Glen Osborne (ASO) Joint Comprehensive Plan

The ASO Joint Comprehensive Plan furnished both existing conditions and analysis data for its three (3) participating municipalities. In addition, the ASO joint planning process provides a current example of the benefit of shared municipal planning and management resources within the Sewickley Valley region. The (ASO) Joint Comprehensive Plan was adopted in November 2006.

4. ASO Joint Zoning Amendments

In order to act on the goals and objectives of the ASO Joint Comprehensive Plan, the three communities embarked on a concerted effort to update their Zoning Ordinances. To date, the Joint Steering Committee focused on several areas of their respective ordinances and have developed draft text pertaining to Impervious Surface Limitations, a Developable Areas Worksheet, Natural Resource Protection Overlay, etc. which will help protect their shared resources for the benefit of all the communities as a whole. These measures provide an active and long-term tool for addressing resource conservation and management issues.

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5. War Memorial Park Master Plan Report / Hoey's Run Fluvial-Geomorphology Study

The War Memorial Park project began as a Master Plan for the improvement and restoration of Sewickley Borough's second largest community park. The planning process was expanded to include a fluvial geomorphology study of Hoey's Run stream which runs through the Park.



Photograph 3: Severe bank erosion caused by frequent flooding along the Hoey's Run stream corridor.

The stream corridor study was initiated to determine the causes for and possible solutions to the frequent flooding, severe bank erosion and poor water quality of the stream. The Park's Master Plan was subsequently amended from one of culverting the stream to accommodate active ball fields, to a program featuring informal recreation, the enhancement of existing riparian and woodland habitats and stream restoration activities featuring a series of active and passive storm water controls.

6. Waterworks Park Master Plan Report

The Waterworks Park Master Plan report was a study which provided a comprehensive guide for future improvements to the property for use as a community park. The Plan designates land for recreation, municipal services, conservation and preservation. This report also documents the issues identified and recommendations formulated as part of the Waterworks Park planning process. It provides a brief overview of planning activities, demonstrates the location and extent of future site development and offers suggested implementation strategies for Park improvements.

7. Allegheny Places: The Allegheny County Comprehensive Plan

The Allegheny County Comprehensive Plan has provided updated digital base data for GIS mapping and analysis as well as a county-wide framework for municipal planning activities. The Comprehensive Plan identifies key challenges related to water resources as follows:

- Reducing sewer overflows;
- Impacts of development on steep slopes;
- Impacts of development on landslide prone areas;
- Loss of forest land;
- Flood protection and mitigation;
- Protecting and improving ground and surface water quality;
- Wetland protection;
- Protection of wildlife and biodiversity corridors.

The joint involvement of townships and boroughs in the creation of Act 167 Plans would be of great value to the County since, to date, seventeen (17) of Allegheny County's twenty-six (26) designated Act 167 watersheds do not have an approved Plan.

8. Franklin Park Comprehensive Plan

The Franklin Park Borough Comprehensive Plan, completed in 2007, discusses current conditions, identified and evaluated trends, and in aggregate, provided for the future arrangement of land from the perspective of use, housing, circulation, community facilities, utilities, natural and historic resources, and water supply. Recommendations for future growth and trends were made based on the gathered information and then formulated to project the future needs and desires of the community.

9. Allegheny County Greenprint

The Allegheny Land Trust's (ALT) Strategic Plan, completed in 2006, called for the development of the ALT Greenprint. The Greenprint is the mapped result of compiling and processing a region's resource inventory data gathered over several years to identify lands meeting three fundamental

THE SEWICKLEY VALLEY REGION

criteria—biodiversity, unique scenic character, and water quality and storm water management functions. The resulting Greenprint Map defines the areas in which land conservation resources should be concentrated because they represent the highest and best natural systems in the county, and are of primary importance to protect because they provide the greatest public benefit for the county and region. The first Greenprint analysis was completed for Allegheny County in 2006.

10. Sewickley Heights Comprehensive Plan Update

Completed in 2009, the Sewickley Heights Comprehensive Plan Update re-envisioned the future of the Borough based on the recent trends related to its population and resources. As in previous versions of the Comprehensive Plan, there was a strong emphasis on balancing the demands for growth with the protection of the Borough's natural resources and historic rural character.

11. Sewickley Heights Vision Plan

As part of its Greenprint Program, the ALT assists communities identify their highest value natural systems and assists/encourages these communities to incorporate land conservation goals and strategies into comprehensive plans, municipal ordinances, land conservation programs, etc. With the assistance of ALT, Sewickley Heights Borough is currently conducting a planning effort to maintain the integrity of the Borough's cultural landscape.

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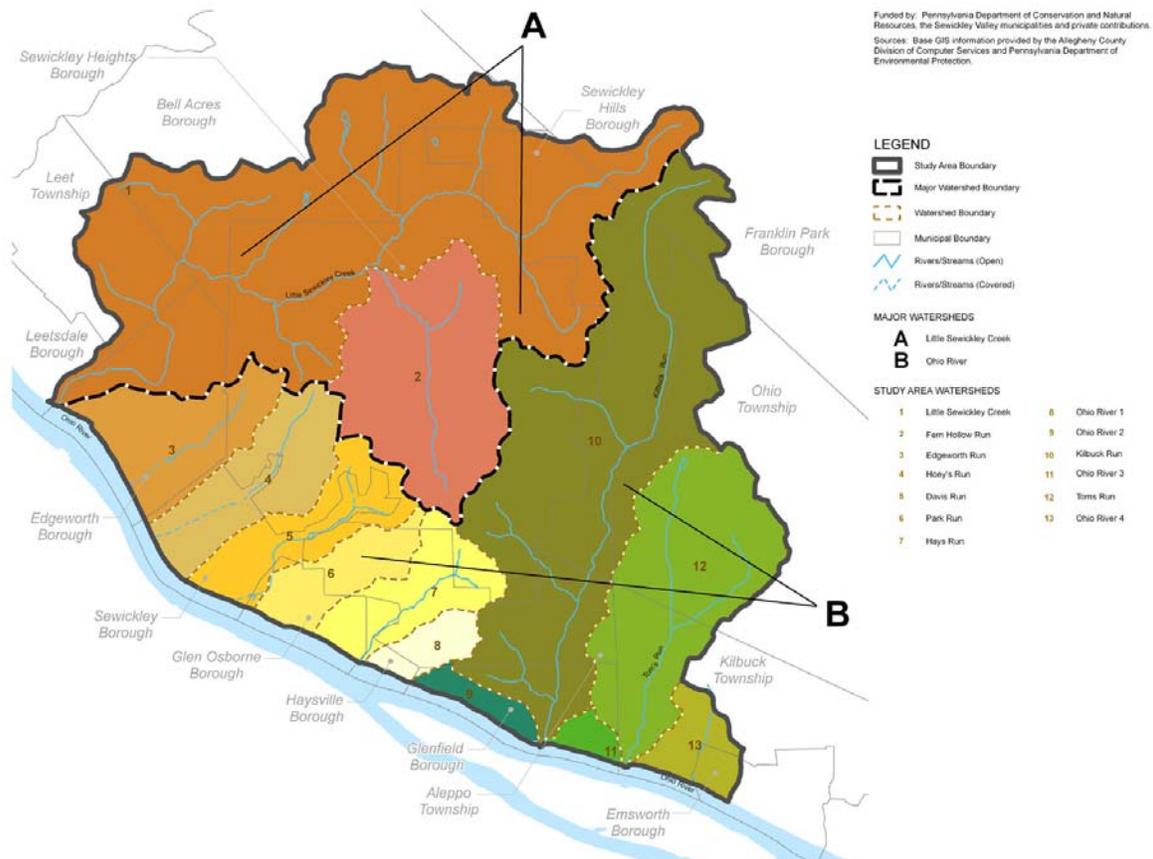
MAPPING AND ANALYSES SUMMARY

VI. MAPPING AND ANALYSES SUMMARY

A. Project Study Area

Phase I Mapping and Analyses focused on inventorying and identifying the existing physical conditions, land use, demographics as well as projected future conditions of the Region. Summaries of the individual maps have been providing in the following sections. 11" x 17" fold out copies of each map can be found in Appendix B of this Report. Upon developing inventory maps, additional composite maps were constructed to identify highest resource areas and guide future planning and development, etc. This report section builds on the previous analysis of the GIS mapping and provides an overall assessment of current conditions within the project study area. The assessment also reflects stakeholder input and past studies as outlined previously in this Report.

Map Exhibit 2: Project Study Area



The Project Study Area Map displays the project study area boundary, watershed and sub-watershed boundaries, township and borough borders, as well as river and stream locations. All of the additional data collected, mapped, and analyzed in Phase I pertains to the areas and locations shown on this map. The general terrain of the region can be inferred from the blue lines that depict the streams which define the locations of the low lying valleys and from the brown dashed lines which indicate the highest elevations found along the ridges which separate the thirteen (13) sub-watersheds.

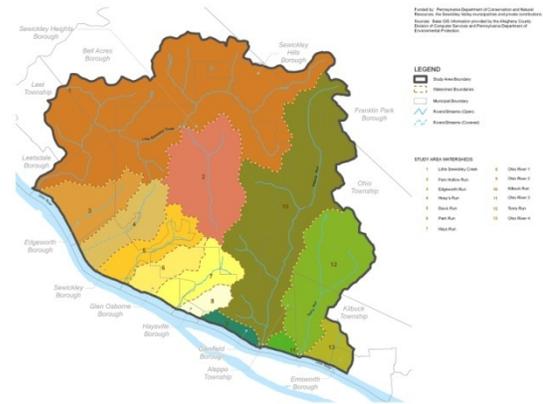


Figure 4: Project Study Area Watershed and Sub-Watersheds.

The following descriptions outline the geographic characteristics of each of the project study area’s streams and associated sub-watersheds.

Little Sewickley Creek

The Little Sewickley Creek is approximately six (6) miles in length along its primary reach and flows from east to west along the northern portion of the project study area. Its 4,741-acre watershed is the largest in the project study area and includes sections of Leetsdale Borough, Edgeworth Borough, Leet Township, Sewickley Heights Borough, Bell Acres Borough, Sewickley Hills Borough and Franklin Park Borough. Little Sewickley also drains the Fern Hollow watershed described below. Land use within this watershed is generally rural with significant dedicated open space areas situated within Sewickley Heights Borough. The majority of existing development in the watershed is comprised of scattered residential, although there are some commercial and industrial uses located in Leetsdale Borough adjacent to the Ohio River.

Fern Hollow

Fern Hollow, a tributary of Little Sewickley Creek, flows primarily north and is located entirely within Sewickley Heights Borough. The 1,382-acres of the Fern Hollow watershed are primarily wooded and rural in character. Pockets of low

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density residential development are located in the eastern, western and southern portions of the watershed.

Edgeworth Run

Edgeworth Run is an approximately one (1) mile long tributary of the Ohio River. Its 685-acre watershed is located in the southwestern portion of the project study area and includes parts of Edgeworth, Sewickley and Sewickley Heights Boroughs. The watershed is predominantly urbanized and includes intensely developed single and multi family residential, and commercial as well as industrial areas adjacent to the Ohio River in Edgeworth and Sewickley Boroughs.

Hoey's Run

Hoey's Run is a nearly two (2) mile long tributary of the Ohio River. Its 684-acre watershed includes portions of Sewickley and Sewickley Heights Boroughs. The watershed's intensely developed residential areas adjacent to the Ohio River in Sewickley Borough contrast with the semi-rural character of the watershed's northern areas which are situated within Sewickley Heights Borough.

Davis Run

Davis Run is a tributary of the Ohio River which flows southwest and is approximately 1.5 miles long. This 584-acre watershed includes portions of Sewickley Borough, Glen Osborne Borough, Aleppo Township and Sewickley Heights Borough and contains moderately intense residential development in Osborne Borough adjacent to the Ohio River and in Sewickley Borough.



Photograph 4: A wetland in a previously disturbed portion of the Davis Run watershed in Sewickley Borough is a natural resource which accommodates groundwater recharge.

Park Run

The Park Run watershed contains sections of Glen Osborne Borough, Aleppo Township and Sewickley Heights Borough. The 371-acre watershed has a very narrowly defined stream approximately 1.2 miles in length which serves as a general drainage way. Based on this situation, water does not always flow through the watershed year-round. The watershed is primarily rural with some low density residential development near the Ohio River. Glen Osborne's community park surrounds the stream channel and is bounded by Beaver Avenue and Ohio River Boulevard.

Hays Run

Hays Run flows southwest for a length of slightly over one (1) mile into the Ohio River. Its 516-acre watershed includes areas of Osborne Borough, Aleppo Township, Haysville Borough and Sewickley Heights Borough. The watershed is primarily rural with some residential and industrial development adjacent to the Ohio River.

Ohio River 1

The Ohio River 1 sub-watershed (surrounding an unnamed tributary to the Ohio River) is located in sections of Hayesville Borough, Aleppo Township and Glenfield Borough. The 186-acre watershed is primarily rural with some industrial development adjacent to the Ohio River. The watershed has a narrowly defined drainage way approximately .8 miles in length. Based on this situation, water may not flow through the watershed year-round.

Ohio River 2

The Ohio River 2 sub-watershed (surrounding an unnamed tributary to the Ohio River) includes sections of Glenfield Borough and a small portion of Aleppo Township. The 138-acre watershed is predominantly rural with some industrial development in Glenfield Borough adjacent to the Ohio River. The watershed has no defined stream, but the general area serves as a drainage way. Based on this situation, water may not flow through the watershed year round.

MAPPING AND ANALYSES SUMMARYKilbuck Run

Kilbuck Run is a significant Ohio River tributary running parallel to I-79 and carrying water southwards for 4.5 miles before reaching the River. Its 3,237 acre watershed is a major section of the eastern project study area encompassing parts of several municipalities including Glenfield Borough, Aleppo Township, Sewickley Heights Borough, Sewickley Hills Borough, Ohio Township and Franklin Park Borough. The watershed's land-use patterns are primarily rural with industrial development located near Kilbuck Run and residential areas spread intermittently throughout the watershed. The stream has suffered from flooding-most likely created by the significant run-off from I-79.

Ohio River 3

At 94 acres, the Ohio River 3 sub-watershed (surrounding and unnamed tributary to the Ohio River) is the smallest watershed in the project study area. The watershed contains sections of Glenfield Borough and Kilbuck Township and is generally rural with some residential and industrial areas adjacent to the Ohio River. The watershed has no defined stream, but the general area serves as a drainage way. Based on this situation, water may not flow through the watershed year round.

Tom's Run

Tom's Run flows south for approximately two (2) miles before reaching the Ohio River. Its 1,434-acre watershed contains portions of Kilbuck Township, Sewickley Hills Borough, Aleppo Township and Ohio Township and is largely rural with scattered residential development and some industrial development adjacent to the Ohio River.

Ohio River 4

The Ohio River 4 tributary (the last unnamed tributary in the project study area) flows approximately one-half (1/2) mile south into the Ohio River. Its 273-acre watershed is located in the southeastern corner of the project study area and includes a portion of southern Kilbuck Township and the westernmost section of Emsworth Borough. The watershed is primarily rural with some residential and industrial development located near the Ohio River.

The following table provides a summary of the overall acreage and length respectively of each project area watershed and its primary streams. Watershed numbers, as labeled on all project maps, are indicated in the left hand column.

Table 3: Watershed /Sub-Watershed /Stream Summary

Map No.	Name	Watershed / Sub-Watershed Acreage	Approx. Stream Length (miles)
Little Sewickley Creek		6,123	8.0
1	Little Sewickley Creek	4,741	6.0
2	Fern Hollow	1,382	2.0
Ohio River		8,202	14.5
3	Edgeworth Run	685	1.0
4	Hoey's Run	684	2.0
5	Davis Run	584	1.5
6	Park Run	371	1.2
7	Hayes Run	516	1.0
8	Ohio River 1*	186	0.8
9	Ohio River 2*	138	0.0
10	Kilbuck Run	3,237	4.5
11	Ohio River 3*	94	0.0
12	Tom's Run	1,434	2.0
13	Ohio River 4*	273	0.5

(*) Represent unnamed tributaries of the Ohio River

MAPPING AND ANALYSES SUMMARY**B. Social and Economic Characteristics**

The social and economic characteristics of the project study area municipalities are broadly varied. However, each community has unique resources which, if maximized and shared with the region's communities, will make the Sewickley Valley as a whole greater than its parts.

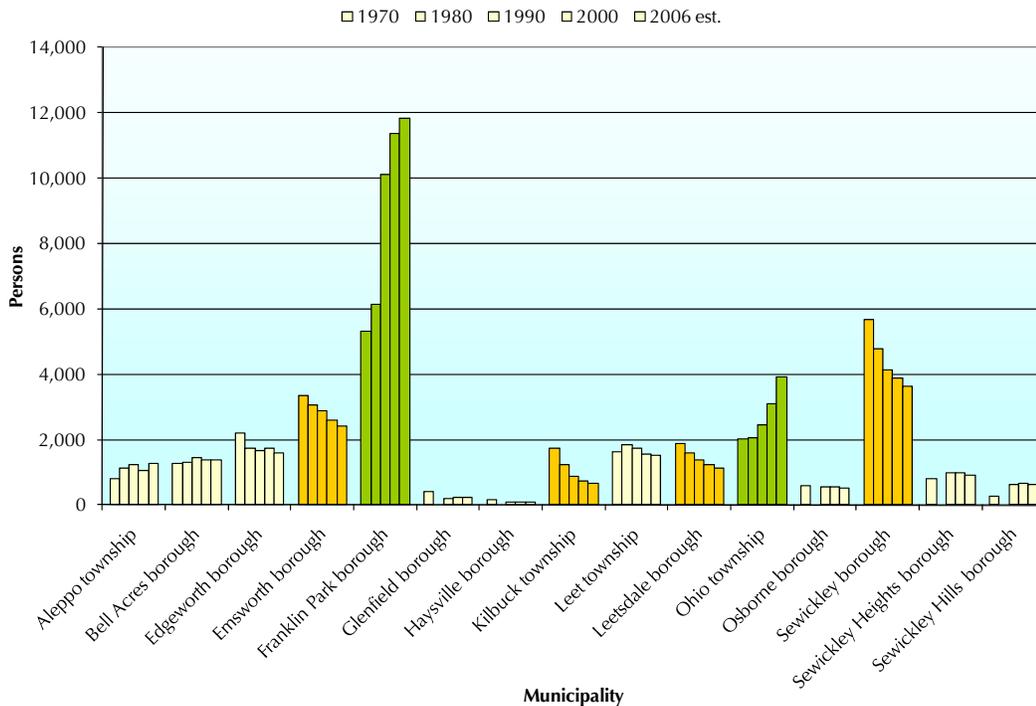
1. Population:

The population of the project study area is far less than the U.S. Census Bureau 2006 County Subdivision estimate of more than 30,000 people for the fifteen (15) communities. The reason for the discrepancy is that significant portions of several communities fall outside of the watershed limits which define the project study area boundary. Notably, only 464 acres or 5% of Franklin Park's, land area (whose total acreage and population respectively are 8,670 and 11,858), is located within the project boundary. After Franklin Park, the most populous municipality is Ohio Township, with an estimated 3,900 residents; however, again, only a small portion of the Township lands are included within the project study area. Sewickley Borough with 3,600 residents is the third most populous community within the project study area, but contributes the highest population to the project study area because it is more densely populated than Franklin Park and Ohio Township, and because all of its land area falls within the project study area boundary. Sewickley Heights Borough which covers 4,755 acres is the largest community completely contained within the project study area; it is also the most sparsely populated. The smallest and least populous community in the project study area is Haysville, with 138 acres and 78 residents.

Population changes experienced in the Sewickley Valley have been uneven. Trends from the past 35 years suggest that consistent growth has taken place in two (2) communities in the Valley (Franklin Park Borough and Ohio Township) and that consistent declines have taken place in four (4) communities (Emsworth Borough, Kilbuck Township, Leetsdale Borough, and Sewickley Borough). The remaining nine (9) communities have been relatively stable in total population.

Table 4: Total Municipal Population

(Based on US Census Bureau, County Subdivision Population Estimates, June 1, 2006)



Forecasts prepared by the Southwestern Pennsylvania Commission (SPC) anticipate a collective population increase for the fifteen (15) communities to over 37,000 by 2035. As in the past, this population growth will not be evenly experienced; but will depend rather on factors such as infrastructure, housing, and land availability. While it is likely that less populated communities further removed from the previously-developed Ohio River corridor are likely to see the greatest population increases, factors such as Aleppo Borough’s recently approved Act 537 Plan and the Sewickley Borough partnership with Haysville and Glenfield Boroughs to prepare an Act 537 Plan (discussed in the GIS inventory descriptions) will influence growth in ways that cannot be predicted on the basis of past trends.

Project area demographics were mapped according to population density, per municipality, population forecast per municipality, and employment by municipality. The data mapped indicates the level of development and development density of the project study area as related to delineated sub-

MAPPING AND ANALYSES SUMMARY

watersheds. Demographics data will be used to analyze the impacts of development on storm water runoff and groundwater resources for current and future conditions.

2. Housing

Single family homes make up the majority of housing units in the Sewickley Valley. They make up at least 80% of all housing units in twelve (12) of the fifteen (15) communities. In the other three (3) municipalities – Leetsdale, Sewickley, and Emsworth Boroughs – single family homes remain the predominant housing type, but are joined by small-to-mid sized multi-family housing, the presence of which reflects the fact that these boroughs are the Sewickley Valley's historic population centers.

The age of housing also varies by community. In eight (8) of the Valley's municipalities, at least fifty percent (50%) of the homes were built prior to 1950. Only two (2) communities – Ohio Township and Franklin Park Borough– saw their largest housing starts in the 1980s and 1990s.

All of the communities in the Sewickley Valley are characterized by stable populations. In five (5) of the communities, more than two-thirds (2/3) of the population had been at their current homes for at least a decade at the time of the 2000 Census. In Haysville, the smallest of all the municipalities in the Valley, over 68% of the population had lived in the same home for at least 30 years.

Home owners greatly outnumber renters throughout the Valley. In nine (9) of the communities, owner occupied housing units make up over 85% of all occupied housing. Only in the Valley's traditional population centers of Sewickley, Emsworth, and Leetsdale Boroughs, are ownership rates below County and State averages of 68% and 71% respectively.

Improved infrastructure in the region has been mandated by state and federal actions. These improvements will be a factor in future development trends within the region. The sanitary sewer service improvement and expansion planned to begin in 2010 in Aleppo Township and the future

Sewickley-Glenfield-Haysville Act 537 Plan will offer insights into the impacts of this type of change.

3. Employment Centers

The project study area's principal employment centers are located in the lower lying communities of Sewickley, Edgeworth and Leetsdale Boroughs. Many of the employment centers focus on industrial activities; adjacent to the River and the rail lines. There are very few large scale professional office developments in the region.

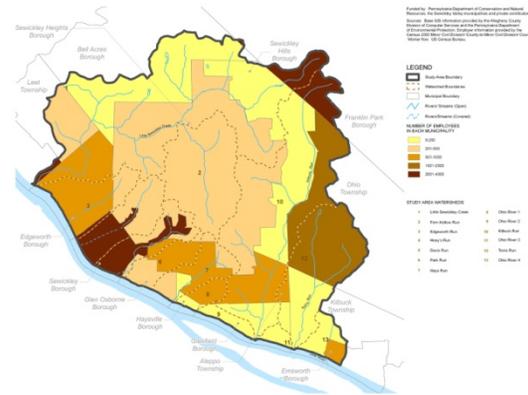


Figure 5: The Employment by Municipality Map indicates higher employment in the darker areas adjacent to the River and the industrially/commercially zoned districts.

In 2002, Sewickley Borough had the largest employment base with 3,957 jobs in the community (Franklin Park's employment areas are located outside the Project Study Area). In 2002, Glenfield Borough offered the fewest number of jobs, with 21. Collectively, Sewickley Hills, Sewickley Heights, Leet Township, and Bell Acres possessed a total of 667 jobs.

MAPPING AND ANALYSES SUMMARY**C. Cultural Resources**

A complete inventory of the cultural resources of the region is not within the scope of this Plan. However, a brief overview of their great variety and worth is warranted to be able to reference their value to the region. Many of these resources are situated within the historic population centers mentioned above. Sewickley Borough features a lively business district as well as numerous regional institutions such as the Sewickley Valley Hospital, the Sewickley YMCA, the Sewickley Public Library, the Sewickley Community Center, and the Sweetwater Center for the Arts as well as an abundance of churches. Other resources are found in the more rural communities. Sewickley Heights Borough, known for its beautiful woodland landscapes offers the Fern Hollow Nature Center and the Sewickley Heights History Center.



Photograph 5: Sewickley Heights History Center.

The region as a whole is characterized by more generalized resources. The older communities consist of a variety of historic architectural styles. In addition to athletic fields and playground areas, many of the region's parks feature miles of woodland-based trails. There are two private golf courses in the Sewickley Valley: Sewickley Heights Golf Club and Allegheny Country Club. Recreational facilities owned by the Quaker Valley School District are also open for public recreation. Finally, the Ohio River is a historic and cultural resource of importance to the Sewickley Valley and beyond, offering water activities as well as a close up view of Pittsburgh's industrial activities – reflecting the city's past and its present.



Photograph 6: Sewickley Hills Borough Great Room Facility.

D. Natural Resources

The natural resources of the project study area are the features which give the region much of its appeal to long term residents, newcomers and visitors. The wooded slopes and valleys, riparian buffers, Biological Diversity Areas, and conserved lands are valued for their own qualities, and for their role in protecting the high quality streams and watersheds of the region, also important natural features. Environmental resources must be central to any consideration of planning opportunities and challenges within the region.

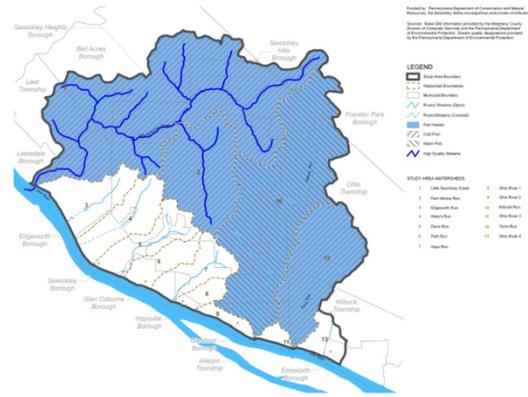


Figure 6: The Aquatic Habitat Map illustrates high quality warm water and cold water fish habitat in the Sewickley Valley – resources that will benefit from improved storm water management.



Photograph 7: View of the Region’s precious natural resources, including the Ohio River, riparian buffers, wooded slopes, etc. at Haysville.



Photograph 8: Channelized stream have historically been used to direct surface water and storm water away from active/passive recreation sites.

MAPPING AND ANALYSES SUMMARY**E. Public Facilities Infrastructure****1. Sewer and Water**

Six (6) independent sewer systems and numerous private septic fields service the region. Some public systems combine sanitary sewers and storm water flow which can result in combined sewer over flow and the release of untreated effluent into the Ohio River. For the less developed areas, septic tanks and fields are used for sewage treatment. With limited treatment capacity these systems are acceptable only in sparsely developed or agricultural areas. Both private and public sewer infrastructure located in areas containing sensitive resources can pose a threat to the future conservation of these resources. The previously mentioned Aleppo and Sewickley-Glenfield-Haysville Act 537 Plans are indicative of future infrastructure improvements in the region which will be implemented as per PA DEP requirements. These changes, while positive, must be approached with careful planning in order to insure that new infrastructure does not conflict with partner community conservation and watershed protection efforts.

Five (5) publicly owned drinking water systems serve the region. These systems draw water primarily from the Ohio River, although one (1) system collects water from a local reservoir. Drinking water needs of areas not served by these public systems rely on private wells. Typically, these private wells can be subject to groundwater reductions caused by drought and/or decreased infiltration and ground water recharge due to development and increases in impervious surfaces. They are also susceptible to ground water contamination. Like sewer improvements, future potable water supply and distribution will be closely tied to the successful management of the region's watershed basin.

2. Transportation Routes

Two (2) major transportation routes cut through the Sewickley Valley. Western Pennsylvania's primary north-south highway, Interstate 79, lies near the Valley's eastern border and has one interchange in Glenfield Borough adjacent to the Ohio River and one at the boundary of Ohio Township and Sewickley Hills Borough. One interchange connects with Pennsylvania Route 65, a four-lane arterial road linking communities along the Ohio River with Pittsburgh to the east and Beaver County to the west. The other interchange connects to Blackburn and Mount Nebo Roads, east/west collectors connecting to Interstate 279 to the east and the Pittsburgh Orange belt to the west. A series of smaller collector-type roads link communities along the River with those further up the valley.



Photograph 9: Deciduous woodlands and stream valleys border Waterworks Road as it enters Sewickley Heights Borough and Aleppo Township.

In addition, operational freight rail lines are present along the north shore of the Ohio River. These lines are owned and operated by the Norfolk Southern Railroad and is that particular railroad's busiest freight route between the Midwest (Chicago) and Northeast (New York City).



Photograph 10: Norfolk Southern Railroad at Railroad St. in Haysville.

Notable local road facts include:

- The communities with the largest total land area contain the most miles of roadway. Sewickley Heights Borough, Bell Acres Borough and Sewickley Hills Borough contain the largest land area within the Valley and maintain approximately 90 miles of roadway.

F. Land Use and Habitat Maps

1. Land Coverage

Land Coverage mapping provides a general illustration of current development patterns in the project study area. Land cover is neither an adopted zoning map nor a detailed assessment of individual land uses at the parcel level and therefore some discrepancies may exist between land cover and other types of land analyses. However, the general information portrayed on the map is useful in assessing future development opportunities and potential subsequent impacts to watershed drainage patterns and natural areas.

The predominant color on the map is green which symbolizes in its different shades forest cover, farm lands and grasslands. The map indicates that the natural features and environmental resources of the Sewickley Valley are its most outstanding characteristics. These are features which can support proper storm water management, but can also be adversely affected by poor control of storm water runoff and uncoordinated land development practices.

2. Parks and Conserved Lands

The Map shows the distribution of public parklands, conserved lands and Ohio River public access points. Parks and conserved lands include lands typically set aside for active and passive recreation and/or habitats for area wildlife or for the conservation of public natural resources.



Photograph 11: Several parks such as Maple Lane Park serve as active playground and recreational sites for children.



Photograph 12: Little Sewickley Creek running along Little Sewickley Creek Road.

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Parks, playgrounds and conserved lands are distributed throughout the project study area with the largest acreage of both land uses located in the Little Sewickley Creek watershed, and most specifically within Sewickley Heights Borough. Most of these areas are wooded and function as valuable buffers to waterways adjacent to or within their boundaries. The Parks and Conserved Lands Map can be used to visualize the relationship of area parks and open space to other types of existing development and can be used in decision making regarding future land development in the vicinity of these areas.

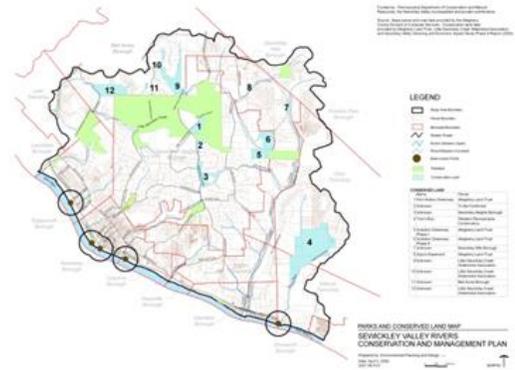


Figure 8: The Parks and Conserved Lands Map illustrates existing protected open space within the Region.

Table 5 provides information as to the names and ownership of the conserved lands within the project study area.

Table 5: Conserved Lands

No.	Name	Owner
1	Fern Hollow Greenway	Allegheny Land Trust
2	None	Unknown
3	None	Sewickley Heights
4	Tom's Run	Western Pennsylvania
5	Audubon Greenway Phase I	Allegheny Land Trust
6	Audubon Greenway Phase II	Allegheny Land Trust
7	None	Sewickley Hills Borough
8	Zupcic Easement	Allegheny Land Trust
9	None	Little Sewickley Creek Watershed Association
10	None	Little Sewickley Creek Watershed Association
11	None	Bell Acres Borough
12	None	Little Sewickley Creek Watershed Association



Photograph 13: Wooded slope and rock outcroppings along Little Sewickley Creek.

G. Green Infrastructure Mapping

Green infrastructure is an approach to wet weather management that is cost-effective, sustainable, and environmentally friendly. Green infrastructure management approaches and technologies infiltrate, evapotranspire, capture and reuse storm water to maintain or restore natural hydrologies.

1. Bedrock Geology

Bedrock is made up of the solid rock which underlies the earth's surface materials and is a major determinant of the rate of drainage, presence of aquifers and location of potential mineral resources. Mapping the location and depth of each type of bedrock is important for



Photograph 14: Soil erosion potential is increased by siltstone geology, steep slope disturbance, poor soils and waterway constrictions.

MAPPING AND ANALYSES SUMMARY

the analysis of water-flow, slope stability and infiltration. Bedrock mapping indicated two (2) predominant bedrock types that make up the geology of the project study area: sandstone (pale yellow) and silt stone (pale green). Both sandstone and siltstone are sedimentary formations which have been laid down and compressed in layers. The distinctive pattern illustrated on the map emphasizes the relationship of topography and hydrology to underlying geologic formations. The sandstone (Casselman formation of the Pennsylvanian Age) is located in all of the lowlands along the streams and adjacent to the Ohio River. The siltstone (Glenshaw formation of the Pennsylvanian Age) is present on all of the uplands rising from the stream and river valleys.

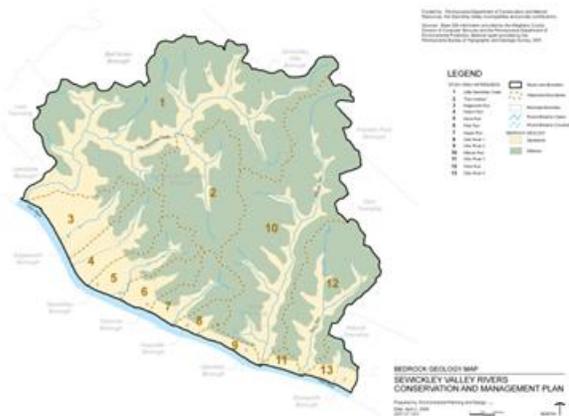


Figure 9: The Bedrock Geology Map illustrates the relationship between the region's ridge tops and valleys.

The sandstone (Casselman formation of the Pennsylvanian Age) is located in all of the lowlands along the streams and adjacent to the Ohio River. The siltstone (Glenshaw formation of the Pennsylvanian Age) is present on all of the uplands rising from the stream and river valleys.

The pattern formed by the two formations on the map indicates the ways in which the rock has been weathered and eroded by the streams and their tributaries, and clearly indicates the conveyance of storm water from the project study area uplands to the Ohio River.

2. Oil and Gas Resources

Permitted gas and oil field locations and wells were mapped based on data from the most up to date source. Although the data source is more than ten (10) years old and additional wells have been drilled, this data offers a starting point in portraying the gas and oil resources in the region. Of equal importance is the presence of potential untapped oil and gas resources which indicate possible locations of future extraction activities. This data will inform strategies to control negative impacts of existing and future wells on surface and ground water quality.

3. Soil Conditions

Soil is made up of particles of broken rock that have been altered by chemical and environmental processes including weathering and erosion. Soil types identified for an area are often related to hydrologic and geologic factors. Soils mapped indicate floodway/floodplain locations, areas of conspicuous soil creep, landslide prone areas, wetland environments and Pennsylvania red beds locations. The thirteen (13) project area sub-watersheds show similar patterns of valley, stream, floodplain and wetland environments bordered by uplands of landslide prone areas and Pittsburgh red beds which pose real threats to the health of the low lying ecologies.



Photograph 15: Hardwood forests stabilize the narrow ravines throughout Sewickley Valley.

The overall soil pattern reflects the geology and landform of the region and illustrates the need to address mitigation of storm water runoff regimes that will negatively impact the project study area hydrology.

4. Steep Slopes

Slope is the rate of rise or fall of the natural terrain in a single direction expressed as a percentage. The slopes found within the project study area have been calculated based on a two foot (2') contour interval as represented by LiDAR-based topographic data obtained from the PA DEP. Steep slopes are generally defined as those above 25% and are fragile ecosystems that are sensitive to disturbance. Steep slopes which are altered by natural events or human activities can be vulnerable to erosion and landslides and are therefore considered unsuitable for development.

Almost 5,000 acres of the region's lands [more than one third (1/3) of the total land area] are characterized by steep slopes, meaning slopes exceeding twenty five percent (25%). One-fourth (1/4) of these slopes are extremely steep being above forty percent (40%). Steep slopes are fragile

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landscape features; their disturbance by human use and development or by natural events can contribute to accelerated storm water flows and to the degradation of waterways by increasing erosion and sedimentation.

5. Agricultural Suitability

Approximately 2,000 acres of suitable agricultural lands have been mapped within the area indicating the presence of relatively deep, well-drained and moderately-sloped soil conditions. Lands suitable for agriculture are typically also well suited for development. Each use presents different environmental risks. Agricultural operations provide local economic activity and open space; they can also act as a conduit for increased storm water run-off and can contribute to agricultural-related groundwater pollution when chemical fertilizers, animal waste and other agricultural bi-products leach into the soil. A different set of opportunities and challenges are presented when these lands are developed for active human use (athletic fields, housing, commercial etc.) including loss of open lands and natural habitat, and increased storm water run-off caused by removal of vegetation and the addition of impermeable surfaces in the form of grass fields, roads and/or buildings.

6. Aquatic Habitat

Mapping of stream data has identified streams and watersheds that have been studied and found to be favorable to coldwater and warm water fish by the PA DEP as well as high quality streams. The presence of cold water (trout) and warm water (bass) fish species in the project study area's streams provides an indication of the overall health of the hydrologic systems. Little Sewickley Creek, Fern Hollow, Kilbuck Run and Tom's Run watersheds contain favorable fish habitats with a total of over 7,500 acres of cold water habitat and over 3,200 acres of warm water habitat. This data will be used to develop plan protocols for the mitigation of potential storm water threats to these watershed resources.

7. Riparian Corridors

The map indicates a 300 foot wide high quality riparian corridor for the entire length of Little Sewickley Creek and its tributaries including Fern Hollow. In total 600 acres of protective buffer is attributed to these waterways. Additional 300 foot wide corridors are indicated for portions of other project study area streams and



consist of more than 535 acres of land or protective vegetative cover. A riparian corridor is a vegetated buffer growing near a water body or wetland which acts as an interface between water and land. A prime riparian corridor indicates the existence of a high quality stream, or a stream that exhibits chemical and biological water quality exceeding federal “fishable and swimmable” standards. The corridor also includes all stream orders above such streams (headwaters).

Photograph 16: The abundant vegetation of habitable woodlands serves as naturally passive storm water management.

Left in their natural state, riparian corridors provide important habitat diversity and habitat interconnectivity. They increase storm water infiltration and filter impurities and pollutants thereby protecting aquatic resources from erosion and degradation. Poor management of these areas has a reverse effect, contributing to increased storm water run-off, pollutants and flooding, and decreased wildlife habitat.

8. Habitable Woodlands

Almost 4,000 acres of habitable woodlands have been mapped within the project study area. Habitable woodlands are defined by contemporary study as wooded areas large enough to contain a self-sustained eco-system of flora and fauna. These woodlands are typically large contiguous forested areas at least 300 feet removed from existing development. Due to the abundance of vegetation, these lands provide excellent naturally created passive storm water management increasing infiltration of water and reducing run-off quantity and acceleration.

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9. Biological Diversity Areas (BDAs)

Biological Diversity Areas are defined as lands that support several important biological species. The three (3) designated BDAs mapped within the project study area are the northern bank of the Ohio River, Tom's Run Valley and Camp Meeting Woods. The Ohio River BDA consists of the vegetative buffer which parallels the Ohio River, emphasizing the symbiotic relationship of aquatic habitats and riparian corridors.

H. Gray Infrastructure Maps

1. Public Sewer Water Service

Mapping includes the portions of the project study area that are served by existing public sewer and water. Public sewer and water infrastructure overlap in many areas and predominate in the most densely developed areas adjacent to the Ohio River.

The adequacy and safety of potable water and sanitary sewer infrastructure is closely integrated with the management of water quality and storm drainage. Within the project study area, the PA DEP approval of Aleppo Township's Act 537 Plan for sewage disposal and anticipated construction schedule (2011) will facilitate development of lands previously undevelopable or appropriate only for very low density development due to lack of sewer service. Additionally, Sewickley Borough is currently in agreement with Haysville and Glenfield Boroughs to assist them in the preparation of an Act 537 Plan for a sewer system interconnect in Glen Osborne that would serve those communities and Aleppo Township once the communities complete individual sewer system expansions. Infrastructure expansion must be addressed on a regional level in order to prevent the occurrence of development that is contrary to storm water management goals.

2. Existing Water Pollution Control Facilities

Sites of water pollution control facilities included in the PA DEP Water Pollution Control Program are included in the project study area map data. The facilities mapped are industrial and storm water waste sites. Water pollution control facilities may be emitters of point source pollution and can directly impact local water quality. Water quality degradation in turn impacts recreation sites and activities and local aquatic ecology. Water pollution control facilities are monitored by yearly inspections by County officials and by monthly self-inspection reports. Many complaints received and addressed by the Water Pollution Control Section of the Allegheny County Health Department are related to problems such as overflows, sewer line breaks or blockages, residential sewer back-ups, and stream pollution, all of which relate to issues of municipal water quality and storm water flow.

3. Existing Captive Hazardous Waste Sites

Mapping of hazardous waste facilities is based on the PA DEP Pennsylvania Hazardous Waste Facilities Plan to meet the requirements of the state's Solid Waste Management Act. The hazardous waste program regulates the generation, storage, transportation, treatment, and



Photograph 17: The United States Coast Guard station in Glen Osborne is a hazardous waste storage facility along the Ohio River.

disposal of hazardous waste. Under this plan, captured hazardous waste sites need ongoing pollution monitoring due to the on-site waste accumulation. Stored waste includes those from local medical facilities, oil companies, and the United States Coast Guard. The improper storage and disposal of hazardous waste can easily impact water quality since waste or waste residues transported overland by storm water run-off will threaten both surface water (rivers, streams and lakes) as well as ground water.

MAPPING AND ANALYSES SUMMARY**4. Impervious Surface Coverage**

The Impervious Surface Coverage Map is based on GIS data provided by the Pennsylvania Department of Transportation (Penn DOT). Impervious or impermeable surfaces are those which allow little to no rainwater to seep into the soil. They include lands and buildings, paved areas and some types of grass lawns. Impervious surfaces directly affect water infiltration, storm water run-off and water quality. Urban areas generally have a higher ratio of impervious to permeable areas due to the presence of major streets, buildings, parking lots, and reduced vegetative cover. Rural lands typically have a much greater proportion of permeable surfaces which can reduce and slow storm water run-off and accommodate groundwater recharge.

The level of impermeability of the locations mapped is indicated with a range of zero (0) to one hundred (100). The large majority of impervious surfaces are shown in the lowlands of Edgeworth and Sewickley, between Route 65 (Ohio River Boulevard) and the Ohio River edge, and along Interstate 79. Overall, the level of impervious surfaces for the region is not very high, and interestingly even in the most urbanized portions impervious surfaces appear to be less prevalent than some of the areas across the Ohio River perhaps indicating the “small town/rural feel” of the project study area.

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VII. MUNICIPAL OFFICIALS SURVEY

A. Purpose

The Municipal Officials Survey marks the culmination of Phase I Plan. The purpose of the survey was 1) to obtain a general consensus of storm water management priorities for the Sewickley Valley and 2) to identify problem area locations and causes. The base maps were developed to be specific to each community while also offering a view of adjacent communities as well as a key map of the overall project study area. Information represented on the survey maps included rivers, streams, parks, open spaces, topography, and roads.

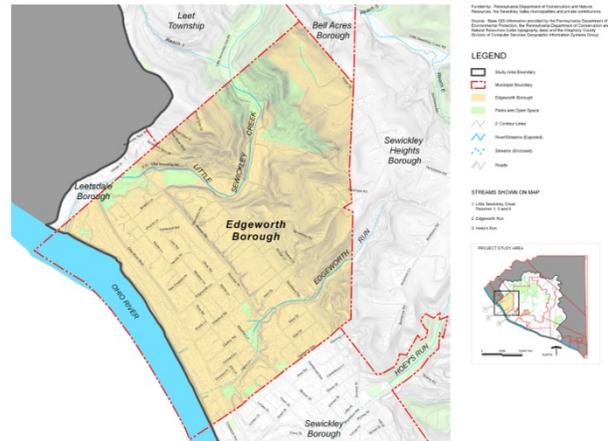


Figure 10: Example of the Community Maps used to record local drainage and storm water data.

Following is a summary of the content, responses and outcomes of the Municipal Officials Survey. The survey in its entirety along with the tabulation of the results can be viewed in Appendix C of this report. Appendix C also includes a detailed explanation of the information to be derived from each question.

B. Content

The content of the survey was based on the map and on tabular and written response data collected relating to the information recorded on the map.

1. Mapping

Survey participants located and mapped locations of obstructions relating to localized storm water management problem areas. The purpose of the maps was two-fold. First, the map served as a tool for each municipality to identify specific storm water, drainage or run-off problem areas within the

community. Second, the maps were collected and analyzed on a regional basis to identify how each issue affects the Sewickley Valley as a whole.

2. Tabular/Written

The problem locations mapped were further described by participants in their responses to Survey Questions related to prioritization of water quality and flooding issues, identification of key obstructions, and problem area descriptions / frequency.

In Question 4, participants were asked to describe the extent of flooding and other storm related water damage than occurred as a result of Hurricane Ivan in 2004 which had widespread impacts in Allegheny County.

C. Response Summary

Subsequent to the completion and return of the surveys, responses were tabulated and a series of maps was prepared illustrating problem areas as related to significant project area conditions including zoning, slopes, and soils types. These exhibits, along with a summary of all the maps produced in the Phase I Plan were presented at a municipal managers. Complete packets of these materials were subsequently mailed to each community representative.

Summaries of the Survey responses are as follows.

1. Question 1: Municipal Prioritization of Water Quality and Flooding Issues

In Question 1 of the survey, communities were asked to prioritize the storm water-related issues listed. The Planning Team tallied the responses as shown in Table 6 (Response Tabulation A). The number of responses in the "Very Important" column of Table 6 indicates that both erosion and sedimentation on disturbed lands and flooding are important priorities to the communities. Because the responses are weighted on a scale of 1 – 5, with "Relatively Unimportant" having a weight of 1 and "Very Important" having a weight of 5, the numbers in the cells of Table 6 were multiplied by the associated weight. A response of "Very Important" received a weighted score of 5 producing the scores in Table 7 (Response Tabulation B).

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Table 6: Question 1 Response Tabulation A

Description	Number of Responses by Priority				
	Very Important (5)	(4)	Moderately Important (3)	(2)	Relatively Unimportant (1)
Water Quality:					
Lands (farmlands and construction sites)	6	0	1	0	3
Erosion & Sedimentation from Streambanks	4	4	1	1	0
Erosion & Sedimentation downstream from disturbances	2	7	1	0	0
Nutrients	1	3	3	1	2
Other:	1	0	0	0	0
*Outflow from development					
Flooding	6	1	2	1	0
Development-Related Stormwater Increases	4	3	1	1	1
Inadequate Groundwater Recharge Area	3	0	3	0	3
Other (please identify):					

Table 7: Question 1 Response Tabulation B

Description	Weighted Priorities					Totals
	Very Important (5)	(4)	Moderately Important (3)	(2)	Relatively Unimportant (1)	
Water Quality:						
Lands (farmlands and construction sites)	30	0	3	0	3	36
Erosion & Sedimentation from Streambanks	20	16	3	2	0	41
Erosion & Sedimentation downstream from disturbances	10	28	3	0	0	41
Nutrients	5	12	9	2	2	30
Other:	5	0	0	0	0	5
*Outflow from development						
Flooding	30	4	6	2	0	42
Development-Related Stormwater Increases	20	12	3	2	1	38
Inadequate Groundwater Recharge Area	15	0	9	0	3	27
Other (please identify):	0	0	0	0	0	0

The storm water-related issues have been prioritized based on the total of the weighted score in Table 8.

Table 8: Prioritized Storm Water Issues

Map No.	Issues
1	Flooding
2	Erosion & Sedimentation from Streambanks
3	Erosion & Sedimentation Downstream from Disturbances
4	Development-Related Storm Water Increases
5	Erosion & Sedimentation on Disturbed Lands (farmlands and construction sites)

2. Questions 2 and 3: Identification of key obstructions (i.e. bridges, culverts, dams, buildings, river walls, embankments, etc) that relate to localized storm water management problem areas.

In Question 2 of the Survey, the communities were asked to identify key obstructions (i.e. bridges, culverts, dams, buildings, river-walls, embankments, etc.) in their municipality that relate to localized storm water management problem areas. The communities were then asked to mark the location(s) on the individual Borough/Township Map provided, assign an identification number to each obstruction, and complete the accompanying table. The answers to Question 2 were to be used as a tool to help the communities answer Question 3 and to demonstrate in graphic form on the Borough/Township Maps the nature and location of the problem areas.

The responses from the various communities had similar patterns that could be grouped into categories of flooding, erosion and contamination. There were also subcategories noted within the three (3) main categories. Flooding was broken down by general cause into backwater, inadequate maintenance and existing/potential obstruction/constriction. Erosion was broken down by type into stream bank and uncontrolled runoff/spring seep. There was one occurrence of contamination listed as an oil spill. Because of the nature of that occurrence it did not fit in to either flooding or erosion and, therefore, a separate category was created.

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The communities then noted the problem area's frequency of occurrence in Question 3. The Planning Team summarized those responses in Table 9: Summary of Storm Water Problem Areas by Category. The "Percent of Total" column displays the percentage of storm water problem area causes and types compared to the total number of all reported problem areas.

Table 9: Summary of Storm Water Problem Areas by Category

	Description	Frequency				Total	Percent (%) of Total
		Frequently	Semi-Annually	Annually	Major Events		
Flooding	Backwater	0	0	0	1	1	0.6%
	Inadequate Maintenance	8	0	2	48	58	35.4%
	Existing/Potential Obstruction or Constriction	13	1	7	77	98	59.8%
Erosion	Stream Bank	3	0	1	0	4	2.4%
	Uncontrolled Runoff/Spring Seep	0	0	0	2	2	1.2%
Contamination	Oil	0	0	0	1	1	0.6%
	Other					0	0.0%
Totals		24	1	10	129	164	
Percent (%) of Total		14.6%	0.6%	6.1%	78.7%		

Table 9 identifies that the main cause (almost 60%) of flooding and, ultimately, of storm water issues in the project study area are existing or potential obstructions and constrictions within streams and drainage ways. Table 9 also demonstrates that most problems or issues occur during major events like Hurricane Ivan.

Primary Survey findings are as follows:

- The majority of storm water related issues consist of problems with inadequate maintenance and obstructions/constrictions (95.2%).
- Majority of storm water-related issues are related to existing/potential obstructions or constrictions (59.8%).

- Majority of storm water-related issues occurred during major storm events (78.7%).

Development Impacts on Storm Water Issues

The Municipal Officials Survey focused primarily on storm water issues within each municipalities' own storm sewer system. This resulted in the identification of inadequate maintenance and constrictions/obstructions as primary causes of storm water issues within those systems. However, this is only part of the overall storm water picture. In addition to these "point source" types of issues, one of the primary contributors to storm water issues is man's land development activities.

Traditional land development practices often entail large amounts of land disturbance, deforestation, soil compaction and the construction of large areas of impervious surfaces. All of these practices reduce the land's natural ability to slow down and absorb excess water during a storm event, which leads to an overall increase in storm water runoff volumes and velocity, which in turn causes greater erosion and sedimentation, flooding, etc.

While it is difficult to address the issues created by existing development, by developing smarter through the implementation and enforcement of best management practices, such as requiring net zero run-off development, municipalities can actively work to reduce and/or eliminate negative storm water impacts of new development.

Figure 11: Development Impacts on Storm Water Management.

D. Survey Composite Maps

Four (4) composite maps have been created to illustrate the data tabulated from the Municipal Officials Survey responses. The maps illustrate storm water problem areas by location, number, and category in relation to Generalized Zoning Classification, Poor Soils, Steep Slopes and Watershed. These maps highlight the challenges to be addressed in future storm water planning in the Sewickley Valley. The maps contained in this report section may be viewed in more detail in Appendix F where they are formatted as 11" x 17" fold outs.

The four (4) Municipal Officials Survey composite maps graphically represent the storm water problem area locations with dot symbols that are colored to

MUNICIPAL OFFICIALS SURVEY

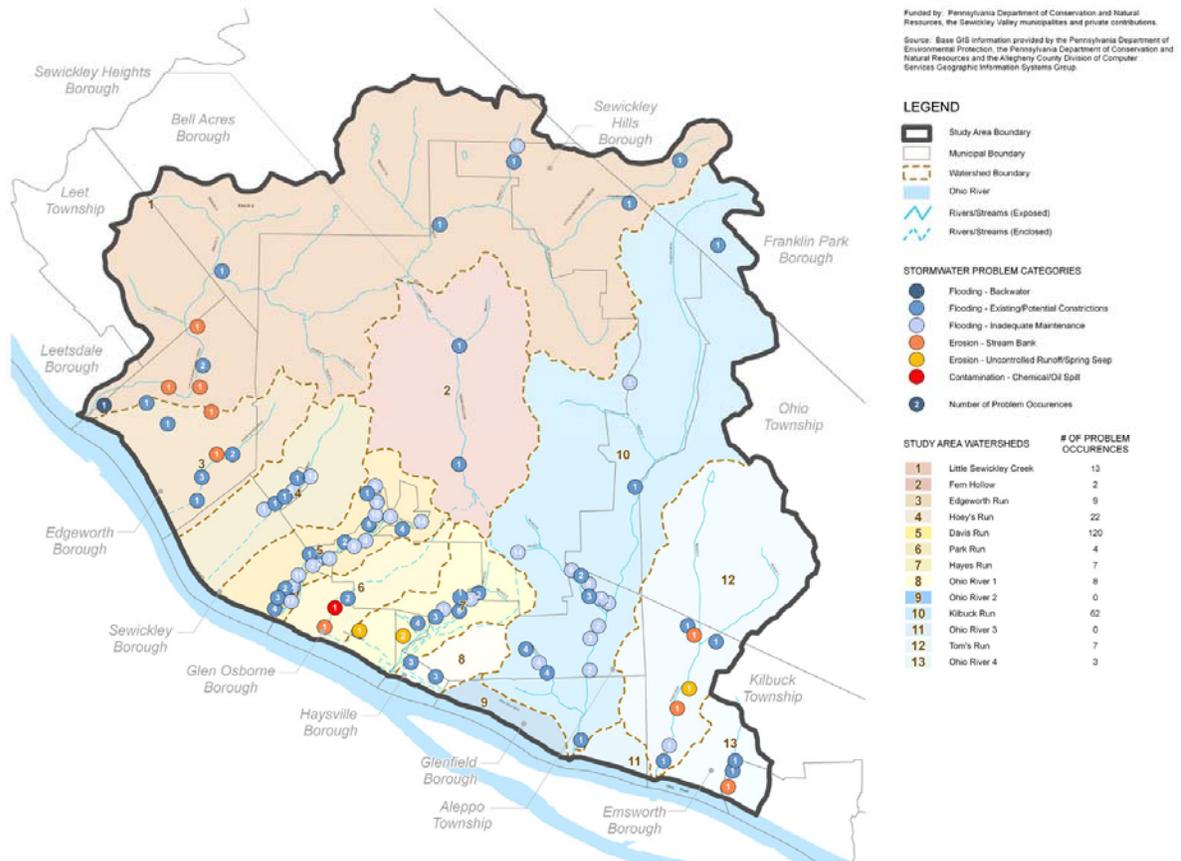
represent the problem categories as identified in the survey. The numbers within the dots represent the number of occurrences that were recorded. Table 10 illustrates the problem categories and their map symbols.

Table 10: Storm Water Problem Categories Mapped

	Flooding - Backwater
	Flooding - Existing/Potential Constrictions
	Flooding - Inadequate Maintenance
	Erosion - Stream Bank
	Erosion - Uncontrolled Runoff/Spring Seep
	Contamination - Chemical/Oil Spill

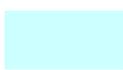
Map Exhibit 3: Municipal Officials Survey Problem Areas by Watershed/Sub-Watershed

The Municipal Officials Survey Problem Areas Map gives an overall view of the problem areas that were located and mapped by the project study area communities for the Municipal Officials Survey. Table 11 indicates the number of problem occurrences that were recorded for each sub-watershed.



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Table 11: Number of Problem Occurrences Recorded per Sub-watershed

Color	Subwatershed	No. of Occurances
	Little Sewickley Creek	13
	Fern Hollow	2
	Edgeworth Run	9
	Hoey's Run	22
	Davis Run	120
	Park Run	4
	Hays Run	7
	Ohio River 1	8
	Ohio River 2	0
	Kilbuck Run	62
	Ohio River 3	0
	Tom's Run	7
	Ohio River 4	3

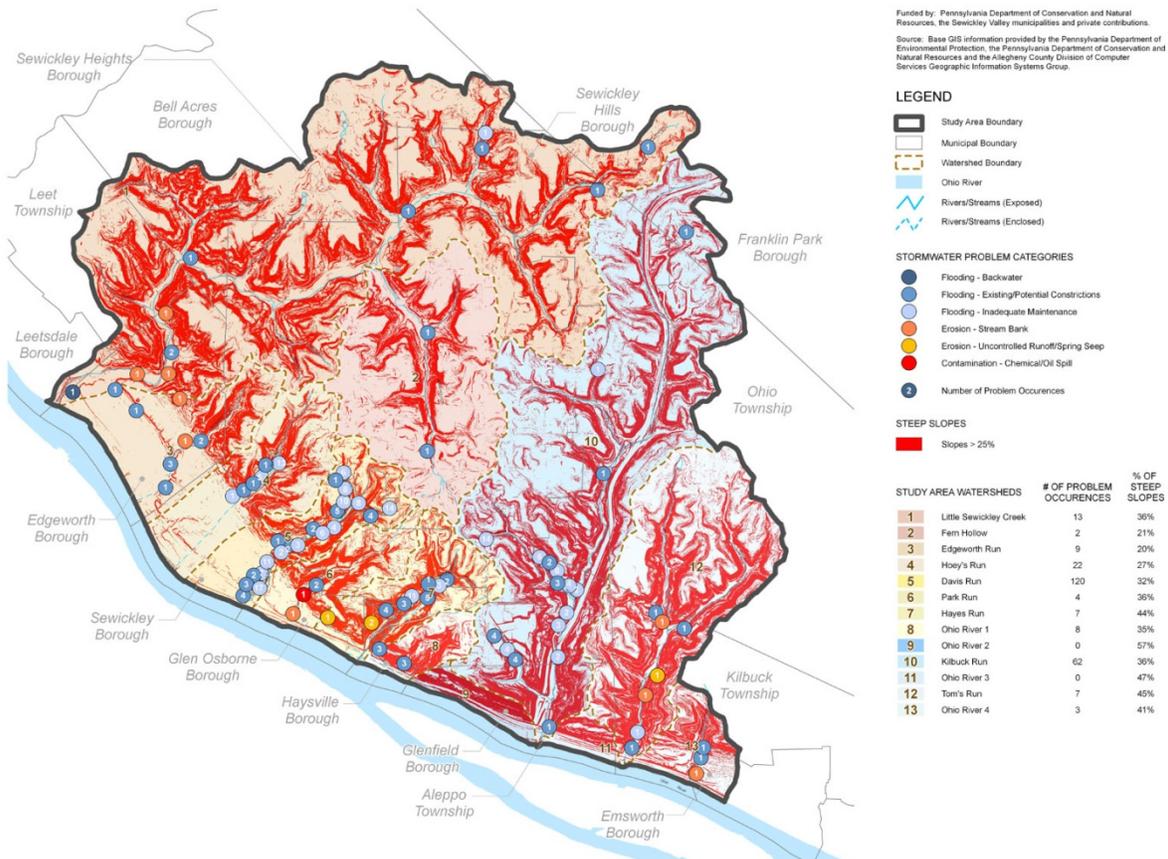
The highest number of problems was recorded in the Davis Run, Kilbuck Run, Hoey's Run and Little Sewickley Creek sub-watersheds/watersheds which were 120, 62, 22 and 13 respectively. With the largest land area, the percentage of problem areas recorded per acre in the Little Sewickley Creek watershed is much smaller than in the other three (3) sub-watersheds. In the Edgeworth Run and Ohio River 1 sub-watersheds recorded problem areas numbered eight (8) and nine (9)

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respectively. Problems recorded in the Tom's Run and the Hays Run sub-watersheds numbered seven (7) for each. Fern Hollow, Park Run and Ohio River 4 sub-watersheds problem areas were two (2), four (4) and three (3) respectively. No problems were recorded in the Ohio River 2 and Ohio River 3 sub-watersheds.

Map Exhibit 4: Municipal Officials Survey Problem Areas by Steep Slopes

The map shows storm water problem occurrences in relationship to the steep slopes in the region which have been described earlier as slopes greater than 25%. Steep slopes are symbolized on the map by two (2) foot contours depicted in "red". Additionally, the percentage of steep slope acreage in each watershed has been calculated and presented in tabular form on the map in order to show any correlation between percentage of steep slopes in a watershed/sub-watershed and storm water problems recorded. It is obvious from the map graphic that there is a strong relationship between steep slope locations and problem occurrences, with most of the "dots" located within or down-stream of steep slope areas. Survey



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results do not show an obvious correlation between steep slope percentage and storm water problems recorded in a given watershed/sub-watershed. This is probably due to the fact that both development and steep slope disturbance are varied throughout the region. However, the percentage of area in steep slopes within a watershed should be a factor considered in all future land use decisions. The sensitivity of these features and their potential impact on watershed health as well as their habitat value are negative and positive factors that make them central to watershed planning. Table 12 is an enlargement of the table included in the map which lists percentage of steep slopes and number of problem occurrences by watershed.

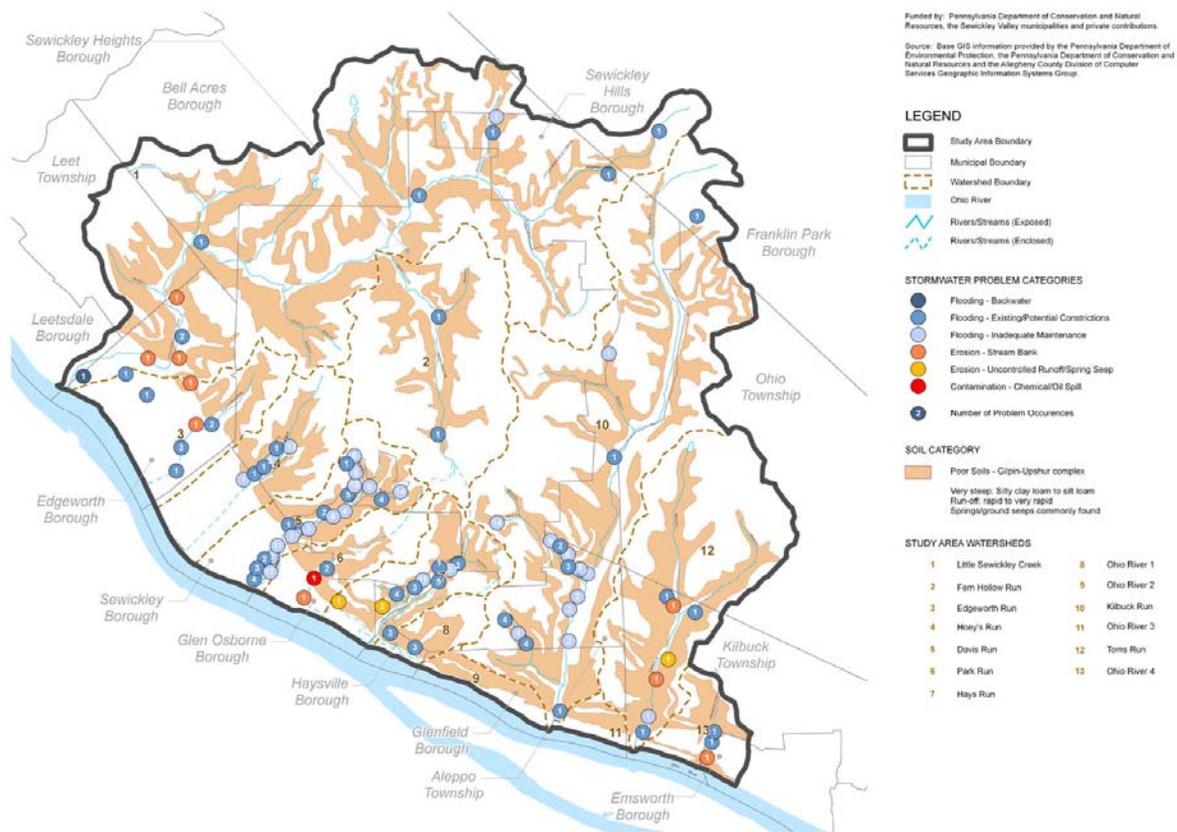
Table 12: Steep Slopes and Problem Occurrences by Watershed.

Color	Subwatershed	No. of Problems	% Steep Slopes
	Little Sewickley Creek	13	47%
	Fern Hollow	2	57%
	Edgeworth Run	9	41%
	Hoey's Run	22	36%
	Davis Run	120	36%
	Park Run	4	45%
	Hays Run	7	35%
	Ohio River 1	8	44%
	Ohio River 2	0	32%
	Kilbuck Run	62	27%
	Ohio River 3	0	20%
	Tom's Run	7	21%
	Ohio River 4	3	36%

Map Exhibit 5: Municipal Officials Survey Problem Areas by Poor Soils

The map shows storm water problem occurrences in relationship to the location of poor soils within the region which are indicated by the color “beige”. The map has been generalized to show the overall pattern of soils which are comprised of the Gilpin-Upshur complex. The character of this complex is as follows:

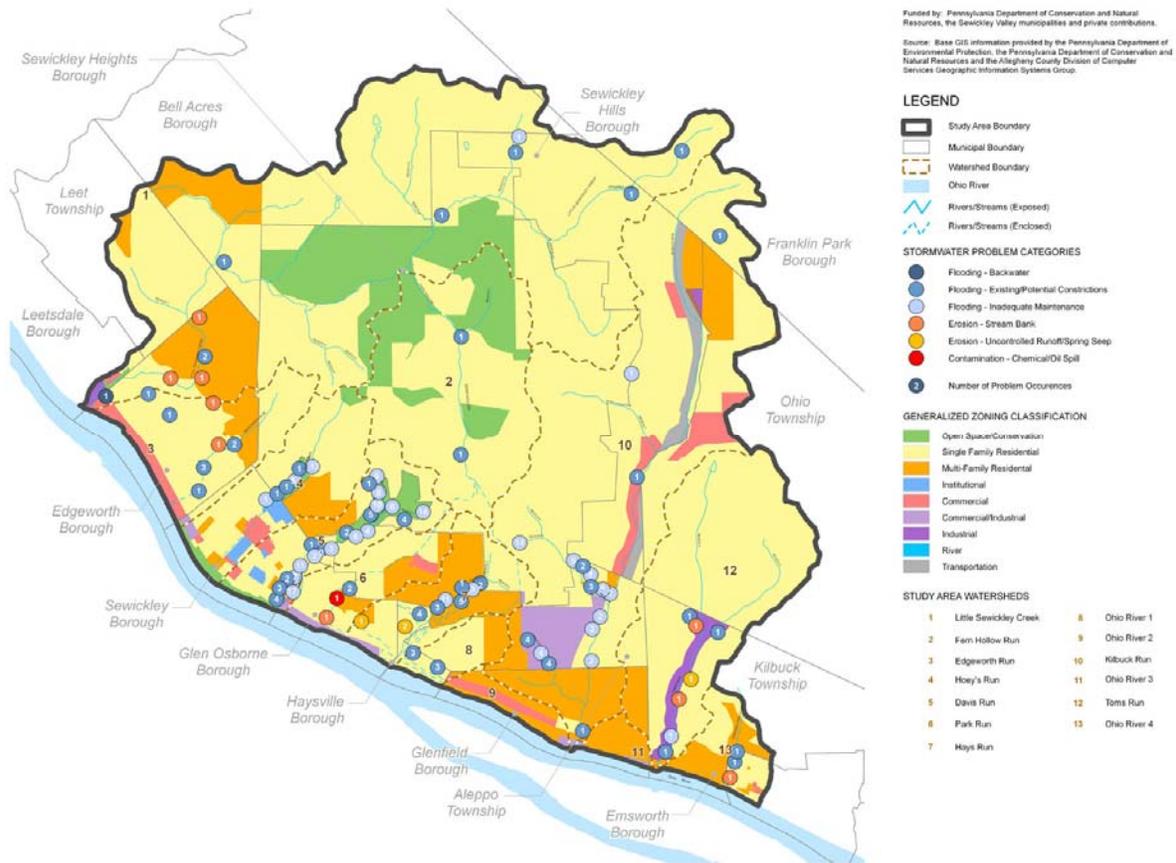
- Very steep; silty clay loam to silt loam
- Run-off: rapid to very rapid
- Springs/ground seeps commonly found



As discussed in the GIS Atlas descriptions, the land form patterns reflect the hydrology, geology, and soils of the region. The relationship between poor soil locations and steep slopes is very apparent when the slope and soil maps are compared, and the storm water occurrences therefore can be associated with the soil characteristics described above.

Map Exhibit 6: Municipal Officials Survey Problem Areas by Generalized Zoning Classification

The map shows storm water problem occurrences in relationship to nine (9) generalized zoning categories which regulate land use within the Sewickley Valley. An exception to this is the mixed-use district where commercial, industrial and, in some cases, residential land uses may be integrated.



Along the Ohio River, communities such as Sewickley Borough, Osborne Borough and Edgeworth Borough have the highest residential densities and the greatest diversity of land uses. The communities located on the upland areas such as Sewickley Heights, Sewickley Hills and Bell Acres Boroughs have a limited palette of zoning classifications and permit lower residential densities only. Along the Ohio River, the majority of the land is zoned R-1 (single-family residential), though areas are also zoned for more dense and varied housing, local commercial activity (along PA Route 65), and larger-scale industrial / commercial activity.

Table 13: Generalized Zoning Classifications within the Sewickley Valley

Generalized Zoning Classifications	
	Open Space/Conservation
	Single Family Residential
	Multi-Family Residential
	Institutional
	Commercial
	Commercial/Industrial
	Industrial
	River
	Transportation

Table 13 illustrates the generalized zoning classifications and their map symbols. There is some correlation between the storm water problem occurrences and the zoning classifications as mapped. Many of the sites noted lie within the higher density Multi-Family Residential districts and adjacent to or within Commercial/Industrial and Industrial zoned areas. In general most of the problems have occurred in the higher density, more urbanized portions of the Valley and few problem occurrences have been noted in the more rural upland areas. Zoning is a tool whereby uses and density can be controlled and therefore must be applied according to the land's capacity for development. Zoning in the region should be amended to support the goals for the conservation of watershed resources.

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VIII. CONCLUSION

Phase I of the Rivers Conservation and Management Plan presents a graphic and written summary of the Sewickley Valley's physical and natural resources and their relationship to the growing challenges of storm water control and management. The analysis of the project study area and the Municipal Officials Survey responses as related to storm water priorities within the region, will serve as the starting points for the technical studies and outcomes related to land and water resource management for partner communities in Phase II of the Plan.



Photograph 18: The forest buffer of an upper reach of Davis Creek in Waterworks Park serves as a resource for both habitat and water quality protection.

A. Natural Resources / Opportunities

The Rivers Conservation aspect of Phase I focused on the geographic distribution and significance of the project study area's combined natural resources. The Weighted Composite Maps included in Appendix B graphically portray the types and relative value of existing sensitive site features and exceptional habitat/recreation areas. The relevance of the features highlighted on these maps is multi-dimensional. Firstly, the mismanagement of the natural features of the region will add to erosion, water quality degradation, and run-off quantity and velocity thereby augmenting storm water problems within the Valley. Secondly, the extraordinary number of high quality natural features within the Sewickley Valley watersheds/sub-watersheds has the potential to contribute positively to storm water management. The large tracts of conservation lands, riparian buffers, and woodland habitat offer opportunities for infiltration, protection of ground water resources, and reduction of run-off acceleration, all of which can aid in improving the health of the regional watershed.

B. Storm Water Run-Off Challenges

The Problem Areas Maps identified in the Municipal Officials Survey, as summarized in the preceding section, depict the problem areas in the context of the region's key physical and demographic characteristics; including watershed location and proximity to steep slopes, problem soils and generalized zoning classifications. The problem areas have been presented as the challenges of 1) flooding, erosion and contamination and 2) endangerment of the existing sensitive site features. The development of Phase II of the Rivers Conservation and Management Plan for the Little Sewickley Creek and the Ohio River watersheds will provide the education opportunities/forms, technological tools, and regulatory measures to enable the partner communities to successfully respond to these challenges.

C. A Double-Edged Sword

The opportunities and challenges of the partner communities can be viewed as two (2) sides of a double edged sword. On one side the region's exceptional natural resources are one of its major "draws" offering a high quality of life and the potential for sparking expansion and economic development in the partner communities. On the "flip" side, this same growth and prosperity has the potential to degrade and destroy both the very social/recreational values that attract residents to the region. Moreover the potential degradation reduces the ability of the natural resources to function as a productive ecological system supporting regional growth and success.

The Phase I Plan has prepared the foundation for Phase II activities and outcomes with the following completed tasks and products:

1. A demonstrated commitment of the partner communities to act collectively and combine their resources to respectively address the PA DCNR and PA DEP goals and objectives of rivers conservation and storm water management in the Sewickley Valley.
2. Detailed mapping and analysis created a data and geographic informational foundation for assessing the current conditions within the project study area

CONCLUSION

and the significance of these conditions for future storm water management within the Little Sewickley Creek and the Ohio River Watersheds.

3. An assessment of current conditions presents an overview of the social and economic characteristics, employment centers, cultural resources, natural resources, public facilities and infrastructure and land use within the fifteen (15) partner communities. Current conditions will be the baseline for predicting the effects of future growth in the region and will inform recommendations for both rivers conservation and for storm water management.
4. The Municipal Officials Survey provides a summary of the storm water related problems within each sub-watershed and within each partner community. This information will form the basis of sub-watershed area technical analyses and modeling in Phase II of the Plan.

D. Conclusion

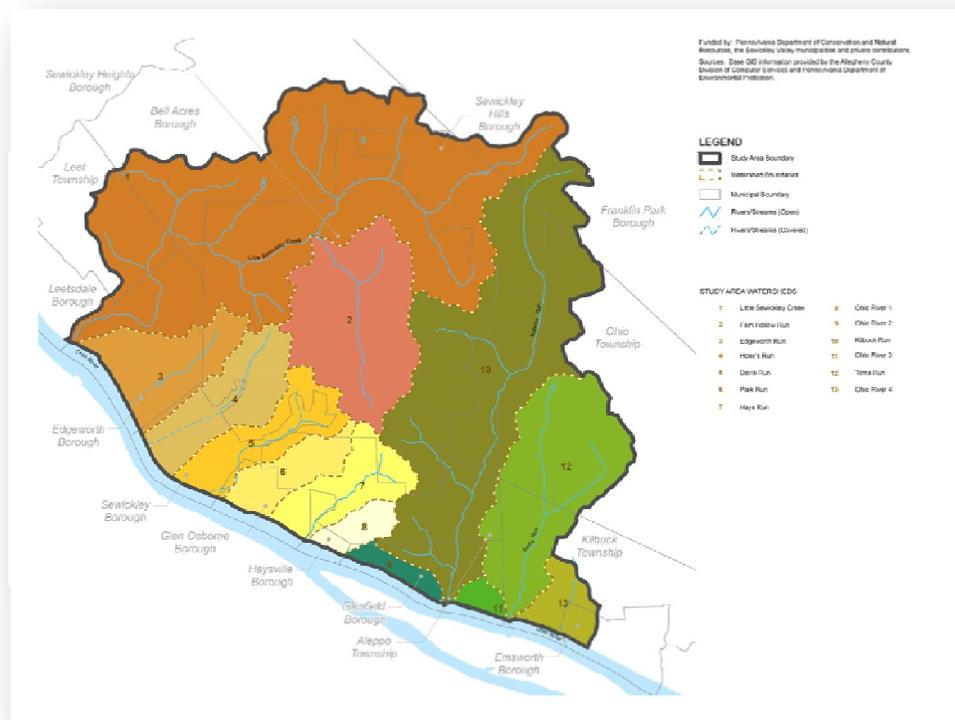
In keeping with Phase I, Phase II of the Plan will continue to concentrate on the dual objectives of the PA DCNR Rivers Conservation Plan to develop a conservation and management plan which addresses existing land use and watershed characteristics as well as potential impacts from new development. This project approach supports the notion that 1) socially and environmentally responsible planning and development views the opportunities and the challenges of the region as inter-related factors which cannot be considered separately and 2) shared watershed planning objectives must be implemented by each partner community for the good of the watershed and region as a whole. This approach will continue to provide the framework for the detailed technical studies and policy-oriented recommendations related to land and water management that will be the focus of the Phase II Plan.

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Sewickley Valley Rivers Conservation and Management Plan

Sewickley Valley Communities Partnership

Phase II Recommendations



Allegheny County, Pennsylvania

December 2010

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PURPOSE, GOALS AND OBJECTIVES**IX. PURPOSE, GOALS AND OBJECTIVES****A. Phase II Purpose**

Building on the inventory and analyses completed in Phase I which identified specific issues within the Sewickley Valley regarding water quality, stream bank erosion, storm water discharge, illegal dumping, water access, and wildlife conservation, Phase II of the Rivers Conservation and Management Plan seeks to develop management and implementation strategies, tools and policies, as well as recreation, education and water resource related economic development opportunities to address the issues identified in Phase I. This is accomplished through additional analyses and the development of key recommendations that define methods to address the health of water resources, avoidance of flooding, erosion and landslides, conservation of the Region's sensitive resources, and the continued and enhanced resident enjoyment of the Commonwealth's natural systems. In addition to the recommendations, several key demonstration projects have been conceptualized to illustrate the implementation of a few of the plan's recommendations. These demonstration projects are intended to provide realistic examples, inspirational rallying points and potential early implementation steps.

In Phase II, the partner communities are continuing their commitment to collectively address their key water resource challenges by combining comprehensive planning strategies to create a multi-faceted management plan for the natural resources of the Sewickley Valley.

B. Goals and Objectives

Goals are defined as the general results toward which all efforts will be directed. Objectives are the specific attainable results pursuant to each goal. The following goals and objectives formed the guiding principles for Phase II's direction and activities. The goals are indicated by the numbered statements; the objectives are detailed by the bulleted text.

1. Provide participating municipalities with a “blueprint” for active measures in addressing their water conservation and management issues.
 - Identify potential management and implementation strategies for administering the recommendations contained within this Report.
 - Identify the impact, priority and magnitude of implementing the Report’s recommendations.
 - Illustrate how the Report’s recommendations can be implemented to achieve the Region’s water conservation goals.

2. Protect and enhance the existing water resources and natural environments.
 - Identify specific policies that reinforce ongoing sustainable development and management of water resources.
 - Identify specific sensitive resource areas that are integral to the overall health of the Region’s water resources.
 - Identify strategies/policies to protect sensitive resources.
 - Identify strategies to promote awareness of water conservation issues.

3. Provide for and promote river and stream related recreational opportunities.
 - Maximize access opportunities to the region’s waterways.
 - Identify ancillary recreation opportunities such as trails, nature centers, etc.

PLANNING APPROACH

X. PLANNING APPROACH

A. Work Tasks

The Phase II approach incorporates the Phase I physical and natural resource assessment and outlines ways to manage storm water through planning policies, as well as ways to leverage the Region's water resources to maintain and improve the quality of life for residents within the Sewickley Valley. Work tasks include:

1. Prioritize the conservation of sensitive resources based upon the Phase I inventories;
2. Identify opportunities for leveraging the Region's existing natural, historic and cultural resources to provide economic opportunities through recreation and tourism;
3. Develop specific policy, land management, recreation, education and economic recommendations.
4. Determine potential future threats to conservation efforts;
5. Demonstrate through example projects how potential policies and/or actions can be implemented to achieve the Region's water resource conservation goals, such as mitigating storm water issues, improving water quality and providing access to water resources; and
6. Outline management and implementation strategies for administering joint municipal storm water and conservation initiatives.

B. Public Participation

Throughout the entire planning process, a number of opportunities or venues for public input were available. One Public Meeting and several Project Steering Committee Meetings were held throughout Phase II to obtain community feedback.

1. Public Meeting

A Public Meeting was held early in Phase II and included a brief formal presentation of the Phase I work products followed by subsequent discussions regarding potential implementation and management strategies to address the water conservation issues identified in Phase I. The meeting allowed the Planning Team to personally present the public with background data and planning concepts, as well as address any questions the public may have regarding the project.

2. Steering Committee Meetings

The Planning Team met with the same Steering Committee members as in Phase I to discuss the work scope, initial Stakeholder thoughts, concerns and visions regarding Phase II, and ultimately to establish the Stakeholders' initial goals and objectives regarding the planning process outcomes. The goals and objectives recommended by the Stakeholders have served as the foundation of planning activities and were continuously refined as new facts were revealed and new ideas emerged.

Throughout the planning process, additional Steering Committee Meetings were held, to review work completed to date, work through and build consensus regarding planning issues, and discuss future planning schedules, directions and activities.

3. Public Officials Meeting

Based upon the review of preliminary recommendations with the Steering Committee and subsequent discussions, it became clear that the Region's municipal leaders needed to come together to agree upon a unified strategy for addressing water conservation issues. Accordingly, a "Regional Summit" was held on January 10, 2011 to review the project findings with municipal leaders, discuss the "critical path" for municipalities to address water conservation issues and to develop an informal agreement for municipalities to adopt the Rivers Conservation and Management Plan, as well as continue to form intergovernmental cooperative initiatives to address land and water conservation issues on a watershed basis.

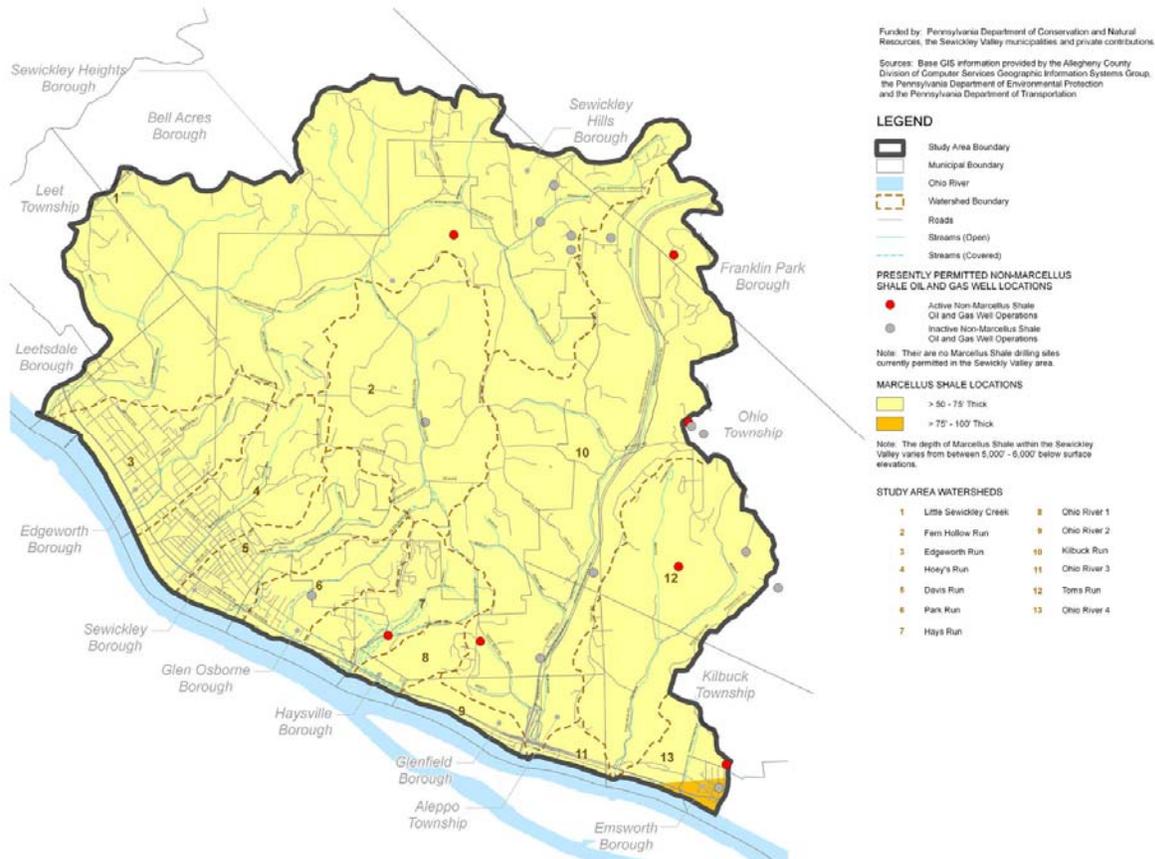
TECHNICAL STUDIES AND ANALYSES SUMMARY**XI. TECHNICAL STUDIES AND ANALYSES SUMMARY****A. Additional Phase II Maps**

The Phase II technical studies build upon the inventories and analyses completed as part of Phase I, and analyzed the concentrations of sensitive resources to provide the framework for developing maps that identify resource protection, greenway and recreational opportunities. In addition, due to the current public discussions throughout western Pennsylvania regarding natural gas exploration and its impact on water resources, additional inventory mapping was conducted specifically related to Marcellus shale in the region. These maps provide the framework for the Sewickley Valley Region to intensify and focus its conservation efforts on those areas that have the highest conservation value. All maps highlighted in this section can be found in Appendix B as an 11" x 17" fold out exhibit. The maps include:

- Oil and Gas Resource Analysis Map;
- Sensitive Resource Overlay Plan;
- Green Space Opportunities Map;
- Regional Greenbelt Concept Plan;
- Existing Recreational Opportunities Map; and
- Proposed Recreational Opportunities Plan.

B. Oil and Gas Resource Analysis

Map Exhibit 7: Oil and Gas Resource Analysis Map



The Oil and Gas Resource Analysis Map displays the active and inactive conventional oil and gas well operation within and in the immediate vicinity of the Sewickley Valley Region. Currently there are seven (7) active and thirteen (13) inactive oil and gas well operations. The locations of the gas/oil drillings are relatively within close proximity to one another, and much of the drilling has occurred on the eastern portion of the Region. Coincidentally, these strategic locations may have been chosen due to the relative depth of the underlying Marcellus shale formation.

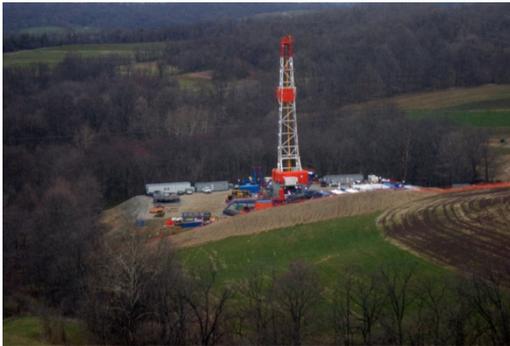
Hydraulic fracturing which enables gas to be released from the pores of organic shale, such as the Marcellus, requires the use of chemicals and large quantities

TECHNICAL STUDIES AND ANALYSES SUMMARY

of water. In Pennsylvania over 2,200 Marcellus Shale wells have been drilled since 2005. In Allegheny County, a total of 3 Marcellus Shale wells have been drilled since 2008.

Marcellus shale natural gas extraction can potentially affect vital resources such as land, water and air as outlined below:

1. Heavy equipment traveling over the land can cause compaction of soil which reduces plant production and increases runoff.
2. Access roads to a well site may require the clearing of forested lands, and not only reduces the number of trees, but disrupts the habitats in that area.
3. State highways and municipal roads can be severely affected by the extreme use and wear from heavy traffic volumes.
4. The large water demands required for drilling and hydraulic fracturing can affect municipal water supplies as well as fish and other aquatic habitats.
5. Drilling by-products such as hydrocarbons, heavy metals, radioactive materials, and high levels of total dissolved solids are separated out and transported to landfills where they are stored.



Photograph 19: Marcellus shale gas compression station in Union Township, Washington County, PA.



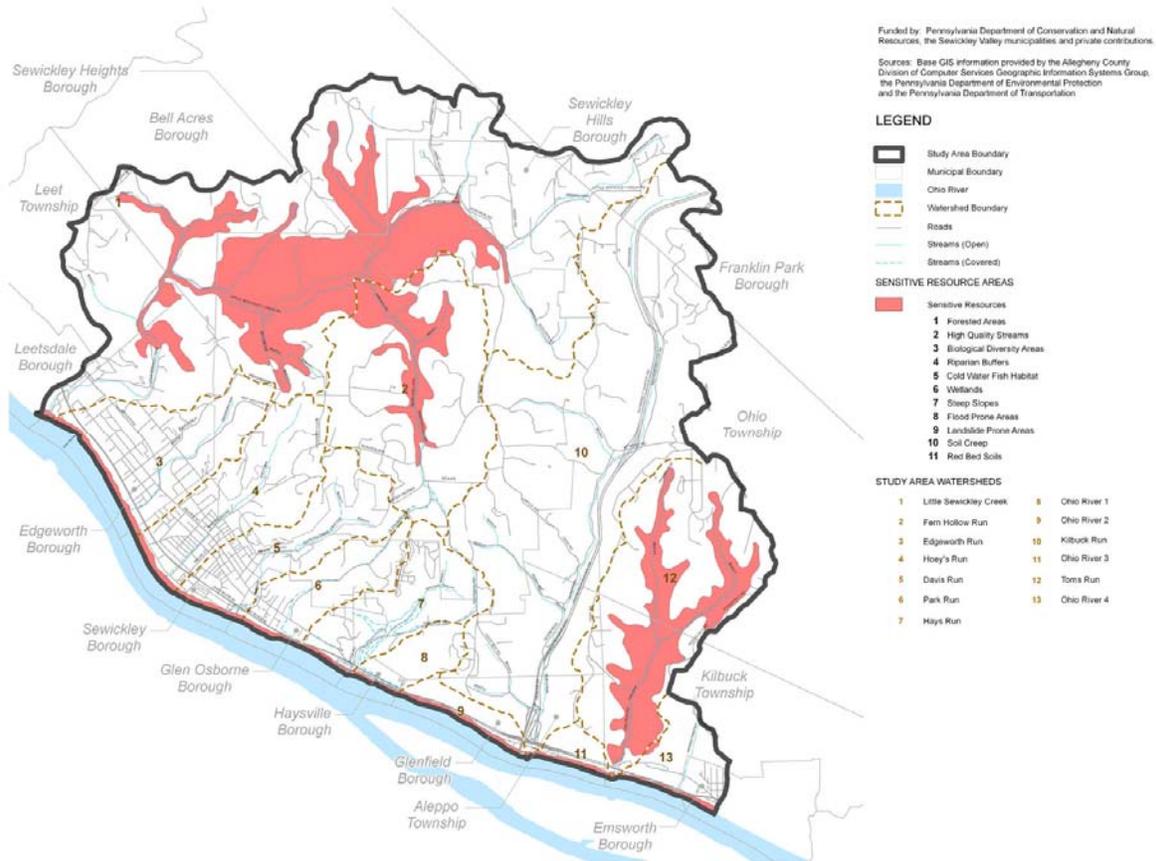
Photograph 20: An active Marcellus shale drilling site in Upshur County, WV.

Based on current industry trends, natural gas extraction, particularly Marcellus shale drilling is becoming a very wide-spread phenomenon in Western Pennsylvania. The communities within Sewickley Valley need to be aware of the types of environmental impacts being imposed on the Region. However, natural gas drilling can offer many benefits to not only the Region, but Pennsylvania as a whole as well. Some of these benefits include economic opportunities, creation of new jobs, and the reduction of dependence on resources from overseas. While there is opportunity to expand on drilling in the region, municipalities have to be aware of the potential impacts drilling may have on essential resources like land, water and air.

TECHNICAL STUDIES AND ANALYSES SUMMARY

C. Sensitive Resource Overlay

Map Exhibit 8: Sensitive Resource Overlay Plan



The Sensitive Resource Overlay Plan displays those areas within the project area that exhibit the highest concentration of sensitive resources (forested areas, riparian buffers, steep slopes, wetlands, soil creep, etc.). These areas are recognized and mapped to show which areas are most vulnerable to the impacts of human activity. All of the areas require special attention due to their uniqueness, rarity, diversity, etc. These critical areas shall require special protection, preservation and minimizing of disturbance in order to protect the future of these resources.



Photograph 21: Residential subdivision in Sewickley Hills where the site was stripped of a large portion of its vegetation, increasing the likelihood of erosion, the loss of wildlife habitat, etc.

The significance of the map underlines areas within the Region that have high concentrations of resources that need to be protected/preserved. Protecting these resources will provide numerous benefits including, protecting wildlife habitat, prevent increases in storm water and chemical runoff, providing natural filtration for air and water pollutants, offering flood, erosion and sedimentation control, etc. In order for this technique to be adopted and enacted, each Municipality would need to amend their current zoning and/or subdivision and land development ordinances. Enforcing this type of zoning technique can be difficult due to the reliance on intergovernmental cooperation and the need for a unified enforcement effort or entity.

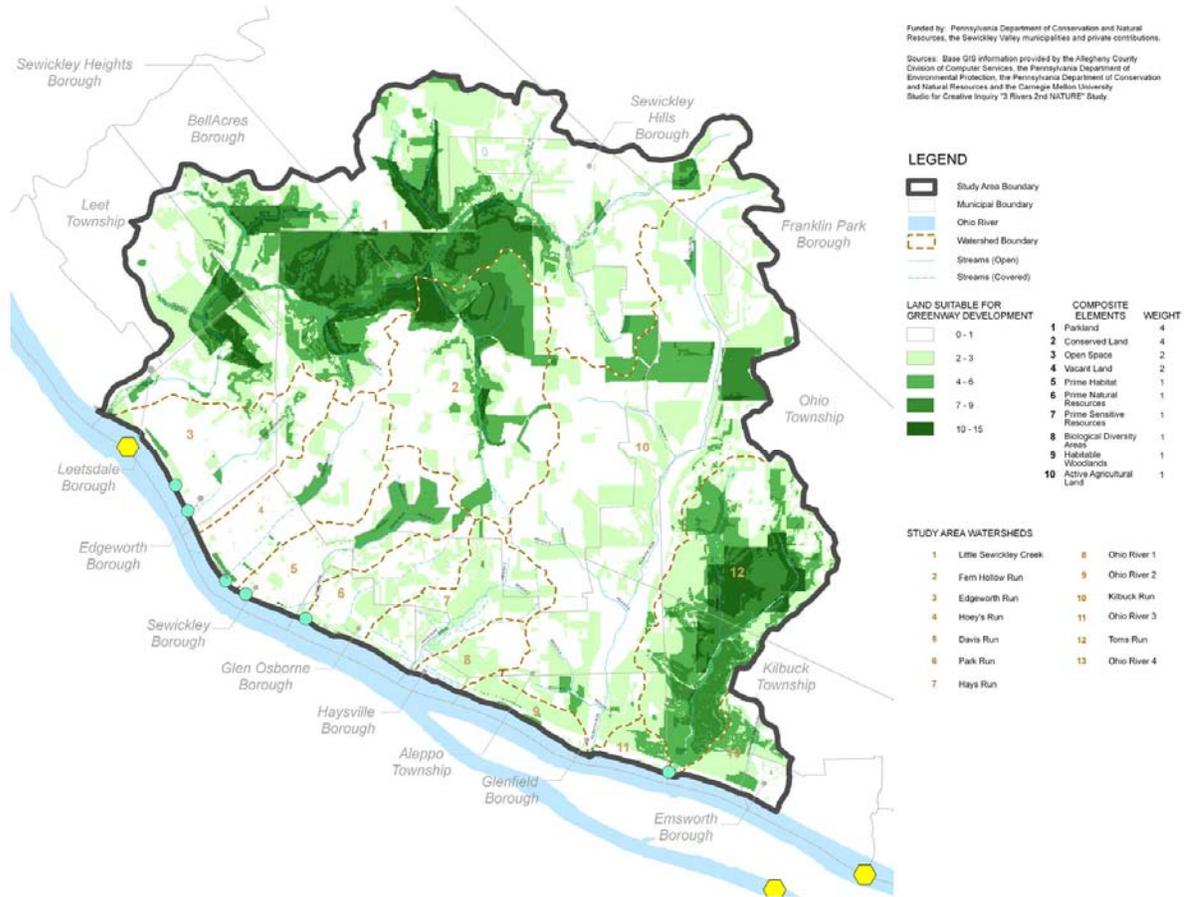


Photograph 22: Protecting valuable resources such as stream corridors and forested areas will help protect wildlife habitat, minimize erosion, reduce storm water runoff, etc.

TECHNICAL STUDIES AND ANALYSES SUMMARY

D. Green Space Opportunities

Map Exhibit 9: Green Space Opportunities Map



The Green Space Opportunities Map is combination of resources analyzed from Phase I as well as additional water resources data and recreation areas data collected and used to identify areas within the region that need to be protected / conserved. The weighted composite elements include parkland, conserved land, open space, vacant land, prime habitat, prime natural resources, prime sensitive resources, biological diversity areas, habitable woodlands and active agricultural land. In turn, this map provides the basic framework for developing and strategically locating a network of greenway corridors within the Region.

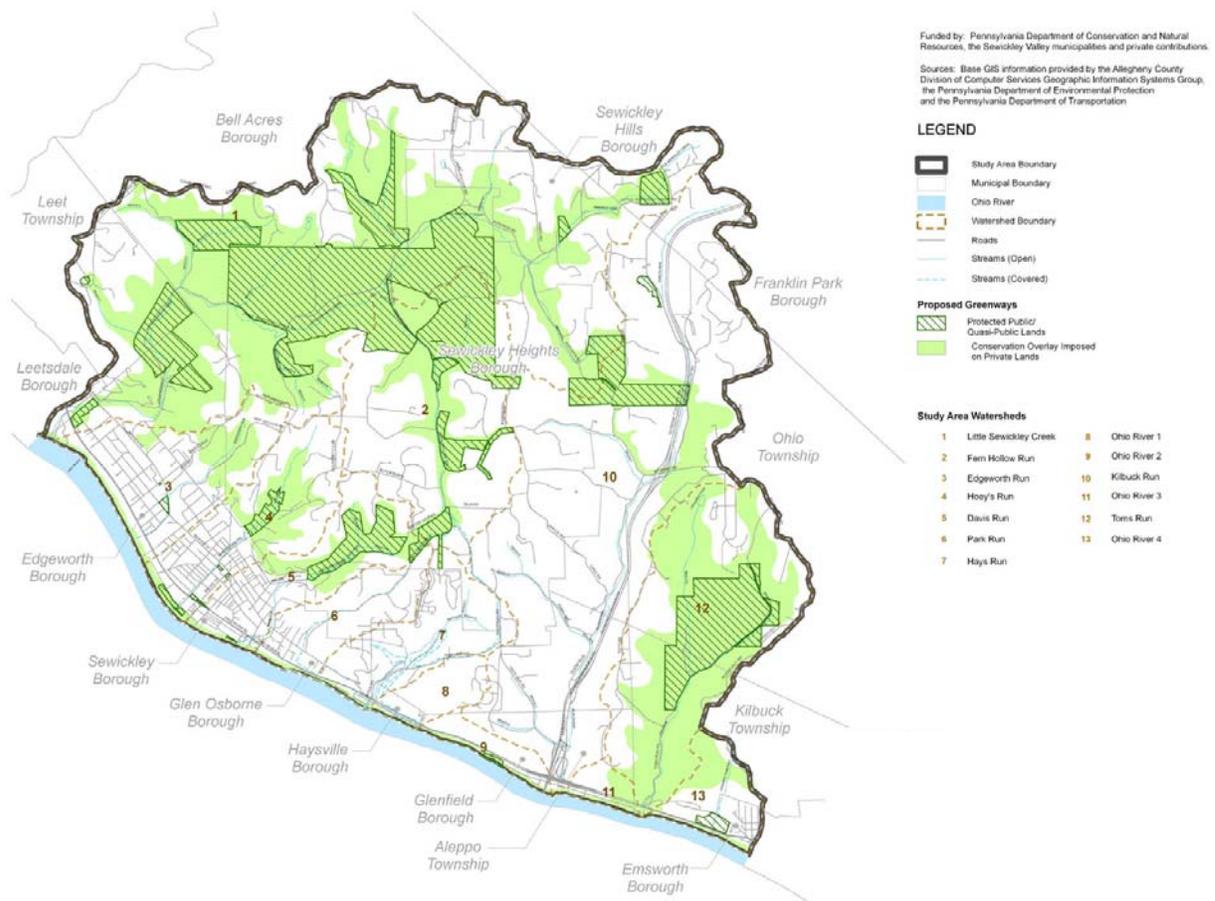
SEWICKLEY VALLEY RIVERS CONSERVATION AND MANAGEMENT PLAN

The significance of the map underlines areas within the region that have high concentrations of “green” resources combined with the sensitive resources outlined in the above map which need to be protected/preserved. The “green” resource map will be the underlying factor in developing a greenways corridor map. Mapping these areas helps to understand the valuable resources within the region that are in need of preservation in order to protect wildlife, promote recreation, reduce runoff, encourage sustainability, elevate the physical attractiveness of the region, maintain the rural character, etc. In order for this technique to be adopted and enacted, each Municipality would need to amend their current zoning and/or subdivision and land development ordinances.

E. Regional Greenbelt Concept

Map Exhibit 10: Regional Greenbelt Concept Plan

Based upon the analysis of the Green Space Opportunities Map, the Proposed



TECHNICAL STUDIES AND ANALYSES SUMMARY

Regional Greenbelt Concept Plan displays proposed potential greenway corridors which includes, protected public/quasi-public lands and conservation overlays imposed on private lands. A greenbelt is a network of public opens spaces and recreational areas connected through a series of trail corridors and parks. Greenways can fulfill a number of activities such as walking, hiking, jogging, biking, bird watching, fishing, picnicking, horseback riding, nature studying and other related outdoor activities. Many of the valley's ecological features (wildlife, water bodies, fish habitat, vegetation, birds, etc.) can be experienced within the Greenbelt. A major goal in creating a regional-scale Greenbelt is to establish a network of interconnected trails, parks and open spaces, water bodies, conservation lands, etc. This network provides protection to sensitive resources, while providing valuable quality of life resources for the Region's residents.

The significance of the Greenbelt Concept Plan highlights potential greenway corridors that have been strategically developed based upon the Green Space Opportunities Map. This map establishes a continuous network of green corridors that will provide numerous benefits including, recreational opportunities, wildlife protection, runoff reduction, promoting sustainability, enhance property values, maintain the rural character of the region, increase the physical attractiveness of the developed areas, etc. In order for the Greenbelt to be created, cooperation between each of the participating municipalities would be necessary and modifications to the zoning and/or subdivision and land development ordinances would be required.



Photograph 23: Signs of wildlife migration within the Region.

The Boulder, Colorado Greenbelt System:

The concept of a greenbelt was initially intended to protect open space surrounding a community, and utilize this space as a public amenity. This concept can also be applied to protect a community from the pressures of sprawl and to preserve its unique character. However, today the term "greenbelt" can refer to a linear strip of protected natural land within an urbanized context. These strips of land are often along streams, low-lying areas and steep slopes which generally have low development value.

Boulder, Colorado was an early pioneer of the greenbelt concept, and is comprised of a series of corridors along riparian areas including Boulder Creek and six of its tributaries, which provide an opportunity to integrate multiple-use objectives.

Objectives:

- Riparian, floodplain and wetland protection and restoration;
- Water quality enhancement;
- Storm Drainage;
- Alternative transportation routes for pedestrians and bicyclists;
- Recreation;
- Protection of cultural resources.

Statistics:

- 42,000 acres
- 130 miles of improved trails
- 304 miles of unimproved trails
- 3.5 million visitors each year

For more information visit www.bouldercolorado.gov

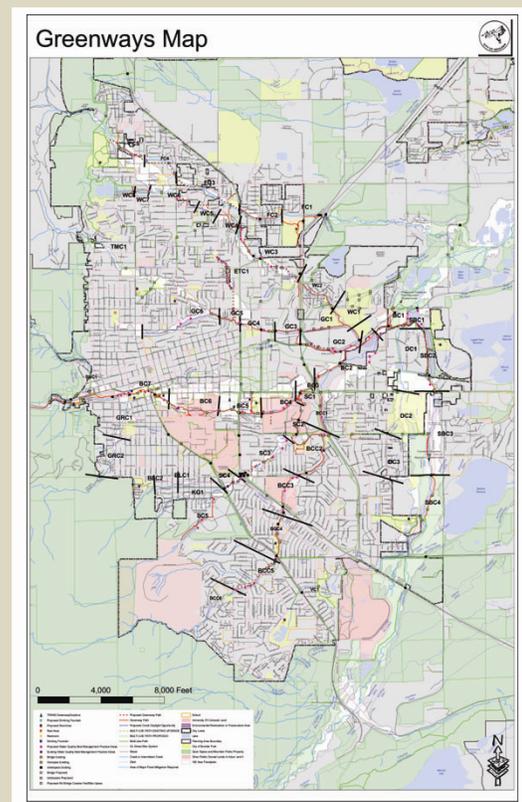
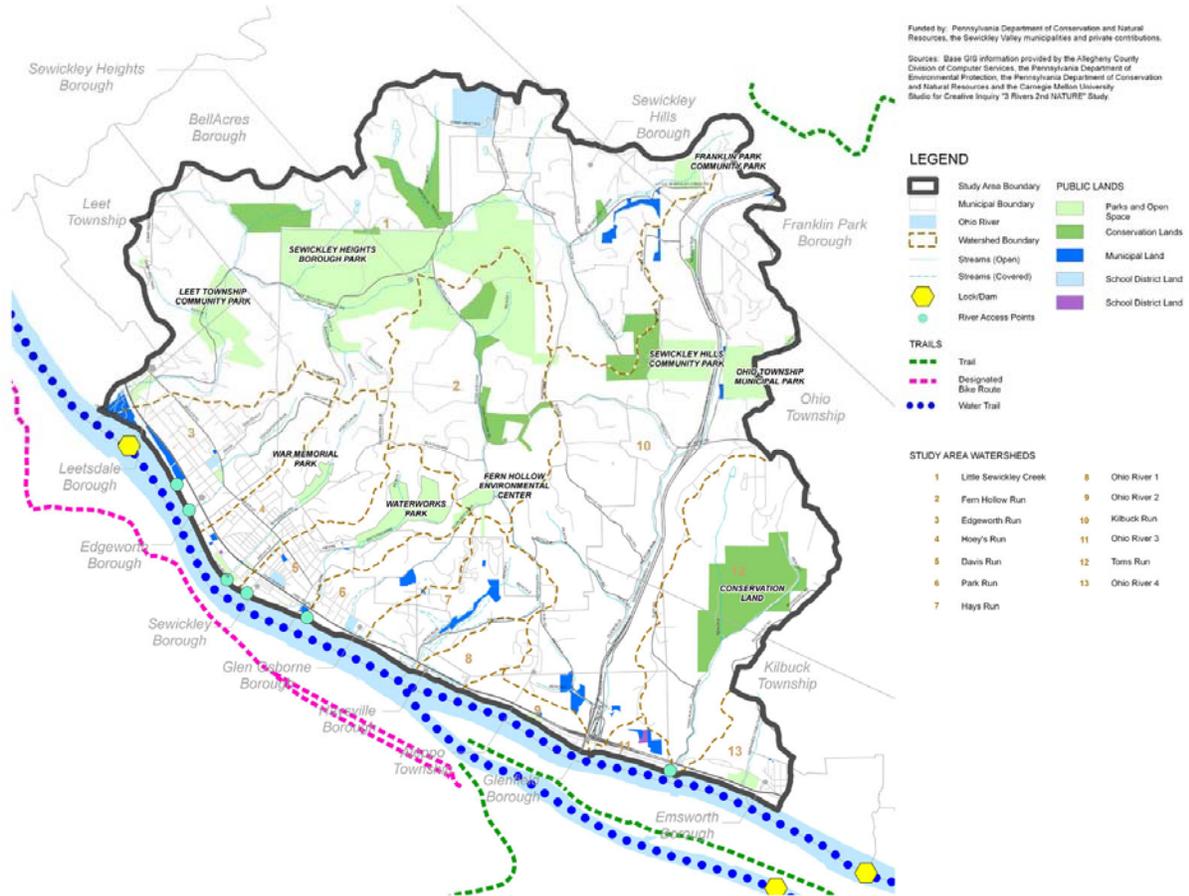


Figure 12: Boulder, Colorado Greenbelt System

TECHNICAL STUDIES AND ANALYSES SUMMARY

F. Existing Recreational Opportunities

Map Exhibit 11: Existing Recreational Opportunities Map



The Existing Recreational Opportunities Map displays existing bicycle and pedestrian trails/routes, water trails/routes, river access points, lock dams, as well as public lands (parks and open space, conservation, municipal and school district).



Photograph 24: Horseback riding and other passive/active recreation activities throughout the existing parks and trails.

SEWICKLEY VALLEY RIVERS CONSERVATION AND MANAGEMENT PLAN

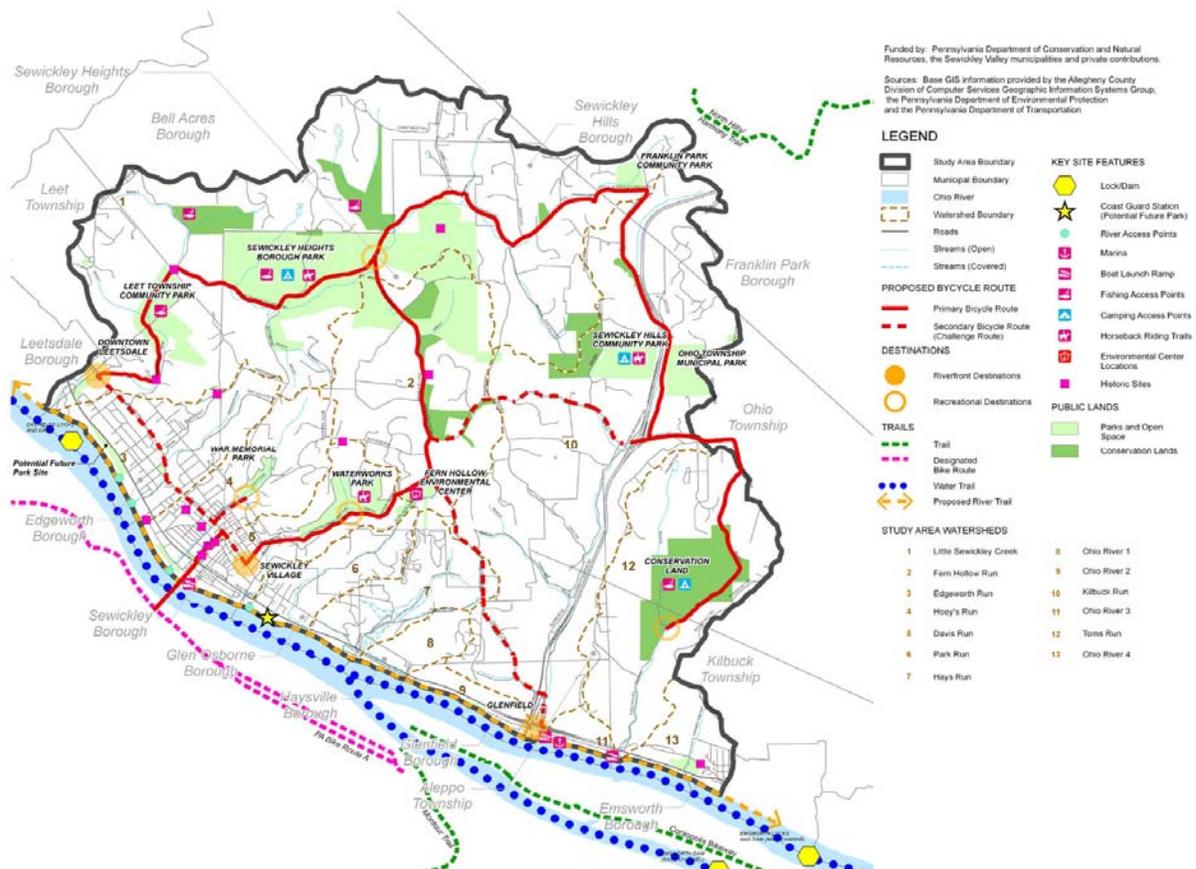
The map highlights existing recreational areas/corridors within the region. These recreation areas are also linked to the Greenbelt forming an interconnected web of green and recreational amenities. Highlighting these recreational areas and trails corridors will help provide the framework to developing a region-wide scenic bicycle and trails map. These recreational areas and trail corridors will help promote awareness of existing recreation facilities, encourage outdoor recreation, promote healthy communities, maintain the physical attractiveness of the developed areas, etc.



Photograph 25: Existing public boat launch and river access along the Ohio River.

G. Proposed Recreational Opportunities

Map Exhibit 12: Proposed Recreational Opportunities Plan



TECHNICAL STUDIES AND ANALYSES SUMMARY

The Proposed Recreational Opportunities Plan displays existing and proposed recreational opportunities related to the Sewickley Valley Region's water resources. This includes additional bicycle, pedestrian and water trails/routes, accessible and challenge bicycle trails, recreational and riverfront destinations, as well as key site features (camping, fishing, boat launch, river access, historic sites, etc.). The accessible and challenge bicycle trails would offer an outstanding tour of the Sewickley Valley communities and its rural countryside, as well as providing connections to the public parks and open spaces. The primary trail offers a gentle, slow-paced riding experience while the secondary trails are primarily more challenging with hilly terrain. Both routes intersect at various destination points/nodes throughout the valley.



Photograph 26: Expand upon existing pedestrian trails loops to further develop the region-wide network of trails and open spaces.

The significance of this map further develops the region-wide network of trails and open spaces. There is opportunity to expand on the existing bicycle and pedestrian trail network, create destination points at significant points of interest, connect existing parks and open spaces, etc. Cooperation among the municipalities is critical in expanding these networks and developing a region-wide comprehensive network of trails. This will help, encourage outdoor recreation, promote healthy communities, and further develop awareness of the natural features of the Region.



Photograph 27: Provide additional bicycle routes and challenge trails along roads and within parks and open spaces.

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RECOMMENDATIONS**XII. RECOMMENDATIONS**

In preparing the Sewickley Valley Rivers Conservation and Management Plan, it was recognized that the health, protection, safety and sustainability of the Region's water resources is dependent upon complex, interconnected natural and manmade systems which are not isolated to a particular waterway's flow channel, but encompass each waterways' entire watershed. These complex resource systems are ignorant of political boundaries, and resource impacts within the upland areas of a watershed have direct impacts on all resources and communities downstream.

Due to this complexity, the recommendations represent a comprehensive approach to addressing the Region's water resource and recreation conservation issues while being aware that for the Plan to be successful, the fifteen (15) Sewickley Valley communities need to coordinate their efforts because issues related to water recreation and conservation are greater than any one municipality. As part of this comprehensive approach, the Plan includes traditional conservation planning recommendations focusing on resource conservation and recreation. In addition, policy and land management recommendations, such as zoning, subdivision and land development ordinances, are described which can be used as tools for municipalities to further protect and manage resources.

The Phase II recommendations have been organized into the following five (5) categories:

- **Management and Implementation** – outline potential management structures to be created/adopted by the participating municipalities in order to govern the management, implementation and maintenance of the Plan's recommended initiatives;
- **Policy, Land and Resource Management** – identify further specific legislative actions to be taken in order to address water conservation issues and to protect sensitive resources;
- **Recreation** – highlight specific opportunities to leverage the Sewickley Valley's natural resources that provide additional quality of life resources to its residents and visitors;
- **Education and Awareness** – detail potential educational programs that can raise public awareness regarding water conservation issues as well as programs designed to monitor the health of the Region's waterways; and

- **Economic Development** – suggest unique ways in which the Sewickley Valley communities can leverage the Region’s water resources to promote economic growth and development.

Within each recommendation category, there are primary and secondary actions. Primary recommendations are those that are of the highest priority and will have the greatest overall/long-term impact on achieving the Region’s land and water conservation goals. The primary recommendations also require some level of cooperation and coordination between the partner communities to be successfully implemented. Secondary recommendations are often the “low hanging fruit” that can typically be implemented by individual municipalities and often have a limited immediate impact on water resource and recreation conservation goals.

A. Management and Implementation Recommendations

Suggested Primary Action: Utilize Intergovernmental Cooperation Agreements (ICA’s) between the fifteen (15) participating communities to form a Sewickley Valley Watershed Conservation Partnership. This Partnership would be supported with dedicated funds from the participating municipalities to procure funding, manage, oversee and maintain joint municipal water conservation projects/initiatives.

Intergovernmental Cooperation Agreement:

An Intergovernmental Cooperation Agreement (ICA) is a legally binding agreement between municipalities to achieve a common goal. The contents of the agreement will vary depending upon the subject, but can be custom tailored to fit the appropriate local context and typically include: purpose, duration, establishment of a board/commission, formula for computing each municipality’s contribution for capital and operating expenses, and method for allocating revenues and costs.

Figure 13: Definition of an Intergovernmental Cooperation Agreement.

Alternative Primary Action: An alternative to forming a Partnership is to create a cooperative relationship with an existing organization, such as the Allegheny Land Trust, to procure funding, manage, oversee and maintain joint municipal water conservation projects/initiatives. While dedicated financial support from participating municipalities would still be necessary, start-up costs would be largely eliminated and the use of an existing organization could jump start implementation activities. Furthermore, this strategy could potentially yield

RECOMMENDATIONS

greater funding due to its association with an established and well respected organization.

Suggested Secondary Action: Communities should explore the possibility of dedicating a portion of their annual operating budgets, such as .5% to 1%, to fund stream and recreation related projects in accordance with the recommendations contained within this Report. This budget allocation should occur commensurate with the amount of the municipality acreage which falls within the project study area. The dedicated funds should then be directed to the Sewickley Valley Watershed Conservation Partnership or its proxy.

B. Policy, Land and Resource Management Recommendations

Suggested Primary Action: To address the negative affects development can have on storm water management, and to conserve those sensitive natural resources which naturally regulate and maintain water quality, the fifteen (15) participating communities should adopt similar and coordinated ordinance regulations with regards to site clearing, steep slopes and poor soils, floodplains, riparian buffers, and lot coverage/impervious surfaces.

The participating communities of Aleppo, Sewickley and Glen Osborne are currently engaged in the development of joint zoning and subdivision ordinance updates which include coordinated efforts with regards to steep slopes, lot coverage/impervious surfaces, etc.

Suggested Primary Action: In addition to the ordinance provisions previously described, develop and adopt a Sensitive Resource Overlay that targets the below resources. The overlay is meant to provide protection for environmentally sensitive natural resources such as wetlands, stream corridors, forested areas, etc. The fifteen (15) communities should enact ICA's to empower themselves with the ability to collectively regulate development in those areas with the highest concentration of sensitive natural resources. The Aleppo, Sewickley and Glen Osborne effort can serve as a model and a starting point for the other communities. As part of the Sensitive Resource Overlay, property owners would conduct an inventory of sensitive resources on their property. These resources, in conjunction with corresponding development ratios, calculate the appropriate amount of disturbance allowable in these particular areas. An

example of natural resource protection related zoning regulations for Glen Osborne can be found in Appendix D. These sensitive resources include, but are not limited to:

- Forested Areas
- Biodiversity Areas
- High Quality Streams
- Cold Water Fish Habitats
- Wetlands
- Riparian Buffers
- Flood Prone Areas
- Steep Slopes
- Landslide Prone Areas
- Areas of Soil Creep and Red Bed Soils

In conjunction with a sensitive resource overlay, greenways and blueways are fundamental ingredients to enhancing and leveraging existing natural resources as well as adding new opportunities. Develop and adopt a detailed Regional Greenbelt Plan which identifies and highlights the network of significant landscapes that are important for natural infrastructure functions such as storm water infiltration as well as for human use and recreation activities as well as those lands that support resource conservation. This Plan illustrates a Greenbelt Concept Plan and presents actions including a list of tools aimed to continue protection of public natural areas and to encourage conservation of privately held sensitive lands.

Suggested Secondary Action: Assess the current condition of existing riparian buffers by conducting a walk-through along each stream reach in the Region and identifying areas where more than 50' wide of natural vegetation has been removed, as well as areas prone to erosion and landslides. Plant/restore native vegetation in these areas to help stabilize the soils and reestablish the riparian buffer.

Suggested Secondary Action: Permit the Transfer of Development Rights for the conservation of resources and the development of suitable land. With a Transfer of Development Rights Zoning Ordinance, a municipality allows the exchange of development density from one private property owner to another

RECOMMENDATIONS

property owner. This exchange is done in order to 1) protect open space and/or areas with sensitive resources, and 2) encourage development in accordance with a municipalities future land use policies. Utilizing the Sensitive Resources Overlay Plan, the Greenbelt Concept Plan and the various inventory and analyses maps within this report, municipalities can strategize optimal future land use patterns that are sensitive to these delicate areas. In doing so, the municipalities can identify potential private lands within these sensitive areas that are desirable to protect, and then engage private property owners in a Transfer of Development Rights. Essentially it is a “win – win” in the sense that the municipalities are able to protect its resources and control growth in accordance with its policies, while the private property owner receives land that is typically better suited to development and therefore of higher value.

Transfer of Development Rights:

- Landowner is financially compensated for choosing not to develop some or all of their land
- Landowner severs the “development rights” from their land
- Purchased by other landowner or real estate developer for use at another location
- Land is permanently protected through conservation easement
- Development rights purchased from the farmer/landowner can be reused

For more information visit www.conservationtools.org

Figure 14 Key Elements of a Transfer of Development Rights (TDR).

Suggested Secondary Action: Encourage the granting of Land Conservation Easements to protect open space. A conservation easement is a voluntary, legally binding agreement that limits certain types of uses or prevents development from taking place on a piece of property in order to protect its ecological or open space values. Once an easement is in place, it continues to protect the land regardless of individual property ownership, in other words, the terms of the easement supersedes the rights of the property owner even in the case of a transfer of ownership. Municipalities should identify individual property owners with large contiguous lands within the sensitive areas highlighted in this report, and work with established land conservation organizations, such as the Allegheny Land Trust, to approach these property owners regarding the possibility of establishing a Land Conservation Easement.

Suggested Secondary Action: Develop and adopt Conservation Development/Subdivisions ordinances or Cluster Development ordinances to

expand open space and conservation lands. A Conservation Development/Subdivision ordinance requires developers to establish designated conservation areas as part of their subdivision plans. For example, for every proposed dwelling unit or square foot of development area that is developed, a portion of the acreage of land must be set aside as a designated conservation area. In addition, the ordinance can also target where these conservation areas are to be established in order to develop an interconnected network of conservation lands between multiple developments. These types of policies can allow a private property owner to realize the economic potential of the land while helping implement the Greenbelt Concept Plan.

Suggested Secondary Action:

Promote/encourage participation in the Conservation Reserve Enhancement Program (CREP), particularly in areas where agricultural lands are adjacent to or in direct conflict with existing water bodies/courses and sensitive natural resources. CREP is administered by United States Department of Agriculture (USDA) Farm Service Agency (FSA), and is a voluntary land retirement program that helps protect environmentally sensitive land, while providing a financial incentive to agricultural producers. These contracts require a minimum 10-year commitment to hold land out of agricultural production and the establishment of remediation practices. In addition to the annual “rental rates” paid to the land owner, the program can provide cost-shares of up to 50 percent of the eligible costs to install the best management practices. Municipalities should work with the State’s Farm Service Agency Committee to create educational materials and approach farm owners along the Region’s streams and encourage their enrollment in the CREP program.



Photograph 28: The Reach 3 stream corridor in Kilbuck.

RECOMMENDATIONS

Suggested Secondary Action: Remove existing obstructions such as tire dumps, backyard debris, landslide or soil deposits, etc. from within stream channels, floodways and storm water conveyance systems. When excess runoff encounters these types of constrictions during a storm event, blocked drainage ways can cause potential flooding up-stream. In addition, increased flow velocities through a constriction point can increase erosion and sedimentation down-stream of these points. Furthermore, the removal of excess debris or constrictions from drainage ways will promote higher water quality. Municipalities should utilize the Municipal Officials Survey / Problem Area Inventory completed as part of Phase I of this plan to actively pursue clean-up efforts through municipal and volunteer efforts.



Photograph 29: Natural obstructions in waterways are often the cause of constricted water flow which increases the potential for stream bank erosion and flooding.

Suggested Secondary Action: Utilize the Phase I Municipal Officials Survey / Problem Area Inventory as the basis for the development of a Recovery/Restoration Plan and Schedule. This plan should develop a prioritized implementation strategy for addressing the previously identified problem areas, and develop a schedule for continued inspections and maintenance of perpetual obstruction areas along the existing streams. The Recovery/restoration Plan should be developed and implemented by the regional Partnership proposed as part of these recommendations.



Photograph 30: Stone lined stream channel in Edgeworth Park.

Suggested Secondary Action: Un-channelize streams and watercourses where possible and restore them to a naturalized stream channel with native

riparian buffers. In doing so, capitalize on the opportunity to incorporate additional floodplain area or storm water detention facilities while removing channelized systems. This may include areas which allow for intentional flooding and act as temporary storm water retention areas. Even in areas which cannot be un-channelized, natural riparian buffers should be restored if possible. Restoring streams to a more naturalistic state with riparian buffers helps to slow, cool and filter run-off, while also increasing valuable natural habitats.

Suggested Secondary Action: Each participating municipality should complete the U.S. Environmental Protection Agency's Water Quality Scorecard. The Scorecard is designed to help local governments balance water conservation issues and the desire for growth by identifying opportunities to remove barriers, and revise and create codes, ordinances, and incentives for better water quality protection. It guides municipal staff through a review of relevant local codes and ordinances, across multiple departments and at the municipal, neighborhood and site scales. The goal of the program is to help communities protect water quality by reducing storm water flows and to educate stakeholders on issues that have water quality implications. A sample of the U.S. Environmental Protection Agency's Water Quality Scorecard can be found in Appendix E.

Suggested Secondary Action: Curb the takeover of invasive species by educating the public on horticultural options and eliminating established colonies of these species using environmentally friendly methods. Municipalities should work with local organizations such as the Allegheny Land Trust, the Western Pennsylvania Conservancy or the Fern Hollow Nature Center to develop educational brochures that can be made available to the general public regarding invasive species. These brochures should contain information discouraging the planting and propagation of invasives, the proper methods for removal of invasives, as well as listing native alternatives. Municipalities should also work with the local organizations such as, Allegheny Land Trust and



Photograph 31: Eliminate the takeover of invasive species and educate the public on horticultural techniques for controlling these species.

RECOMMENDATIONS

Western Pennsylvania Conservancy to identify colonies of invasives within sensitive and high value biodiversity areas, and develop measures to remove those invasives and reestablish native plant communities.

Suggested Secondary Action: Promote green buildings and green building principles that address water and energy conservation issues such as green roofs, storm water harvesting, etc. Municipalities should partner with organizations such as the U.S. Green Building Council and the Pittsburgh-based Green Building Alliance to circulate educational brochures available to the public and potential developers regarding the benefits of green design, as well as the various incentive programs that are available through the State and federal governments for implementing green building solutions. Individual municipalities may also take this one step further and consider offering local incentives, such as grants, tax credits, density credits, etc. for implementing green practices.

Suggested Secondary Action: Redevelop brownfields and blighted areas, and promote urban infill to curb unnecessary development of open spaces. Municipalities should identify brownfields and vacant properties, and develop marketing strategies and incentive programs to attract/persuade prospective businesses to develop these areas over other undeveloped lands. Some incentives may include providing grant application assistance to private property owners for renovations to blighted buildings, preparation of “pad ready” sites by the municipality, etc.

Suggested Secondary Action: Work with local groups in their efforts to prevent littering. Municipalities can engage this effort on multiple levels, from providing free advertising for clean-up events in local newsletters to installing “goes to the river” medallions on local storm water inlets.

Suggested Secondary Action: Provide regular municipal street sweeping. Regular street cleaning can remove a large percentage of trash and debris, as well as fine particles and pollutants that could otherwise enter the water system during a storm event. These removed materials can then be processed and disposed of in a controlled manor. Street sweeping can also improve air quality, again by removing fine particles and pollutants that readily become airborne in windy conditions.

Suggested Secondary Action: Restore quality of streams by practicing methods of restoration ecology. The proposed multi—municipal Partnership should approach groups such as the Little Sewickley Creek Watershed Association to learn more about stream restoration and restoration ecology. The Partnership can then work with these associations to procure funding for local restoration activities.

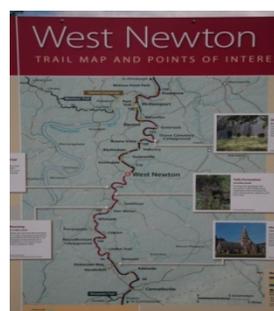
C. Recreation Recommendations

Suggested Primary Action: Focus on the development of marquee demonstration projects (outlined in section XV of this report) to build awareness and support for the Region’s water conservation initiatives.

Suggested Primary Action: Define a network of designated Scenic Bicycle Routes that connect the region’s major parks and cultural/commercial centers. These bike routes should also parallel the region’s high quality streams whenever possible to capitalize on their scenic beauty. In conjunction with the development of designated scenic bicycle routes, the region should explore opportunities to connect to other neighboring trail systems, such as the Ohio River Trail, the Montour Trail, the Panhandle Trail and Great Allegheny Passage.

Suggested Primary Action: Develop a region-wide navigational and informational signage system for proposed water and pedestrian trails. The proposed Partnership, with the guidance of Ms. Hannah Hardy of the Pennsylvania Environmental Council, should develop a comprehensive hierarchal signage strategy that raises awareness of available water and recreational resources to

residents and visitors alike. Signage should include, but not be limited to gateway, trailhead, directional, informational and historical signs. In doing so, the connections between recreational amenities, business and historical



Photograph 32: Region-wide trails map and points of interest for West Newton, PA.



Photograph 33: Directional signage for West Newton, PA.

RECOMMENDATIONS

districts, and residential areas will be strengthened, as well as promote increased revenue for businesses and municipalities generated from recreational users.

Suggested Secondary Action: In the long-term, create four (4) additional riverfront parks in Edgeworth (2), Leetsdale (1) and Glen Osborne (1).

- Develop additional public river access points at the Glen Osborne/Sewickley Water Authority site (for powered and unpowered watercraft), at the United State Coast Guard site, and at the Edgeworth Borough owned riverfront parcel (for unpowered watercraft).
- Install canoe/kayak racks in Glenfield (at the PA Fish and Boat Commission access point and All-States Marina, Inc.), Sewickley (at the existing and proposed access points on Walnut and Chestnut Streets), Edgeworth and Leetsdale.
- Construct a river oriented trail along the Ohio River; connect to the PA Fish and Boat Commission access point in Glenfield to the Leetsdale Riverfront Park and to the park on the other side of Rt. 65.



Photograph 34: Potential public river access point and boat/kayak/canoe launch at the Osborne Coast Guard station.

Suggested Secondary Action: Identify and designate unique natural features, such as exceptional views, large rock outcroppings, exceptional streams, extremely old trees, etc. Individual municipalities or the Partnership could develop an informational brochure to showcase and promote these unique features, especially along recreational/scenic corridors. This will provide destinations that will entice individuals to utilize recreational amenities.



Photograph 35: Preserving scenic views such as this view along the Ohio River basin is vital for maintaining the character of the Region.

Suggested Secondary Action: Take measures to identify, showcase and preserve scenic views in the Region. Based upon the proposed Greenbelt Plan, municipalities should identify if there are any scenic views that are important to the character of the Sewickley Valley, and that should be maintained and preserved as a cultural resource. Once identified, municipalities can then actively seek to protect these views through various planning tools, such as zoning regulations, transfer of development rights, land conservation easements, etc.

Suggested Secondary Action: Identify and nominate historical and cultural places that are eligible for the National Register, Historic Plaques program, or Historic Landmarks program. Utilizing the Proposed Recreational Opportunities Plan as a starting point, which identifies sites that are either on or eligible for the National Historic Registry, municipalities can take active



Photograph 36: Historic humpback style bridge located in Leet Township, PA.

measures to protect and highlight these resources. Furthermore, appropriate sites should be included as points of interest on any region-wide recreational network that may be developed as recommended in this plan.

Suggested Secondary Action: Connect neighborhoods to the streams and river by extending trails systems into the neighborhoods. Partner communities should provide major pedestrian/cyclist routes throughout the Sewickley Valley and connections to other regional trails such as the Montour Trail and Ohio River Water Trail. They should also provide connections, or trail spurs, into residential neighborhoods to promote use of these amenities. This can have several benefits including increasing property values due to proximity to recreational amenities, and promoting overall population health and fitness. In addition, direct access to the streams and river can increased resident awareness of water conservation issues and inspire active participation in watershed initiatives.

RECOMMENDATIONS

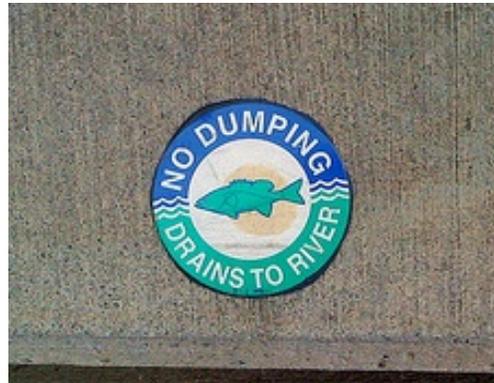
Suggested Secondary Action: Make public access points convenient and safe for non-motorized boats by designating certain areas for their use. This can be accomplished by either physically separating motorized boating facilities from non-motorized boating facilities, or by providing “no wake” zones and appropriate signage. Also, dock access should be provided for motorized boaters, while non-motorized boaters often prefer an at grade boat launch area.



Photograph 37: Safe public access point for non-motorized boats located along Pittsburgh's North Shore.

D. Education and Awareness Recommendations

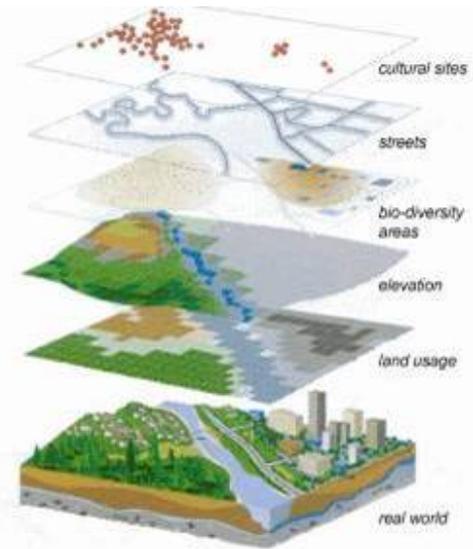
Suggested Primary Action: Promote public awareness of storm water related issues through the implementation of a comprehensive watershed/storm water educational signage system. These signs should be concentrated along stream corridors, as well as along conventional storm water conveyance systems, such as signage at storm water inlets and outfalls indicating that the water eventually “Goes to the River”.



Photograph 38: Potential watershed / storm water education signage along storm water inlets.

Suggested Primary Action: Create and organize a series of regional “blue crew” volunteer teams like the PA Cleanways program, to assist municipalities and property owners with the proposed routine inspections and maintenance of storm water systems, as well as to assist with monitoring the potential development of other problem areas. These “blue crews” can also be utilized to monitor water quality in the region’s waterways.

Suggested Primary Action: Establish a scientific, internet database for the rivers and streams that serves as a “catalogue” of all accessible GIS water related resources and provides links to the websites and groups in those studies. The Partnership can coordinate these efforts with the County’s GIS system, and provide links to this information on individual municipal web sites. Furthermore, as municipalities or local groups conduct additional water resource studies, this information can be added to the database proving an ongoing “report” of the region’s water quality, as well as providing an educational tool for municipalities or groups seeking to engage in further scientific studies.



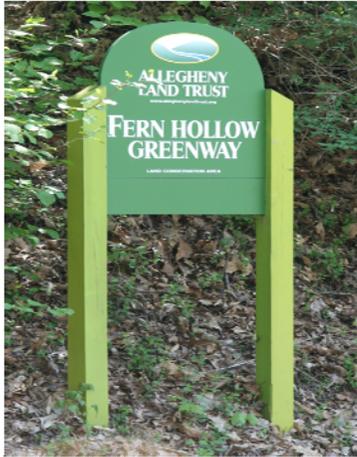
Photograph 39: GIS layering technique used to analyze a variety of resource.

Suggested Secondary Action: Hold workshops for municipal officials on environmental regulations and issues. The Partnership should approach county and state departmental officials, representatives from the local Government Academy as well as local watershed and conservation groups to develop and administer workshops geared towards municipal officials. These workshops should address issues such as storm water regulations, development permitting requirements, best management practices, etc. These workshops would provide municipal leaders with a better understanding of current regulations and practices, which will in-turn, assist these leaders when developing local policies to address these issues, such as ordinance revisions as recommended in this Report.



Photograph 40: Hold public workshops to address storm water regulations, permitting requirements, best management practices, etc.

RECOMMENDATIONS



Photograph 41: A partnership with the Fern Hollow Nature Center could develop Public workshop with government officials, residents, partnering communities, design team, etc.

Suggested Secondary Action: Expand the programming of the existing Fern Hollow Nature Center to include watershed education, management and maintenance. The Partnership should work with the Center to establish and support the creation of environmental and nature education programs/ workshops for children and seniors. These programs can promote child development, mental sharpness and well-being. The focus of these programs could range from interactive ecosystem explorations to plant identification classes. By increasing environmental awareness, especially at a young age, this knowledge and experience is likely to lead to increased environmental consciousness later in life.

Suggested Secondary Action: Broaden the partnerships between the Fern Hollow Nature Center and the regions schools to actively engage students in stream/river maintenance and monitoring programs. This is another “win – win” situation in which students benefit from hands-on practical experience, while the Partnership municipalities would benefit from a cost effective means of continually monitoring the health of its waterways. This will allow the municipalities to track the successes and failures of water conservation efforts, as well as allow for early detection of new water quality issues. In doing so, municipalities will be able to define conservation priorities and potential immediate actions required.

E. Economic Development Recommendations

Suggested Primary Action: Develop “branding” for the Region based upon its Greenbelt potential as well as its recreational and cultural assets. This branding campaign should focus on generating ecotourism through the recreational opportunities available adjacent to the Region’s streams and waterways, as well as on the Ohio River.

- To further capitalize on the region’s scenic and “small town” character, municipalities should develop tourism draws highlighting the region’s unique history, including the Revolutionary War Depreciation Lands which encompassed a large portion of the Sewickley Valley.



Photograph 42: Example of historic markers used to highlight the cultural heritage and historic assets of the Region.

- Municipalities should organize events and festivals focused around their plethora of resources, such as Art in the Parks, etc.

Suggested Secondary Action: Promote tourism on the River and in the Valley’s natural areas. The Partnership can develop promotional materials based upon the region’s “branding” to attract visitors to the area. These materials can also cover several mediums such as brochures at restaurants, rest stops and visitor centers, web-sites, excursion articles submitted to local newspapers, etc.

Suggested Secondary Action: Support and host fishing and boating tournaments. Riverfront municipalities should work together to contact various fishing associations to lobby for hosting tournaments in the region. Hosting such events would provide a venue for showcasing the region and its water related resources. Not only could the Region see a boost in revenues during an event, but could also see long-term gains from increased tourism as a result of increased exposure.



Photograph 43: The “Bass Masters Classic” fishing tournament in Pittsburgh.

RECOMMENDATIONS

Suggested Secondary Action: Explore the potential for PA Trail Town designation and funding. If a regional trail system is established, especially if a connection can be made to the Montour Trail or the Ohio River Trail (in the planning stages on the Moon Township side of the river), individual municipalities along the trails can seek designated trail town status through PA DCNR. A trail town is a destination or ‘stop along the way’, that provides a

place for trail users to stop, rest, eat or even spend the night. If there is adequate and clear wayfinding signage connecting the river trails to the Regional business districts, such as Sewickley and Leetsdale, people are likely to stop, get a bite to eat, and maybe stay the night. This would help boost the local economy as well as, attract new businesses into the town. Trail Towns can also provide outfitters for trail users to rent equipment. Designated Trail Towns are eligible for funds from the PA DCNR as well as PA DCED for projects ranging from streetscape improvements and building renovations to directional signage and pedestrian/cyclist safety measures. Not only would municipalities and individuals benefit from grant improvement dollars, but trail town designation can increase tourism in these communities and boost local business revenues.



Photograph 44: All-States Marina and repaired yard in Glenfield.

Suggested Secondary Action: Work with private property owners to establish more amenities such as restaurants, bike rentals, boat rentals, etc. near the access points of key recreational facilities/amenities. Taking advantage of existing and/or future recreational amenities, municipalities should promote the establishment of complementary businesses adjacent to these amenities, such as a bike rental shop adjacent to a trailhead. Municipalities can reach out to



Photograph 45: Trail-Side Restaurant in West Newton, PA adjacent to the Great Allegheny Passage.

existing successful businesses in other regions and gauge their interest in potentially expanding into the Sewickley Valley Region, and/or market specific properties to potential developers for these types of uses. Additionally, municipalities could provide various financial incentives to assist with the establishment of these businesses in desirable locations.

ACTION PLAN**XIII. ACTION PLAN**

The following action plan outlines how the previously described action recommendations can be implemented, including potential partners/responsible parties, (a comprehensive list of potential partners and their contact information can be found in Appendix F) potential funding sources, priority, relative cost of implementation, as well as relative threat level to implementation. The priorities of actions have been categorized as High (H), Medium (M) and Low (L) and only apply to the primary actions. Due to the nature of this planning study detailed implementation cost have not been compiled, but estimated relative costs are provided as follows; low=less than \$100,000, medium=between \$100,000 and \$500,000, and high=greater than \$500,000. Additionally, relative threats to implementation are provided on a similar scale of low, medium and high. For relative high threats to implementation, some of the most likely sources of “conflict” are listed.

Potential Stakeholders / Implementation Partners

Allegheny Co. Conservation District	Quaker Valley Council of Governments
Allegheny Co. Economic Development	Quaker Valley School District
Allegheny Land Trust	Sewickley Civic Garden Council
Audubon Society of Western PA	Sewickley Creek Watershed Association
Fern Hollow Nature Center	Sewickley Garden Club
Green Building Alliance	Sewickley Planning Commission
North Area Environmental Council	Sewickley Valley Community Fund
PA Dept. of Community and Economic Dev.	Sewickley Valley Historical Society
PA Dept. of Conservation and Natural Resources	Trout Unlimited
PA Dept. of Transportation	US Army Corps of Engineers
PA Farms Service Agency Committee	US Environmental Protection Agency
PA Fish and Boat Commission	US Green Building Council
PA Organization of Watersheds and Rivers	Water Resources Education Network
PA Trails Advocacy Group	Western PA Conservancy
Pennsylvania Environmental Council	Wildlife Habitat Council
Pittsburgh's Green Building Alliance	2009 Rain Garden Alliance
Pittsburgh Trails Advocacy Group	3 Rivers Wet Weather

Figure 15: Potential Stakeholder / Implementation Partners.

SEWICKLEY VALLEY RIVERS CONSERVATION AND MANAGEMENT PLAN

Table 14: Action Plan Table

Action Items	Priority	Potential Implementers	Potential Funding Sources	Relative Cost to Implement	Potential Threat / Obstacle to Implementation
I. Management and Implementation Recommendations					
Primary Action					
1A Form a Sewickley Valley Watershed Conservation Partnership between the fifteen (15) communities	H	Municipalities, Allegheny County Conservation District	Municipalities	L	<ul style="list-style-type: none"> •Lack of funding •Lack of political support
1B Create a cooperative relationship with an existing organization	H	Municipalities, Allegheny Land Trust, Allegheny County Economic Development	Municipalities	L	<ul style="list-style-type: none"> •Lack of funding •Lack of political support
Secondary Action					
1 Allocate a portion of the annual Municipal general funds to finance stream and recreation related projects		Municipalities, Sewickley Valley Community Fund	Municipalities	L-M	<ul style="list-style-type: none"> •Costs •Justification of funds used for initiatives outside Municipal or even watershed
II. Policy, Land and Resource Management Recommendations					
Primary Action					
1 Adopt similar and coordinated ordinance regulations with regards to site clearing, steep slopes and poor soils, floodplains, riparian buffers, and lot coverage/impervious surfaces	H	Municipalities, Sewickley Valley Community Fund	PA Department of Conservation and Natural Resources	L	<ul style="list-style-type: none"> •Lack of funding •Lack of political support
2 Develop and adopt a Sensitive Resource Overlay District	H	Municipalities, Allegheny Land Trust, Sewickley Valley Community Fund	PA Department of Conservation and Natural Resources	L	<ul style="list-style-type: none"> •Lack of funding •Lack of political and public support
Secondary Action					
1 Assess the current condition of existing riparian buffers and identify potential remediation solutions		Municipalities, Sewickley Creek Watershed Association, North Area Environmental Council, PA Organization of Watershed and Rivers	PA Department of Conservation and Natural Resources	L	<ul style="list-style-type: none"> •Lack of technical expertise
2 Encourage the Transfer of Development Rights allowing conservation and development to coexist within each individual Municipality		Municipalities, PA Environmental Council	PA Department of Community and Economic Development, Local Government Academy	L	<ul style="list-style-type: none"> •Lack of political and public support •Lack of program knowledge
3 Encourage the granting of Land Conservation Easements to protect open space		Municipalities, Allegheny Land Trust, Western PA Conservancy, PA Environmental Council	PA Department of Community and Economic Development, Local Government Academy	L	<ul style="list-style-type: none"> •Lack of program knowledge •Reluctance of property owners
4 Develop and adopt Conservation Development/Subdivisions ordinances to expand open space and conservation lands		Municipalities, Allegheny Land Trust, PA Environmental Council, Allegheny County Economic Development	PA Department of Community and Economic Development, PA Department of Conservation and Natural Resources, Local Government Academy	L	<ul style="list-style-type: none"> •Lack of planning policy knowledge •Lack of political support
5 Promote/encourage participation in the Conservation Reserve Enhancement Program (CREP), particularly in areas where agricultural lands are adjacent to or in direct conflict with existing water bodies/courses and sensitive natural resources		Municipalities, State's Farms Service Agency Committee, Farm Owners	USDA Farm Service Agency	L	<ul style="list-style-type: none"> •Lack of program knowledge •Strict terms of the program
6 Remove existing obstructions such as tire dumps, backyard debris, landslides or soil deposits, etc. from within stream channels, floodways and storm water conveyance systems		Municipalities, Volunteers, Sewickley Creek Watershed Association, North Area Environmental Council, PA Organization of Watersheds and Rivers	PA Cleanways, PA Department of Environmental Protection, PA Natural Resources Conservation Service	M	<ul style="list-style-type: none"> •Awareness •Private property issues •Liability for clean-up efforts
7 Utilize the Phase I previously completed Municipal Officials Survey / Problem Area Inventory as the basis for developing an Act 167 works scope and grant application form		Municipalities, Allegheny Land Trust, Allegheny County Conservation District, Sewickley Creek Watershed Association, North Area Environmental Council	PA Department of Environmental Protection	M	<ul style="list-style-type: none"> •Lack of technical expertise •Private property issues
8 Un-channelize streams and watercourses where possible and restore them to a naturalistic stream channel with native riparian buffers		Municipalities, 3 Rivers Wet Weather (out of their area), Allegheny Land Trust, PA Organization of Watersheds and Rivers	PA Department of Environmental Protection, PA Department of Transportation	H	<ul style="list-style-type: none"> •Lack of technical expertise •Private property issues •Costs
9 Each participating municipality should complete the U.S. Environmental Protection Agency's Water Quality Scorecard		Municipalities, Environmental Protection Agency, Allegheny Land Trust	PA Department of Community and Economic Development, Allegheny County Economic Development, Local Government Academy	L	<ul style="list-style-type: none"> •Fear of Federal Government involvement
10 Curb the takeover of invasive species by educating the public on horticultural options and eliminating established colonies of these species using environmentally friendly methods		Municipalities, Western PA Conservancy, Fern Hollow Nature Center	PA Department of Environmental Protection	L-H	<ul style="list-style-type: none"> •Lack of technical expertise •Cost of invasive species removal

ACTION PLAN

Table 14: Action Plan Table – continued

Action Items	Priority	Potential Implementers	Potential Funding Sources	Relative Cost to Implement	Potential Threat / Obstacle to Implementation
11 Promote green buildings and green building principles that address water and energy conservation issues such as green roofs, storm water harvesting, etc.		Municipalities, U.S. Green Building Council, Pittsburgh's Green Building Alliance, 2009 Rain Garden Alliance, PA Environmental Council	Local Incentives: grants, tax credits, density credits, etc. State and Federal Government Incentive Programs	L	•Costs to private property owners •Lack of municipal incentives for green buildings site improvement
12 Redevelop brownfields and blighted areas, and promote urban infill to curb unnecessary development of open spaces		Municipalities, Allegheny County Economic Development, Environmental Protection Agency, PA Department of Community and Economic Development	Environmental Protection Agency (community-wide brownfield assessment grant), Allegheny County Economic Development, PA Industrial Development Authority, PA Opportunity Grant Program	H	•Costs •Liability
13 Work with local groups in their efforts to prevent littering		Municipalities	Municipalities, PA Department of Transportation	L	•Lack of public support
14 Provide regular municipal street sweeping		Municipalities, Quaker Valley Council of Governments	Allegheny County Economic Development, Pittsburgh Community Development Block Grant	L	•Cost and equipment procurement
15 Restore quality of streams by practicing methods of restoration ecology		Municipalities, Little Sewickley Creek Watershed Association, 3 Rivers Wet Weather, Western Pennsylvania Conservancy, Wildlife Habitat Council, Trout Unlimited	PA Department of Environmental Protection, Heinz, Mellon	M-H	•Lack of technical expertise •Cost
III. Recreation Recommendations					
Primary Action					
1 Development of marquee demonstration projects to build awareness and support for the Region's water conservation initiatives	M	Municipalities, PA Department of Transportation, Allegheny Land Trust, PA Department of Conservation and Natural Resources	PA Department of Community and Economic Development, PA Department of Environmental Protection, PA Department of Transportation, Heinz, Mellon	H	•Cost •Political and public buy-in •Maintenance costs
2 Define a network of designated Scenic Bicycle Routes that connect the region's major parks and cultural/commercial centers	L	Municipalities, Audubon Society of Western Pennsylvania, PA Department of Conservation and Natural Resources, Pennsylvania Trails Advocacy Group	PA Department of Transportation	H	•Cost •Planning •Maintenance
3 Develop a region-wide navigational and informational signage system for proposed water and pedestrian trails	L	Municipalities, Allegheny County Conservation District, PA Organization of Watersheds and Rivers, Pennsylvania Environmental Council	PA Department of Conservation and Natural Resources	M-H	•Cost •Planning
Secondary Action					
1 In the long-term, create four (4) additional riverfront parks in Edgeworth (2), Leetsdale (1) and Glen Osborne (1)		Municipalities, PA Department of Conservation and Natural Resources	PA Department of Conservation and Natural Resources	H	•Cost •Maintenance
2 Identify and designate unique natural features, such as exceptional views, large rock outcroppings, exceptional streams, extremely old trees, etc.		Municipalities, Audubon Society of Western Pennsylvania, Sewickley Garden Club, Sewickley Civic Garden Council, Western Pennsylvania Conservancy	PA Department of Conservation and Natural Resources	L	•Lack of political and public support
3 Take measures to identify, showcase and preserve scenic views in the Region		Municipalities, Allegheny Land Trust, Allegheny County Economic Development, PA Department of Transportation	Municipalities	L-H	•Private property issues •Time •Limited control
4 Identify and nominate historical and cultural places that are eligible for the National Register, Historic Plaques program, or Historic Landmarks program		Municipalities, Sewickley Valley Historical Society	Municipalities	L	•Lack of funding •Lack of political and public support
5 Connect neighborhoods to the streams and river by extending trails systems into the neighborhoods		Municipalities, Pittsburgh Trails Advocacy Group	PA Department of Conservation and Natural Resources	M-H	•Cost •Public perceptions
6 Make public access points convenient and safe for non-motorized boats by designating certain areas for their use		Municipalities, PA Fish and Boat Commission, US Army Corps of Engineers	PA Fish and Boat Commission, PA Department of Conservation and Natural Resources	L-M	•Cost
IV. Education and Awareness Recommendations					
Primary Action					
1 Promote public awareness of storm water related issues through the implementation of a comprehensive watershed/storm water educational signage system	L	Municipalities, Water Resources Education Network, PA Department of Environmental Protection	PA Department of Environmental Protection, Local Government Academy	M	•No entity to "champion" the cause •Lack of interest •Lack of funding

SEWICKLEY VALLEY RIVERS CONSERVATION AND MANAGEMENT PLAN

Table 14: Action Plan Table – continued

Action Items	Priority	Potential Implementers	Potential Funding Sources	Relative Cost to Implement	Potential Threat / Obstacle to Implementation
2 Create and organize a series of regional "blue crew" volunteer teams to assist municipalities and property owners with routine inspections, maintenance and monitoring of storm water systems	L	Municipalities, Water Resources Education Network, All Watershed Groups	PA Department of Environmental Protection, PA Cleanways	L	•Lack of volunteers •Liability •Cost
3 Establish a scientific, internet accessible GIS database for the rivers and streams that serve as a "catalogue" of all available water related resources	L	Municipalities, Water Resources Education Network, Allegheny County Economic Development, Allegheny Land Trust, Sewickley Planning Commission	PA Department of Conservation and Natural Resources, Local Government Academy	L	•Set-up and maintenance •Management
Secondary Action					
1 Hold workshops for municipal officials on environmental regulations and issues		Municipalities, county and state departmental officials, local watershed and conservation groups	PA Department of Education, PA Department of Conservation and Natural Resources, Allegheny County Economic Development, Local Government Academy	L	•Lack of political support •Cost
2 Expand the programming of the existing Fern Hollow Nature Center to emphasize watershed education, management and maintenance		Municipalities, Fern Hollow Nature Center, Water Resources Education Network	Municipalities, PA Department of Conservation and Natural Resources	M	•Increase costs and staffing needs
3 Create partnerships between the Fern Hollow Nature Center and the region's schools to actively engage students in stream/river maintenance and monitoring programs		Municipalities, Fern Hollow Nature Center, Water Resources Education Network, Quaker Valley School District	PA Department of Environmental Protection	L	•Increase costs and staffing needs
V. Education and Awareness Recommendations					
Primary Action					
1 Develop "branding" for the region based upon its Greenbelt potential	L	Municipalities, PA Department of Conservation and Natural Resources, Allegheny County Economic Development	PA Department of Conservation and Natural Resources	M	•Lack of funding
Secondary Action					
1 Promote tourism on the river and in the Region's natural areas		Municipalities, Visit Pittsburgh, Allegheny County	Municipalities	M	•Lack of funding
2 Support and host fishing and boating tournaments		Municipalities, Fishing Associations	PA Fish and Boat Commission	M	•Lack of active marketing strategy
3 Explore the potential for PA Trail Town designation and funding		Municipalities, PA Department of Conservation and Natural Resources, PA Department of Community and Economic Development, Trail Towns Program	PA Department of Conservation and Natural Resources, PA Department of Community and Economic Development, The Progress Fund	L	•Lack of existing trail connection •Planning
4 Work with private property owners to establish more amenities such as restaurants, bike rentals, boat rentals, etc. near the access points of key recreational facilities/amenities		Municipalities, Landowners, Business Owners, Trail Towns Program	The Progress Fund	M-H	•Lack of funding for improvement cost assistance

FUNDING**XIV. FUNDING**

Implementing the Sewickley Valley Rivers Conservation and Management Plan will take cooperation between the partner communities and the available partnerships to procure necessary funding. While there are funds available through varying sources, the challenge will be procuring these funds during this difficult economic market when securing grant monies are extremely competitive. The partner communities can potentially increase their ability to procure funding by leveraging their collective efforts and emphasize the cooperative nature and regional impact of specific funding requests.

The following funding sources provide financial assistance for purposes ranging from planning to land acquisition, and generally take the form of grants and/or loans. Programs described below are grouped by the agency that provides the funds:

A. Pennsylvania Department of Conservation and Natural Resources (DCNR)

The **Commonwealth of Pennsylvania** provides grant moneys through the **Community Conservation Partnership Program (C2P2)** to county and municipal governments to support greenway and park planning, acquisition, design and development.

Heritage Park Grants are available to municipalities or nonprofit organizations for promoting public-private partnerships that preserve and enhance natural, cultural, historic and recreation resources to stimulate economic development through heritage tourism.

Land Trust Grants are available to land trusts and conservancies to acquire land for areas that face imminent loss. Land must be open to public use and priority is given to habitats for threatened species.

Rails-to-Trails Grants are available to municipalities and nonprofit organizations to fund the planning, acquisition or development to preserve and protect abandoned railroad corridors.

Community Grants are awarded to municipalities for recreation, park and conservation projects including the rehabilitation and development of parks and recreation facilities; acquisition of land for park and conservation purposes; and technical assistance for feasibility studies, trails studies, and site development planning.

River Conservation Grants are available to municipalities, counties, municipal and inter-municipal authorities and river support groups to conserve and enhance river resources. Planning and implementation grants are available to develop or carry out projects or activities defined in an approved river conservation plan.

Pennsylvania Recreational Trails Program Grants provide funds to develop and maintain recreational trails and trail related facilities for motorized and non-motorized recreation. Eligible applicants include federal and state agencies, local governments and private organizations. Eligible projects include: maintenance, restoration, development, construction of new recreational trails and acquisition of easements or property for recreational trails or recreational trail corridors.

B. Pennsylvania Department of Community and Economic Development (DCED)

The **Land Use Planning and Technical Assistance Program (LUPTAP)** provides grant funds for the preparation of community comprehensive plans and the ordinances to implement them. Multi-municipal ventures are given priority within this fund. LUPTAP funds could be used to implement greenway components of municipal comprehensive plans.

The Community Revitalization Program provides grant funds to support local initiatives that promote community stability and quality of life.

Floodplain Land Use Assistance Program Provides grants and technical assistance to encourage the proper use of land and the management of Floodplain Lands within Pennsylvania.

FUNDING

C. Pennsylvania Fish and Boat Commission

A Boating Facilities Grant Program is available to municipalities to develop access points on municipally-owned land. The Fish and Boat Commission also provides in-kind engineering services for the creation of these access points.

The Coldwater Heritage Partnership provides leadership, coordination, technical assistance and funding support for the evaluation, conservation and protection of Pennsylvania's coldwater streams.

The **State Wildlife Grant Program** provides federal funding for high-priority conservation projects impacting endangered, threatened and at-risk species across Pennsylvania.

The Fish and Boat Commission also supports a **Water Trail Brochure Program**. The program encourages and promotes water trails by creating brochures that delineate water trail locations and access points for any interested water trail group. These groups must provide a map of the water trail and content for the brochure. The Fish and Boat Commission provides in-kind design and layout services as well as reproduction services, which are available for a nominal fee.

D. Federal Funding

The **Land and Water Conservation Fund** provides matching grants to States and local governments for the acquisition and development of public outdoor recreation areas and facilities.

The **Safe Accountable, Flexible, Efficient Transportation Equity Act – A Legacy for Users (SAFETEA-LU)** funds numerous transportation programs to improve the nation's transportation infrastructure, enhance economic growth, and protect the environment. A portion of Pennsylvania's SAFETEA-LU funds, administered through **PENNDOT**, go to greenway projects.

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DEMONSTRATION PROJECT EXAMPLES**XV. DEMONSTRATION PROJECT EXAMPLES**

Several sites located within the Sewickley Valley have been chosen as example Demonstration Projects. These projects have been chosen as potential sites to be redeveloped/enhanced to provide a better quality of life for residents, further development in a sustainable manner, protect natural resources, promote a healthier community, enhance the scenic landscape, etc. for the region. These sites could be used to publicly showcase what can be done with good planning and cooperation. These demonstration projects include:

- Osborne Coast Guard Station Riverfront Park,
- Edgeworth Route 65 Properties, and
- Kilbuck Run at the I-79 Interchange.

A. Demonstration Project #1: Osborne Coast Guard Station

The purpose for recommending a demonstration project on this site was to examine the potential for river access for motorized and non-motorized boats, provide an anchor/destination for a riverfront trail and promote adaptive reuse of the existing structures/buildings and resources. The existing administration office building could potentially serve as a future nature/community center used for workshops which address water conservation as well as the central location for hosting fishing tournaments, etc.

Map Exhibit 13: Existing Conditions: Osborne Coast Guard Station



Existing Uses: The US Coast Guard property situated along the Ohio River on McKown Lane in Glen Osborne, currently serves as the local Coast Guard Station boat landing, administrative center, armory and storage site. The property is divided into two plateaus by a steep concrete rubble embankment; the upper terrace where the parking, storage and office buildings are located; and the lower terrace where the large concrete promenade and boat docking stations are located. On either side of the promenade are boat launches down to the Ohio River. If the Station ever becomes available due to military realignments or property disposition efforts, Glen Osborne or the Region should try to obtain/acquire/secure the site.

DEMONSTRATION PROJECT EXAMPLESMap Exhibit 14: Site Plan: Osborne Coast Guard Station

Proposed Uses: The Coast Guard Station provides a great re-use opportunity and location for a Public Riverfront Park. The property has ample space that could be used for public recreation, boating activities, outdoor entertainment, etc. Many of the existing features on site can be renovated/enhanced for public use. The current administrative center located in the center of the site could serve as the recreation center, restaurant, entertainment center, etc. The existing boat launches could be repurposed for motor boats, kayaks and canoe launches while providing space for canoe and kayak rentals. Picnic pavilions with tables and grills situated throughout the site would provide space for public and private picnic events. Designated playground and sports facilities would allow for children and adult outdoor recreation. The promenade along the river could serve for transient boat docking and fishing activities. An outdoor amphitheater would provide a public entertainment venue while taking advantage of the slope between the river and recreation center. Providing additional vegetation, reducing pavement, adding more groundcover material, providing storm water management rain gardens, etc. would create a more self-sustaining and environmentally sound site.

B. Demonstration Project #2: Edgeworth Route 65 Properties

The purpose for recommending a demonstration project on this site was to examine strategies to reduce the amount of impervious paving through modifications to existing zoning and subdivision and land development ordinances; promoting more “greenery” and less pavement; providing on-site storm water management techniques used for slowing, cooling, and filtering runoff; and providing the safe and efficient flow of traffic while maintaining existing character of the site.

Map Exhibit 15: Existing Conditions: Edgeworth Route 65 Properties



Existing Uses: The Route 65 properties situated in Edgeworth consists of four parcels located at the intersection of Hazel Lane and Route 65. Parcel A, a 1.56 acre site has two buildings, each one-story in height; an Eat’n Park Restaurant and Retail Shops. The site consists of 111 parking spaces and is approximately 95% impervious. Parcel B, a 1.65 acre site has one building which is three-stories in height; UPMC medical offices.

DEMONSTRATION PROJECT EXAMPLES

The site consists of 103 parking spaces and is approximately 81% impervious. Parcel C, a 0.51 acre site consists of 22 parking spaces and is approximately 45% impervious. Parcel D, a 0.86 acre site is undeveloped and subsequently 100% pervious. Parcels A-C each has a significant amount of parking and paved surface with very limited landscaping. Parcel D has the potential to be developed in a sustainable manner.

Map Exhibit 16: Site Plan: Edgeworth Route 65 Properties

Proposed Uses: Based upon the results and calculations of the existing conditions, each parcel contains a significant amount of paving or impervious coverage. Assuming the current zoning ordinance and land development standards for Edgeworth Borough be updated to standards similar to those of progressive and/or PA DEP Act 167 model zoning ordinances, each parcel shown can reduce impervious surface coverage drastically. By reducing the parking/pavement, providing safe and

efficient access into the parcels, providing necessary landscaping and “green” coverage, providing space for on-site storm water infiltration by using bio swales, infiltration zones, etc. these parcels will create a more sustainable environment while maintaining its function and current uses.

C. Demonstration Project #3: Kilbuck Run at the I-79 Interchange

The purpose for recommending a demonstration project on this site was to examine the ways in which creative storm water management techniques can be used to cool, slow and filter storm water; un-channelizing the existing stream and providing a more naturalized stream corridor; provide strategic “vegetated flood zones” in storm/flooding events; designating scenic bicycle routes/connections with bike lanes, signage, and trail heads; enhance and restore the riparian buffer through the use of native plants and planting techniques; and promote public awareness through the use of interpretive/wayfinding signage.

DEMONSTRATION PROJECT EXAMPLESMap Exhibit 17: Existing Conditions: Kilbuck Run at the I-79 Interchange

Existing Uses: The Kilbuck Run at the I-79 Interchange site located at the crossing of I-79 and Rt. 65 in Glenfield is a triangular tract of land which is highly visible from these highway corridors. It is confined on either side by Killbuck St. and Glenfield Interchange Ramp A1 Road. This piece of land is comprised



Photograph 46: Existing Killbuck Run.

of a channelized stream bed with steep, sloping embankments and thick vegetation. It also contains a pull-off rest area as well as a bike lane along Kilbuck St. The channelized stream and embankment is full of invasive species, weeds and other debris.

Map Exhibit 18: Site Plan: Kilbuck Run at the I-79 Interchange



Proposed Uses: Since the stream bed is highly visible from I-79 and Rt. 65 road corridors, there is potential to get funding from Penn DOT and the PA DEP for a scenic view corridor enhancement. These enhancements would include, un-channelizing the stream bed; providing a more naturalized stream flow, develop undulating landform patterns with wide pocket/pool areas along the stream for storm protection during flooding, enhanced riparian buffers; to slow, cool and filter storm water,

DEMONSTRATION PROJECT EXAMPLES

create a massing of varying landscape beds and plant species, convert the parking area into a trail head and provide additional landscaping and buffers, provide an overlook with educational interpretive signage, provide additional pavement markings and signage for bike lane, etc.

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CONCLUSION**XVI. CONCLUSION**

The Phase II Sewickley Valley Rivers Conservation and Management Plan presents a comprehensive assessment of the Region's natural resources from environmental, recreational and cultural perspectives, and outlines management and policy strategies to address the conservation of the Region's highest value resources/areas. Furthermore, the potential multifaceted implementation of these strategies has been illustrated through the development of marquee demonstration project for the region. The strategies and recommendations outlined by Phase II will serve as the starting point for further multi-municipal cooperation, development of a unified management entity to address regional water conservation issues, formal development and adoption of resource protection/conservation policies, as well as the development of recreational, educational and economic development initiatives.

A. Opportunities and Challenges

As concluded in Phase I of this study and further reinforced by the Phase II planning efforts, the opportunities and challenges of the partner communities can be viewed as two (2) sides of a double edged sword. On one side the region's exceptional natural resources are one of its major "draws" offering a high quality of life and the potential for sparking expansion and economic development in the partner communities. On the "flip" side, this same economic prosperity has the potential to degrade and destroy both the very social/recreational values that attract residents to the Region. Moreover, the potential degradation reduces the ability of the natural resources to function as a productive ecological system supporting regional growth and success.

The recommendations developed as part of Phase II support the notion that 1) socially and environmentally responsible planning and development views the opportunities and the challenges of the region as inter-related factors which cannot be considered separately and 2) unified or complementary watershed planning objectives must be implemented by each partner community for the good of the watershed and region as a whole.

The adoption of the Sewickley Valley Rivers and Conservation Management Plan is just the first step in a long road towards comprehensively and sustainably addressing the regions conservation issues. While this planning process and other concurrent planning initiatives have laid the foundation for future successes, there are still steep obstacles which must be overcome to fully realize implementation of the plan from its many perspectives.

1. Natural Resources

As previously mentioned, and illustrated in the various analyses completed as part of this Plan, the Sewickley Valley has a wealth of existing high quality and scenic natural resources. Additionally, due to the region's overall undeveloped land, there is the opportunity for individual communities and the region as a whole to proactively protect these resources from potential negative effects of future development impacts. The major challenge/obstacle to protecting these resources is that these natural systems are "blind" to political boundaries, and in order to effectively protect these systems as a whole, it is not enough for individual municipalities to implement unilateral conservation measures. The partner communities whose development and activities may impact a particular resource must coordinate their efforts to implement multilateral conservation measures. This is the best way to ensure the health and vitality of these valuable resource systems.

2. Management and Implementation

Based upon the successful cooperation among the partner communities in the development and completion of this Plan, there is the opportunity to build upon that success and cooperatively work together to develop a regional management entity that can act on behalf of the individual municipalities, or a group of municipalities, and be the champion of conservation implementation efforts, form cooperative partnerships with other community based conservation and environmental groups, enforce instituted conservation measures, seek out funding sources for implementation efforts and to continually

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monitor and reevaluate the region's changing conservation needs as current physical, environmental, political and economic factors may dictate. There are several challenges associated with the development of such an entity, including how such an entity will be funded and governed, what will be the entities legal enforcement authority, as well as how does the entity balance implementation and enforcement efforts across several communities. Furthermore, if a management entity were to be funded in part by contributions from all the partner municipalities, how do you justify contributions being made by one community for implementation efforts in another, particularly if, for example, those efforts will have no impact on that contributing municipality or even its watershed. One potential way to mitigate some of these challenges would be to develop smaller watershed based cooperative agreements between partner communities that could ensure contributions are spent "locally" while also coordinating efforts with other regional watershed groups.

3. Policy, Land and Resource Management

Again, building upon the successful cooperation of partner communities established through this planning process, there is the opportunity to implement coordinated and comprehensive policy, land and resource management initiatives to address the region's conservation issues. While all of the communities understand that what happens from a land use and resource policy standpoint in one community may negatively affect another, it will be a challenge to balance the current and future needs/visions of each individual municipality, and to motivate/incentivize active participation from all municipalities for the overall good of the region. For example, the current and future needs of a "downstream community" such as Edgeworth Borough (which has limited future growth potential) differ greatly from those of an "upstream community" such as Leet Township (which has significant growth potential). How do you get these upstream communities to buy into the notion that limiting their development potential in order to protect not only Leet Township's resources, but also to prevent potential negative impacts from development in neighboring Sewickley Borough as well as benefit the

region as a whole. The idea that the benefit and health of the whole region is greater than that of any one municipality must constantly be reinforced.

4. Recreation

Due to the vast natural resources which define Sewickley Valley's character, there are not only several identified opportunities for establishing additional specific recreational resources, but there is an opportunity to conduct recreational planning on a regional level and establish recreational/green space networks, such as the suggested greenbelt greenways and blueways. These networks would also most likely be closely associated with the region's water resources and provide regional residents with several venues for both active and passive recreational activities. In addition to the challenge garnering cooperation among partner communities as it relates to the proposed establishment of region-wide recreational systems, there is the added challenge of planning for and funding the sustainable development, expansion and maintenance of these facilities to ensure their long-term quality and availability.

5. Education and Awareness

As the partner communities continue to work on addressing the Region's conservation issues at the governmental level, there is also the opportunity to engage individual communities and residents in conservation initiatives. This can be accomplished by partnering with existing organizations, schools, etc. to provide educational and "hands on" / "grass roots" programs that raise community awareness regarding environmental and conservation issues. The range of programs that could be developed is almost limitless, ranging from educational children's nature walks, to organized volunteer cleanup efforts. There is also the opportunity to develop and utilize specific programs as a means for continually monitoring not only the general health of the region's resources, but also the impacts of implemented conservation initiatives as well as impacts associated with potential development and development requirements. The key challenge to

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the implementation of such programs will be not only to establish partnerships in order to develop the programs themselves, but to energize the public with regards to any developed program and to establish a level of participation that will allow these programs to be sustainable long-term.

6. Economic Development

In addition to the economic value already provided by the Region's existing scenic and natural resource qualities, by implementing the recommendations of this Plan, there are additional opportunities to capitalize on the regions natural resources through the protection and enhancement of valuable scenic open spaces, the development and expansion of recreational systems, the marketing of the region to outside visitors and investors, as well as the continued commitment to a high quality of life for the Valley's residents. For example, protection of a scenic corridor may provide an opportunity for the development of a scenic pedestrian/bicycle trail, which in turn may provide the opportunity for the establishment of trail related businesses and increase tourism, as well as provide a recreational resource for nearby residents and may increase nearby property values. A major challenge to the capitalization of these economic opportunities is to balance potential development with the long-term health of the region's natural resources, as well as the preservation of the region's character which makes it such a unique and desirable destination.

B. Partnerships and Funding

As previously mentioned, and as outlined in this plan, there are numerous cooperative partnership and funding opportunities with regards to the implementation of this Plan's recommendations. The key challenge will be to procure funding for implementation efforts in an ever more competitive economic landscape where available funds are trending down and those competing for funds are trending up. The partner communities can potentially increase their ability to procure funding by leveraging their collective efforts and emphasize the cooperative nature and regional impact of specific funding requests.

C. Final Thought

The most essential factor in successfully implementing the Rivers Conservation and Management Plan is the continued cooperation among partner communities to address conservation issues. Without this cooperative effort, the goals set for in this plan will not be attainable.

**“Man shapes himself through decisions
that shape his environment” – *Rene Dubos***

GLOSSARY OF TERMS

A

Abatement – A reduction in degree of intensity of a substance or quantity.

Acid Mine Drainage – Acid drainage from bituminous coal mines containing a high concentration of acidic sulfates, especially ferrous sulfate.

Act 43 – Pennsylvania Act 1981-43 - Known as the Agricultural Area Security Law, Act 43 enables landowners to propose the creation of agricultural areas to local units of government. Voluntary agricultural areas would consist of 500 or more acres of viable farmland. Incentives to encourage farming in these agricultural areas are provided. It also authorizes county governments to establish programs for the purchase of development easements.

Act 100 – Creates an independent administrative body known as the Agricultural Lands Condemnation Approval Board (ALCAB), which must approve any condemnation, by the Commonwealth of Pennsylvania or its agencies, of productive agricultural land for certain purposes, including the construction of highways on new alignment.

Act 319 – Commonly known as the "Clean and Green Act", it was passed as a Constitutional Amendment permitting preferential assessment of farmland and forest land. The Act is designed to preserve farmland, forest land, and open space by taxing land according to its use value rather than the prevailing market value.

Act 515 – Enables counties to covenant with land owners for preservation of land in farm, forest, water supply, or open space uses. In return, the land is assessed for tax purposes at its value as farmland and not at its market value for urban uses such as housing.

Adaptive Reuse – The development of a new use for an older building or for a building originally designed for a special or specific purpose.

Agricultural Security Area (ASA) – Defined as a unity of 250 or more acres of land, not necessarily connected, which are used for agricultural production.

Air Emissions – Physical, chemical or biological substance emitted into the ambient air which contains air pollutants as defined in Section 302 of the Clear Air Act.

Alignment – The line which represents the proposed location of a new highway or transit line.

Alternative Fuel – A liquid or gaseous non-petroleum fuel. The term usually refers to alcohol fuels, mineral fuels, natural gas and hydrogen.

Americans with Disabilities Act (ADA) – Passed in 1992, this federal law prohibits discrimination on the basis of disability in the services, programs or activities of all state and local governments. Under the

provisions of ADA, the Department must take steps to make all public involvement activities related to the Transportation Project Development Process accessible to persons with disabilities. This includes providing services and/or auxiliary aids to those with special needs.

Aquatic – Living or growing in, on, or near water; having a water habitat.

B

Best Management Practices – The methods, measures, or practices to prevent or reduce the amount of pollution from point or non-point sources, including structural controls, non-structural controls, and operation and maintenance procedures.

Biological Diversity or Biodiversity – The variety and abundance of species, their genetic composition, and the communities, ecosystems, and landscapes in which they occur.

Brownfield – Abandoned industrialized land left unused or underused, often because of the presence of environmental contaminants. These abandoned properties, once remediated (cleaned up), can provide viable spaces for sustainable industries, commercial uses and even parkland or open spaces.

Build-out Analysis – Illustrates the form and pattern that development can be expected to take under a continuation of current trends and the manner and degree to which this form and pattern are contrary to planning goals. A description and illustrations of the consequences of a continuation of current trends help to identify the kinds of action that are needed and to build public support for these measures.

C

Carbon Monoxide (CO) – A colorless, odorless, poisonous gas that is formed as a product of the incomplete combustion of carbon and is emitted directly by automobiles and trucks.

Central Business District (CBD) – The downtown retail trade area of the city or an area of very high land valuation, traffic flow, and concentration of retail business offices, theaters, hotels, and services.

Clean Air Act Amendments (CAAA) of 1990 – Requires assessment of the project's impacts on ambient air quality standards established for mobile source pollutants.

Combined Sewer Overflow – A pipe that discharges untreated wastewater during storms from a sewer system that carries both sanitary wastewater and storm water. The overflow occurs because the system does not have the capacity to transport, store, or treat the increased flow caused by storm water runoff.

Community Development Block Grants (CDBG) – Federal grants, administered by the County, designed to lower the overall cost of a project; projects must demonstrate the ability to improve the economic conditions of an area.

Comprehensive Plan – The general, inclusive, long-range statement of the future development of a community. The plan is typically a map accompanied by description and supplemented by policy statements that direct future capital improvements in an area.

Conceptual Plan – The early, generalized identification of design, operation or construction measures that would minimize or avoid anticipated environmental consequences. Typically, conceptual mitigation ideas are discussed prior to the concluding stages of an environmental study, well before many of the ideas are further worked upon, refined or committed.

Conservation Easement – A legal document that provides specific land-use rights to a secondary party. A perpetual conservation easement usually grants conservation and management rights to a party in perpetuity.

Controlled Access – Partial access restriction that gives preference to through traffic. Also provides for connections to selected public routes and to certain other adjacent locations where vehicles can enter or leave a roadway safely without interfering with through traffic.

Control of Access – A condition in which public authority fully or partially controls the right of abutting property owners to have access in connection with a highway. Common terms defining types of access control are free access and limited access.

Corridor – Any major transportation route that includes parallel limited access highways, major arterials or transit lines. With regard to traffic incident management, a corridor may include more distant transportation routes that can serve as viable alternatives to each other in the event of accidents.

Cropfall (or Subsidence) – Occurs when the support of old underground mines gives way causing the surface to collapse.

Cultural Resource – See Historic Resource.

D

Deep Mine – Open or exposed abandoned surface mine pits following outcropping coal seams usually associated with the formation of a highwall.

Development Right – The nature and the extent to which land, including the air space above, may be improved under a development regulation.

Disability – In the Americans with Disabilities Act (ADA) the term disability is defined to include any physical or mental impairment that substantially limits one or more major life activities, a record of such an impairment, or being regarded as having such an impairment. Major life activities include caring for one's self, performing manual tasks, walking, seeing, hearing, speaking, breathing, learning, and working. Persons with cognitive disabilities and those with contagious or non-contagious disease (including tuberculosis and HIV disease) are specifically included in this definition.

E

Earth Disturbance – Any construction or other activity which disturbs the surface of the land including, but not limited to, excavations; embankments; depositing or storing soil; rock; or earth.

Ecosystem – A functional system which includes the organisms of a natural community together with their environment.

Eminent Domain – The power of government to acquire private property for public use without the owner's consent, when the proposed use of the property promotes a public purpose. Fair market value (also called Just Compensation) must be paid to the property owner. It is usually determined by appraisals which establish the market value of the lands.

Enabling Act – Legislation passed by the state legislature granting specific powers to cities and boroughs and authorizing the powers and duties they can perform.

Environmental – 1. In a scientific context, a combination of external or extrinsic conditions present in nature. 2. In a planning context, a category of analytical studies of aesthetic values, ecological resources, cultural (historical) resources, sociological and economic conditions, etc.

Environmental Protection Agency (EPA) – The government agency responsible for enforcing environmental regulations such as RCRA, CERCLA, Clean Air Act, Clean Water Act.

Erosion and Sedimentation Control Plan – A detailed series of plans developed to minimize accelerated erosion and prevent sedimentation damage. In accordance with Design Manual, Part 2, Chapter 13, and PADER's Erosion and Sediment Pollution Control Program Manual, these plans are prepared in conjunction with construction staging plans, detailing what erosion control measures must be in place at all times during various construction stages and phases.

F

Fauna – The animal life characteristic of a particular region or environment.

Feasibility Study – Evaluation of potential remedial alternatives for their ability to meet technical, public health, environmental and cost effective programs.

Fill – Material, usually soil, used to raise or change the surface contour of an area, to construct an embankment, or to be placed within a stone or concrete arch bridge.

Floodplain – Any flat or nearly flat lowland that borders a stream and is covered by its waters at flood stage.

Flora – The plant life characterizing a specific geographic region or environment.

Free Access – The lowest condition of access control on state highways which allows an unlimited number of private driveway connections, intersections at grade, field entrances, or other land service linkages that give vehicles or pedestrians access to the highway.

Functional Classification – The grouping of streets and highways to classes, or systems, according to the character of service that they provide. Facilities are divided according to the degree to which they provide access to places. The recognition that individual roads do not serve travel independently, and that most travel involves movement through a network of roads, is basic to functional classification. Three general classifications are Arterial, Collector, and Local.

G

Geographic Information System (GIS) – A computerized system of compiling, presenting and analyzing geographic based data. Map images of the road network can be overlaid with land use zoning information, environmental concerns, census data, and other useful information.

Green Space – Any parcel or area of land or water essentially unimproved and set aside, dedicated, designated, or reserved for public or private use or enjoyment, or for the use and enjoyment of owners, occupants, and their guests, of land adjoining or neighboring such open space.

Greenway – A linear open space established along either a natural corridor, such as a river front, stream valley, or ridge line, or over land along a railroad right-of-way converted to recreational use, a canal, a scenic road, or other route; Any natural or landscaped course for pedestrian or bicycle passage; An open space connector linking parks, natural reserves, cultural features, or historic sites with each other and with populated areas; and Locally, certain strip or linear parks designated as a parkway or greenbelt.

Groundwater – Naturally occurring water that moves through the earth's crust, usually at a depth of several feet to several hundred feet below the earth's surface.

H

Habitat – The place where an organism lives, composed of both physical and biological elements.

Hazardous Waste – Waste identified by characteristics, source or specific substance as found in 25 PA Code Chapter 75, Subchapter D and Code of Federal Regulations Title 40, Chapter 261. A hazardous waste may: 1) cause or significantly contribute to an increase in mortality or morbidity in either an individual or the total population; and 2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed or otherwise managed.

Heritage Tourism – Marketing and promotion of cultural and historical elements of interest to visitors of an area.

Historic Integrity – The unimpaired ability of a property to convey its historical significance.

Historic Property – See Historic Resource.

Historic Resource – Building, site, district, object, or structure evaluated as historically significant.

Hydric Soil – Soil that is saturated, flooded or ponded long enough during the growing season to develop anaerobic conditions in the upper part.

I

Infill – Development of new homes, commercial and/or retail buildings, and public facilities on unused or underused lands in existing communities.

Intensity – Refers to the amount of development on a piece of land. The lower the intensity, the higher the amount of land associated with a development (i.e. low density residential = one house on a large lot).

Interchange – A system of interconnecting roadways in conjunction with one or more grade separations, providing for the movement of traffic between two or more roadways on different levels.

L

Land Trust – Private, non-profit conservation organization whose principal purpose is to protect land under its stewardship and intended to exist indefinitely.

Local Government – A city, county, parish, township, municipality, borough, or other general purpose political subdivision of a state.

M

Metropolitan Planning Organization (MPO) – The agency designated by the Governor (or Governors in multi-state areas) to administer the federally required transportation planning process in a metropolitan area. An MPO must be in place in an urbanized area with a population over 50,000. The MPO is responsible for the 20-year long range plan and the transportation improvement program.

Metropolitan Statistical Area – The Census classifications for areas having a population over 50,000. The MSA may contain several urbanized areas, but contains one or more central city or cities.

Mitigation – The replacement of natural features which have been lost or reduced in value.

Mixed-Use Development – Comprehensively planned and designed development that contains at least three different but interdependent uses, including residential use unless otherwise specified. Mixed-use development integrates its physical and functional components, is pedestrian oriented within its development, is connected to its surroundings by pedestrian or public transportation access, and is compatible in density, layout, and character with adjacent development.

Municipalities Planning Code (MPC) – A Pennsylvania State act that empowers the municipalities to plan their development and to govern the same by zoning, subdivision and land development ordinances, by official maps, to promote conservation of energy; to establish planning commissions, planning departments and zoning hearing boards.

N

National Ambient Air Quality Standards (NAAQS) – The standards set by EPA for various Pollutants known to cause health related problems, including ozone and its precursors (nitrous oxides and hydrocarbons), established by the Environmental Protection Agency to measure the health impacts of pollution on air. EPA set up NAAQS measures for six pollutants; carbon monoxide, ozone, particulate matter, lead, sulfur dioxide and nitrous oxide.

National Historic Landmark – A historic property that the Secretary of the Interior has designated a National Historic Landmark.

National Pollutant Discharge Elimination System (NPDES) Permit – Mandated by Section 402 of the Clean Water Act for projects that involve the discharge of pollutants from a point source into surface waters (including wetlands) for disposal purposes; intended to regulate the amount of chemicals, heavy metals and biological waste discharged in wastewater. The EPA has granted Pennsylvania the authority to administer NPDES permits under the Pennsylvania Clean Streams Law.

National Register of Historic Places – A list maintained by the U.S. Department of the Interior of historic and prehistoric sites that have local, state, or national significance.

Natural Resources – Land, fish, wildlife, drinking water supplies and other assets belonging to, maintained by, or otherwise controlled by the federal, state, or local government.

Niche – A site or habitat supplying factors necessary for the successful existence of an organism or species in a given habitat; the role of an organism in an ecological community.

Non-attainment Areas – Counties that do not meet national ambient air quality standards for ozone pollution; ranked by the severity of their problem as marginal, moderate, serious, severe, or extreme. In accordance with the Clean Air Act Amendments of 1990, these areas must take specific emission reduction measures.

O

Ordinance – A municipal ordinance regulates building setbacks, lot and building coverage, parking, and storm water management.

Overlay Zone – A special purpose zoning district that is superimposed over existing zoning jurisdictions. It is designated to provide additional standards and regulations for specific areas based on special conditions such as environmental factors, historical features or neighborhood preservation.

Ozone – Unstable blue gas with a pungent odor formed principally in secondary reaction involving volatile organic compounds, nitrogen oxides and sunlight.

P

Pennsylvania Department of Environmental Protection (PADEP) – State regulatory agency responsible for enforcing environmental regulations.

pH – Measure of hydrogen ion activity in an aquatic ecosystem which affects many chemical and physical processes, as well as the toxicity of many compounds, used to express relative acidity and alkalinity.

Planned Unit Development (PUD) – A PUD is a development, usually residential, that is planned in its entirety rather than lot-by-lot. A PUD will typically have a clustering of structures to preserve open space and unique natural features. It may contain a mix of housing types (single-family) as well as non-residential uses. PUDs have an advantage over conventional lot-by-lot development, in that the best use of land can be made through a comprehensive, unified site plan.

Privatization – The contracting of public services or selling public assets to private industry.

Public Facilities – Streets, utility and service corridors, utility lines, sites for schools, parks, parking garage, sidewalks, pedestrian ways, community facilities, public highways, storm drainage systems, water systems, street lighting systems, off-street parking facilities and sanitary sewerage systems.

Public Involvement – Coordination events and informational materials geared at encouraging the public to participate in project development. A successful Public Involvement Program facilitates the exchange of information among project sponsors and outside groups and the general public, and includes meetings, surveys, committees, presentations, etc.

R

Refuse – Waste material generated as a result of the washing process of raw coal.

Regionally Significant – A project that is on a facility which serves regional transportation needs (such as access to and from the area outside of the region, major activity centers in the region, major planned developments such as new retail malls, sports complexes, etc. or transportation terminals as well as most terminal themselves) and would normally be included in the modeling of a metropolitan area's transportation network, including, as a minimum, all principal arterial highways and all fixed guideway transit facilities that offer a significant alternative to regional highway travel.

Remediation – Involves clean-up of environmentally sensitive material as well as cost for studies relocation, management, overhead and other expenses.

Riparian – Pertaining to anything connected with or immediately adjacent to the banks of a stream.

Roadway Deficiencies – Problems with the existing roadway system or lack of a roadway system that cause safety concerns, motorist inconvenience or traffic congestion.

S

Safety Improvements – Roadway maintenance activities and smaller construction projects that correct conditions occurring on or alongside an existing highway. Typically involves minor widening, resurfacing, regarding roadside, hazard or obstacle elimination, guiderail installation, and miscellaneous maintenance.

Section 401 Water Quality Certification – Required as per Section 401 of the Federal Clean Water Act for projects involving the discharge of materials into surface waters, including wetlands. The applicant must demonstrate that activities will comply with Pennsylvania water quality standards and other provisions of federal and state law and regulations regarding conventional and nonconventional pollutants, new source performance standards, and toxic pollutants.

Section 404 – Section 404 of the Clean Water Act requires approval by the United States Army Corps of Engineers (COE) prior to the placement of any fill materials into waters of the United States, including wetlands.

Seeps – Location where fluids contained in the ground slowly release to the surface and often form small pools.

Shared-ride – Public transportation services which include demand responsive transportation that is available to the general public, operates on a non-fixed route basis and charges a fee to riders. The first fare-paying passenger to enter the public transportation vehicle may not refuse to share the vehicle with other passengers during a given trip.

Signalization – Intersections that carry large vehicular volumes cannot be safely and satisfactorily controlled without traffic signals. The installation of traffic signals at an intersection can effectively separate all or most conflicting flows, bringing about a degree of orderliness and safety that would otherwise be impossible at higher traffic volumes.

Sinkhole – A hollow place or depression where drainage or waste collects or is deposited.

Spoil – Overburden or non-coal material removed in gaining access to the material extracted through surface mining methods.

Sprawl – Uncontrolled growth, usually of a low-density nature, in previously rural areas and some distance from existing development and infrastructure.

State Implementation Plan – A document prepared by state government officials, specifying measures to be used in the attainment and maintenance of national Ambient Air Quality Standards.

Statewide Transportation Plan – The official statewide, intermodal transportation plan that is developed through the statewide transportation planning process.

Stationary Source – Stationary sources of air pollutants are relatively large, fixed sources of emissions (i.e. chemical process industries, petroleum refining and petrochemical operations, or wood processing).

Stream Corridor – Any river, stream, pond, lake, or wetland, together with adjacent upland areas, that support protective bands of vegetation that line the waters' edge.

Streetscape – A design term referring to all the elements that constitute the physical makeup of a street and that, as a group, define its character, including building frontage, street paving, street furniture, landscaping, including trees and other plantings, awnings and marquees, signs, and lighting.

Strip Development – A mixed commercial/retail zone, usually only one store deep, that occurs along both sides of a main street or road.

Subdivision – The division or re-division of lots, tracts or parcels. A municipal ordinance that regulates how this may occur, including, but not limited to, public streets, parks, utilities and storm water management.

Subsidence – Downward movement of strata over mined-out voids.

T

Topography – The natural surface features of a region, including its relief; may be land or water-bottom surface.

Transfer of Development Rights (TDR) – Ability to transfer property entitlements from one property to another when one of the parcels is located in a designated development area.

U

Urban Area – An area having a Center City population of 50,000 or more as defined by the 1990 US Census; may also include other major population concentrations where a systems planning study is deemed necessary.

V

Velocity – The time rate of motion; the distance traveled divided by the time required to travel that distance.

W

Watershed – A region or area bounded by a water parting and draining ultimately to a particular watercourse or body of water.

Wetland – Lands frequently inundated or saturated with water. An important natural resource that provides flood control, pollution control and habitat for fish, birds and mammals and aquatic life. Wetlands are more commonly known as marshes, bogs, swamps, wet meadows and shallow ponds.

Z

Zoning Ordinance – Municipal regulations that may permit, prohibit, regulate, restrict and determine: Size, height, bulk, location, construction, repair, maintenance, alteration, razing, removal and use of structures. Areas and dimensions of land and bodies of water to be occupied by uses and structures, as well as areas, courts, yards and other open spaces and distances to be left unoccupied by uses and structures. Density of population and intensity of fundamental rights provided for citizens in the Constitution and should be protected at all costs

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Appendix A: Existing Resolutions

**TOWNSHIP OF ALEPPO
ALLEGHENY COUNTY, PENNSYLVANIA**

RESOLUTION NO. 2009-03

A RESOLUTION BY THE TOWNSHIP OF ALEPPO, COUNTY OF ALLEGHENY, COMMONWEALTH OF PENNSYLVANIA, ADOPTING AN INTERGOVERNMENTAL COOPERATION AGREEMENT FOR PARTICIPATION IN PHASE II OF THE SEWICKLEY VALLEY RIVERS CONSERVATION MANAGEMENT PLAN

WHEREAS the Townships of Aleppo, Kilbuck, Leet and Ohio and the Boroughs of Bell Acres, Edgeworth, Emsworth, Franklin Park, Glen Osborne, Glenfield, Haysville, Leetsdale, Sewickley, Sewickley Heights and Sewickley Hills have discussed the possibility of governmental cooperation in the development of a Rivers Conservation and Storm Water Management Plan for the Sewickley Valley;

WHEREAS these municipalities share many common characteristics, including the Ohio River shoreline, integrated watersheds, the Route 65 Corridor, economic and employment markets, soil types, land uses, increasing development pressure, growing traffic, limited infrastructure and a mandate to comply with the Municipal Separate Storm Sewer System (MSSS) requirements;

WHEREAS these municipalities have a long history of formal and informal regional / multi-municipal cooperation, including sewer and water authorities, school districts, Council of Government, and most recently the completion of the Sewickley Valley Economic Visioning Plan and Aleppo Sewickley Osborne Joint Comprehensive Plan;

WHEREAS the municipalities believe the development of a regional rivers conservation and storm water management plan is the next step in dealing with growth, preservation challenges, natural habitat maintenance and restoration, and storm water management;

WHEREAS these municipalities believe the completion of such a plan will provide opportunities for the implementation of passive and active storm water management projects, joint infrastructure maintenance efforts and coordinated land use planning;

WHEREAS, in June 2000, the Commonwealth of Pennsylvania created amendments to the Pennsylvania Municipalities Planning Code that give new tools to municipalities for development and implementation of regional and County Plans;

WHEREAS, Aleppo Township wishes to join with neighboring municipalities in the western portion of Allegheny County in the development of Phase II of the Sewickley Valley Rivers Conservation and Storm Water Management Plan;

WHEREAS, priority financial assistance is available to municipalities for joint planning and whereas the Borough of Sewickley has agreed to serve as the point of contact for the

development of grant applications to the Commonwealth of Pennsylvania, and project manager, and Allegheny County has agreed to serve as the fiscal agent;

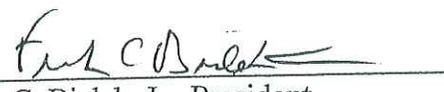
NOW, THEREFORE BE IT RESOLVED, that the Board of Commissioners of Aleppo Township, Allegheny County, Pennsylvania:

1. Concurs in the need for the Sewickley Valley Rivers Conservation and Storm Water Management Plan and agrees to participate in the preparation of such a Plan,
2. Concurs in the need to develop and run regional models (HEC-HMS and HEC-RAS) for analyzing storm water flow in the Sewickley Valley and based on the results of the regional models to identify areas of concern and effective improvement strategies,
3. Concurs that the Plan should achieve compatibility of land development, conservation, and storm water management strategies across municipal boundaries and should achieve consistency with County and Commonwealth goals,
4. Authorizes the Borough of Sewickley's staff to prepare a work scope and a grant application on behalf of the cooperating municipalities,
5. Agrees to participate in the development of a mutually agreed upon cost schedule and cost sharing proposal;
6. Appoints a representative to an Advisory Committee for the purpose of:
 - a. working with the technical planners on development of the Plan and resulting recommendations; and,
 - b. serve as liaison to the community
7. May adopt the plan and may use it to update municipal zoning, subdivision regulations and such other municipal codes and ordinances that are relevant if in the best interests of the Township to do so.

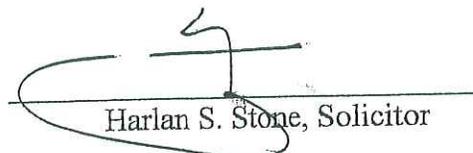
RESOLVED, this 15th day of June, 2009 by the Board of Commissioners of the Township of Aleppo.

ATTEST:


Martha B. Rogers, Township Secretary


Frank C. Bialek, Jr., President
Board of Commissioners

Examined and Approved as to form by me this the 15th day of June, 2009.


Harlan S. Stone, Solicitor

BOROUGH OF BELL ACRES
RESOLUTION # 6/8/09

Sewickley Valley Rivers Conservation and Storm Water Management
Plan

Sewickley Valley Communities Partnership

Intergovernmental Cooperation Agreement for Planning

Whereas the Townships of Aleppo, Kilbuck, Leet and Ohio and the
Boroughs of Bell Acres, Edgeworth, Emsworth, Franklin Park, Glen
Osborne, Glenfield, Haysville, Leetsdale, Sewickley, Sewickley
Heights and Sewickley Hills have discussed the possibility of
governmental cooperation in the development of a Rivers
Conservation and Storm Water Management Plan for the Sewickley
Valley;

Whereas these municipalities share many common characteristics, including
the Ohio River shoreline, integrated watersheds, the Route 65 Corridor,
economic and employment markets, soil types, land uses, increasing
development pressure, growing traffic, limited infrastructure and a mandate
to comply with the Municipal Separate Storm Sewer System (MSSS)
requirements;

Whereas these municipalities have a long history of formal and informal
regional / multi—municipal cooperation, including sewer and water
authorities, school districts, Council of Government, and most recently the
completion of the Sewickley Valley Economic Visioning Plan and Aleppo
Sewickley Osborne Joint Comprehensive Plan;

Whereas the municipalities believe the development of a regional rivers
conservation and storm water management plan is the next step in dealing
with growth, preservation challenges, natural habitat maintenance and
restoration, and storm water management;

Whereas these municipalities believe the completion of such a plan will
provide opportunities for the implementation of passive and active storm
water management projects, joint infrastructure maintenance efforts and
coordinated land use planning;

Whereas, in June 2000, the Commonwealth of Pennsylvania created
amendments to the Pennsylvania Municipalities Planning Code that give
new tools to municipalities for development and implementation of regional
and County Plans;

Whereas, Bell Acres Borough wishes to join with neighboring municipalities in the western portion of Allegheny County in the development of Phase II of the Sewickley Valley Rivers Conservation and Storm Water Management Plan;

Whereas, priority financial assistance is available to municipalities for joint planning and whereas the Borough of Sewickley has agreed to serve as the point of contact for the development of grant applications to the Commonwealth of Pennsylvania, and project manager and Allegheny County has agreed to serve as the fiscal agent;

Now, Therefore be it resolved, that Bell Acres Borough.

1. Concurs in the need for the Sewickley Valley Rivers Conservation and Storm water Management Plan and agrees to participate in the preparation of such a Plan,
2. Concurs in the need to develop and run regional models (HEC-HMS and HEC-RAS) for analyzing storm water flow in the Sewickley Valley and based on the results of the regional models to identify areas of concern and effective improvement strategies,
3. Concurs that the Plan should achieve compatibility of land development, conservation, and storm water management strategies across municipal boundaries and should achieve consistency with County and Commonwealth goals,
4. Authorizes the Borough of Sewickley's staff to prepare a work scope and a grant application on behalf of the cooperating municipalities,
5. Agrees to participate in the development of a mutually agreed upon cost schedule and cost sharing proposal;
6. Appoints a representative to an Advisory Committee for the purpose of:
 - a. working with the technical planners on development of the Plan and resulting recommendations; and,
 - b. serve as liaison to the community
7. Will adopt the plan and will use it to update municipal zoning, subdivision regulations and such other municipal codes and ordinances that are relevant.

Attest:



Dennis Young – Vice President
Bell Acres Borough Council

June 8, 2009

Sewickley Valley Rivers Conservation and Storm Water Management Plan

5/21/09

Sewickley Valley Communities Partnership

Intergovernmental Cooperation Agreement for Planning

Whereas the Townships of Aleppo, Kilbuck, Leet and Ohio and the Boroughs of Bell Acres, Edgeworth, Emsworth, Franklin Park, Glen Osborne, Glenfield, Haysville, Leetsdale, Sewickley, Sewickley Heights and Sewickley Hills have discussed the possibility of governmental cooperation in the development of a Rivers Conservation and Storm Water Management Plan for the Sewickley Valley;

Whereas these municipalities share many common characteristics, including the Ohio River shoreline, integrated watersheds, the Route 65 Corridor, economic and employment markets, soil types, land uses, increasing development pressure, growing traffic, limited infrastructure and a mandate to comply with the Municipal Separate Storm Sewer System (MSSS) requirements;

Whereas these municipalities have a long history of formal and informal regional / multi-municipal cooperation, including sewer and water authorities, school districts, Council of Government, and most recently the completion of the Sewickley Valley Economic Visioning Plan and Aleppo Sewickley Osborne Joint Comprehensive Plan;

Whereas the municipalities believe the development of a regional rivers conservation and storm water management plan is the next step in dealing with growth, preservation challenges, natural habitat maintenance and restoration, and storm water management;

Whereas these municipalities believe the completion of such a plan will provide opportunities for the implementation of passive and active storm water management projects, joint infrastructure maintenance efforts and coordinated land use planning;

Whereas, in June 2000, the Commonwealth of Pennsylvania created amendments to the Pennsylvania Municipalities Planning Code that give new tools to municipalities for development and implementation of regional and County Plans;

Whereas, Township of Ohio wishes to join with neighboring municipalities in the western portion of Allegheny County in the development of Phase II of the Sewickley Valley Rivers Conservation and Storm Water Management Plan;

Sewickley Valley Rivers Conservation and Storm Water Management Plan

5/21/09

Sewickley Valley Communities Partnership

Whereas, priority financial assistance is available to municipalities for joint planning and whereas the Borough of Sewickley has agreed to serve as the point of contact for the development of grant applications to the Commonwealth of Pennsylvania, and project manager and Allegheny County has agreed to serve as the fiscal agent;

Now, Therefore be it resolved, that Ohio Township:

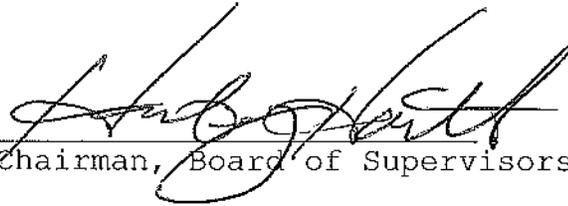
1. concurs in the need for the Sewickley Valley Rivers Conservation and Storm water Management Plan and agrees to participate in the preparation of such a Plan,
2. concurs in the need to develop and run regional models (HEC-HMS and HEC-RAS) for analyzing storm water flow in the Sewickley Valley and based on the results of the regional models to identify areas of concern and effective improvement strategies,
3. concurs that the Plan should achieve compatibility of land development, conservation, and storm water management strategies across municipal boundaries and should achieve consistency with County and Commonwealth goals,
4. authorizes the Borough of Sewickley's staff to prepare a work scope and a grant application on behalf of the cooperating municipalities,
5. agrees to participate in the development of a mutually agreed upon cost schedule and cost sharing proposal;
6. appoints a representative to an Advisory Committee for the purpose of:
 - a. working with the technical planners on development of the Plan and resulting recommendations; and,
 - b. serve as liaison to the community
7. will consider adoption of the Plan and will utilize the Plan and/or portions thereof to update the municipal zoning, subdivision regulations, and other such municipal ordinances that are deemed appropriate by Ohio Township.

Sewickley Valley Rivers Conservation and Storm Water Management
Plan 5/21/09
Sewickley Valley Communities Partnership

Attest:

Ohio Township


Township Manager


Chairman, Board of Supervisors

Date:

8/3/09

BOROUGH OF SEWICKLEY
RESOLUTION NO. 2009-012

**A RESOLUTION OF THE BOROUGH OF SEWICKLEY, SUPPORTING
THE DEVELOPMENT OF PHASE II OF THE SEWICKLEY VALLEY
RIVERS CONSERVATION AND STORM WATER MANAGEMENT PLAN**

WHEREAS, the Townships of Aleppo, Kilbuck, Leet and Ohio and the Boroughs of Bell Acres, Edgeworth, Emsworth, Franklin Park, Glen Osborne, Glenfield, Haysville, Leetsdale, Sewickley, Sewickley Heights and Sewickley Hills have discussed the possibility of governmental cooperation in the development of a Rivers Conservation and Storm Water Management Plan for the Sewickley Valley; and

WHEREAS, these municipalities share many common characteristics, including the Ohio River shoreline, integrated watersheds, the Route 65 Corridor, economic and employment markets, soil types, land uses, increasing development pressure, growing traffic, limited infrastructure, and a mandate to comply with the Municipal Separate Storm Sewer System (MSSS) requirements; and

WHEREAS, these municipalities have a long history of formal and informal regional/multi-municipal cooperation, including sewer and water authorities, school districts, Council of Government, and most recently the completion of the Sewickley Valley Economic Visioning Plan and Aleppo-Sewickley-Osborne Joint Comprehensive Plan; and

WHEREAS, the municipalities believe the development of a regional rivers conservation and storm water management plan is the next step in dealing with growth, preservation challenges, natural habitat maintenance and restoration, and storm water management; and

WHEREAS, these municipalities believe the completion of such a plan will provide opportunities for the implementation of passive and active storm water management projects, joint infrastructure maintenance efforts and coordinated land use planning; and

WHEREAS, in June 2000, the Commonwealth of Pennsylvania created amendments to the Pennsylvania Municipalities Planning Code that give new tools to municipalities for development and implementation of regional and County Plans; and

WHEREAS, the Borough of Sewickley wishes to join with neighboring municipalities in the western portion of Allegheny County in the development of Phase II of the Sewickley Valley Rivers Conservation and Storm Water Management Plan; and

WHEREAS, priority financial assistance is available to municipalities for joint planning and whereas the Borough of Sewickley has agreed to serve as the point of contact for the development of grant applications to the Commonwealth of Pennsylvania, and project manager and Allegheny County has agreed to serve as the fiscal agent.

NOW, THEREFORE, BE IT RESOLVED that the Borough of Sewickley Council:

1. concurs in the need for the Sewickley Valley Rivers Conservation and Storm Water Management Plan and agrees to participate in the preparation of such a Plan,
2. concurs in the need to develop and run regional models (HEC-HMS and HEC-RAS) for analyzing storm water flow in the Sewickley Valley and based on the results of the regional models to identify areas of concern and effective improvement strategies,
3. concurs that the Plan should achieve compatibility of land development, conservation, and storm water management strategies across municipal boundaries and should achieve consistency with County and Commonwealth goals,
4. authorizes the Borough of Sewickley's staff to prepare a work scope and a grant application on behalf of the cooperating municipalities,
5. agrees to participate in the development of a mutually agreed upon cost schedule and cost sharing proposal;
6. appoints a representative to an Advisory Committee for the purpose of:
 - a. working with the technical planners on development of the Plan and resulting recommendations; and,
 - b. serve as liaison to the community

7. will adopt the plan and will use it to update municipal zoning, subdivision regulations and such other municipal codes and ordinances that are relevant.

DULY ENACTED AND ORDAINED this 15th day of June, 2009, by the Borough Council of the Borough of Sewickley in public session.

ATTEST:



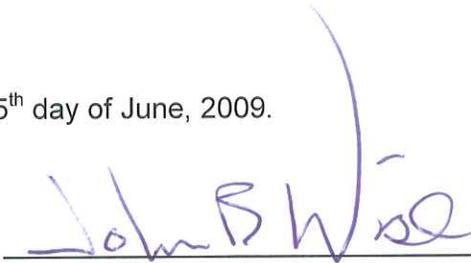
Kevin M. Flannery
Borough Manager/Secretary

BOROUGH OF SEWICKLEY



Robert Hague
President of Council

EXAMINED AND APPROVED by me this 15th day of June, 2009.



John B. Wise
Mayor

Borough of Sewickley Heights

INCORPORATED AUGUST 3, 1935

Borough Hall
Country Club Road
Sewickley, PA 15143-9402

OFFICE OF THE
BOROUGH MANAGER

412/741-5119 • 412/741-5946
FAX 412/741-2215

RESOLUTION NO. 3-2009

Whereas the Townships of Aleppo, Kilbuck, Leet and Ohio and the Boroughs of Bell Acres, Edgeworth, Emsworth, Franklin Park, Glen Osborne, Glenfield, Haysville, Leetsdale, Sewickley, Sewickley Heights and Sewickley Hills have discussed the possibility of governmental cooperation in the development of a Rivers Conservation and Storm Water Management Plan for the Sewickley Valley; and

Whereas these municipalities share many common characteristics, including the Ohio River shoreline, integrated watersheds, the Route 65 Corridor, economic and employment markets, soil types, land uses, increasing development pressure, growing traffic, limited infrastructure and a mandate to comply with the Municipal Separate Storm Sewer System (MSSS) requirements; and

Whereas these municipalities have a long history of formal and informal regional / multi-municipal cooperation, including sewer and water authorities, school districts, Council of Government, and most recently the completion of the Sewickley Valley Economic Visioning Plan and Aleppo Sewickley Osborne Joint Comprehensive Plan; and

Whereas the municipalities believe the development of a Regional Rivers Conservation and Storm Water Management Plan is the next step in dealing with growth, preservation challenges, natural habitat maintenance and restoration, and storm water management; and

Whereas these municipalities believe the completion of such a plan will provide opportunities for the implementation of passive and active storm water management projects, joint infrastructure maintenance efforts and coordinated land use planning; and

Whereas, in June 2000, the Commonwealth of Pennsylvania created amendments to the Pennsylvania Municipalities Planning Code that give new tools to municipalities for development and implementation of regional and County Plans; and

Whereas, the Borough of Sewickley Heights wishes to join with neighboring municipalities in the western portion of Allegheny County in the development of Phase II of the Sewickley Valley Rivers Conservation and Storm Water Management Plan; and

Whereas, priority financial assistance is available to municipalities for joint planning and whereas the Borough of Sewickley has agreed to serve as the point of contact for the development of grant applications to the Commonwealth of Pennsylvania, and project manager and Allegheny County has agreed to serve as the fiscal agent.

Now, Therefore be it Resolved, that the Borough of Sewickley Heights:

1. Concurs in the need for the Sewickley Valley Rivers Conservation and Storm water Management Plan and agrees to participate in the preparation of such a Plan,
2. Concurs in the need to develop and run regional models (HEC-HMS and HEC-RAS) for analyzing storm water flow in the Sewickley Valley and based on the results of the regional models to identify areas of concern and effective improvement strategies,
3. Concurs that the Plan should achieve compatibility of land development, conservation, and storm water management strategies across municipal boundaries and should achieve consistency with County and Commonwealth goals,
4. Authorizes the Borough of Sewickley's staff to prepare a work scope and a grant application on behalf of the cooperating municipalities,
5. Agrees to participate in the development of a mutually agreed upon cost schedule and cost sharing proposal;
6. Appoints a representative to an Advisory Committee for the purpose of:
 - (a) working with the technical planners on development of the Plan and resulting recommendations; and
 - (b) serve as liaison to the community
7. After development, preparation and completion of the Plan, as contemplated herein, will consider the adoption of the Plan as deemed appropriate and in the best interests of the Borough and its residents, and will evaluate the use of the Plan for purposes of updating municipal zoning, subdivision and such other municipal codes, regulations and ordinances as may be relevant and otherwise in the best interests of the Borough and its residents.

ADOPTED this 15th day of June 2009.

THE BOROUGH OF SEWICKLEY HEIGHTS

Attest:


William P. Rohe, Borough Manager/Secretary

By



S. Phil Hundley, President of Council

Appendix B: Mapping

PHASE I MAPPING

I. Phase I Mapping and Analyses

A. Project Study Area

Map Exhibit 1: Project Study Area

The Project Study Area map, shown on the preceding page, displays the project area boundary, watershed boundaries, township and borough borders, as well as river and stream locations. All of the additional data collected, mapped, and analyzed pertains to the areas and locations shown on this map. The terrain of the region can be inferred from the blue lines of the streams which define the locations of the low lying valleys and from the brown dashed lines which indicate the high points of the ridges which separate the thirteen (13) watersheds.

The following table provides a summary of the overall acreage and length respectively of each project area watershed and its primary streams. Watershed numbers, as labeled on all project maps, are indicated in the left hand column.

Table 1: Watershed/Stream Summary

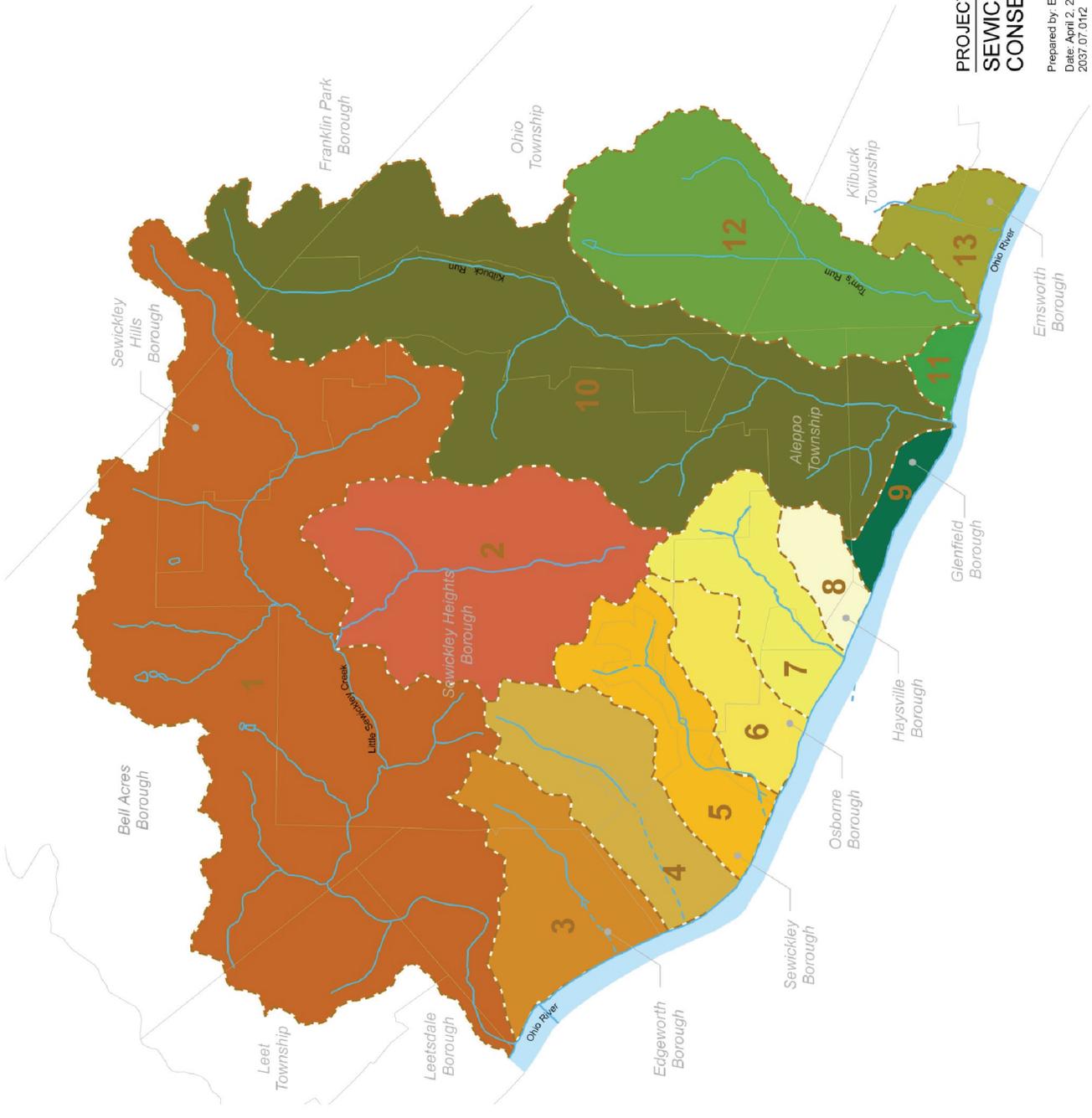
Map No.	Name	Watershed Acreage	Approx. Stream Length (miles)
1	Little Sewickley Creek	4,741	6
2	Fern Hollow	1,382	2
3	Edgeworth Run	685	1
4	Hoey's Run	684	2
5	Davis Run	584	1.5
6	Park Run	371	1.2
7	Hayes Run	516	1
8	Ohio River 1	186	0.8
9	Ohio River 2	138	
10	Kilbuck Run	3,237	4.5
11	Ohio River 3	94	
12	Tom's Run	1,434	2
13	Ohio River 4	273	0.5

PHASE I

Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributions.
 Sources: Base GIS information provided by the Allegheny County Division of Computer Services and Pennsylvania Department of Environmental Protection.

LEGEND

- STUDY AREA WATERSHEDS**
- 1 Little Sewickley Creek
 - 2 "Ferm Hollow"
 - 3 Edgeworth Run
 - 4 Hoy's Run
 - 5 Davis Run
 - 6 Park Run
 - 7 Hayes Run
 - 8 Ohio River 1
 - 9 Ohio River 2
 - 10 Kilbuck Run
 - 11 Ohio River 3
 - 12 Toms Run
 - 13 Ohio River 4
- Study Area Boundary
 Watershed Boundaries
 Municipal Boundary
 Rivers/Streams (Open)
 Rivers/Streams (Covered)



PROJECT STUDY AREA MAP SEWICKLEY VALLEY RIVERS CONSERVATION AND MANAGEMENT PLAN

Prepared by: Environmental Planning and Design, LLC
 Date: April 2, 2008
 2037.07.01r2

B. Demographics

The following demographic maps indicate the level of the development and development density of the project study area. Watershed conditions are contingent upon the types and patterns of development in the region. The maps will be used to study analyze the environmental impacts of development for current and future conditions.

Map Exhibit 2: Population Density

The Map displays the number of residents per acre within each study area census block. Watershed boundaries are also indicated in order to illustrate the relationship of population to the individual drainage basins. Densities are represented from lowest (yellow) to highest (dark brown) as per Table 3 below. Population information is provided by the U.S. Census Bureau, 2000 Census Summary File 1

Table 2: Population Density per Municipality

	Persons per Acre
	0.21 - 0.47
	0.48 - 1.55
	1.56 - 3.03
	3.04 - 9.25

The map illustrates that the lowest range of population densities (yellow) predominate within the project study area and comprise a large contiguous area in the central and northern uplands and a smaller contiguous area to the southeast along the Ohio River and Tom’s Run stream. Somewhat higher density areas (orange) lie adjacent to the low density tracts, one at the western project boundary and one (1) to the southeast. The highest population densities (red/brown and dark brown) are found adjacent to the Ohio River, mostly to the west with a small pocket (Emsworth Borough) located in the southwestern most portion of the study area.

Overall, the Sewickley Creek (No. 1), Fern Hollow (No.2), and Kilbuck Run (No. 10) watersheds contain the largest areas of low density population. The Edgeworth (No. 3), Hoey’s Run (No. 4), Davis Run (No. 5) and Tom’s Run (No. 13) watersheds contain all of the highest density population tracts.

PHASE I

Map Exhibit 3: Population Forecast

The Population Forecast Map shows the anticipated percent of population change expected by the year 2035 of municipalities within the project study area. The percent of change has been calculated based on the U.S. Census 2005 population estimates and the Southwestern Pennsylvania Commission (SPC) Cycle 8 population forecast for 2035. SPC is the Metropolitan Planning Agency (MPO) for Southwestern Pennsylvania one of whose role's is to develop and implement planning tools to predict future needs of southwestern Pennsylvania municipalities. SPC's population forecasts are based on past and current population trends but cannot always take into account municipal changes in local economies, infrastructure, etc.

Based on SPC's forecasting for the Sewickley Valley, the greatest growth (31% - 55%) is projected to occur along the southeastern and eastern border of the project study area in Glenfield and Sewickley Hills Boroughs and Kilbuck and Ohio Townships; all are current areas of low population density with room for growth. Also with growth potential (16% - 30%) are Glen Osborne, Haysville, Sewickley Hills, Leetsdale, and Franklin Park Boroughs. More densely developed municipalities along the Ohio River show the least potential for future growth.

This projection does not reflect current municipal events, notably the recent approval by the PA DEP of Aleppo Township's Act 537 plan for sewage disposal which will result in the improvement and expansion of the Township's sewer infrastructure. Such an expansion will facilitate development of lands previously without access to the public sewer system. Accompanying that development will be the increased potential for future population growth in Aleppo which is not reflected on the map.

Table 3: Population Change Forecast

	% Population Change (2005 - 2035)
	(-)15% - 0%
	1% - 15%
	16% - 30%
	31% - 55%

Map Exhibit 4: Employment by Municipality

The map shows the number of jobs located in each project municipality according to employer information provided by the U.S. Census Bureau 2000 Minor Civil Division/ County-to-Minor Civil Division/ County Worker flow.

The highest rates of employees are located in Leetsdale, Franklin Park and Sewickley Boroughs (2001 – 4000) followed by Ohio Township (1001 – 2000). Franklin Park and Ohio Township are large municipalities with a diversity of development types and potential employment opportunities. Leetsdale and Sewickley Boroughs provide employment opportunities via the Leetsdale Industrial Park on the Ohio River and the commercial and institutional entities located within Sewickley Village. Moderate employment opportunities are indicated in Aleppo Township and Edgeworth and Emsworth Boroughs. The remaining municipalities show relatively fewer employment opportunities, with the fewest indicated in Kilbuck Township and Bell Acres, Sewickley Hills, Haysville, and Glen Osborn Boroughs.

Table 4: Employment by Municipality (U.S. Census 2000)

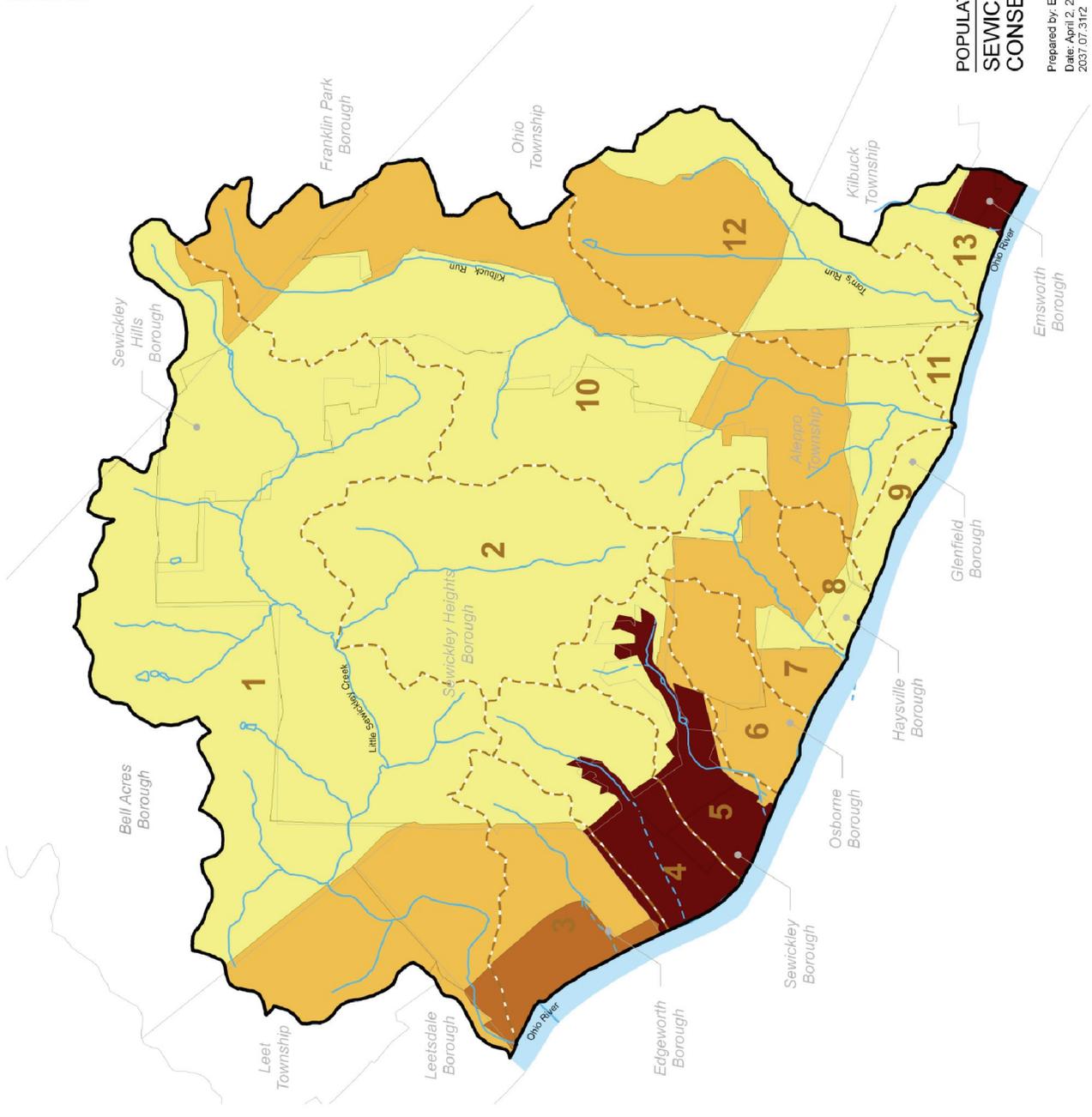
	Number of Employees
	0-250
	251-500
	501-1000
	1001-2000
	2001-4000

PHASE I

Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributions.
 Sources: Base GIS information provided by the Allegheny County Division of Computer Services and the Pennsylvania Department of Environmental Protection. Population information provided by the U.S. Census Bureau, 2000 Census, Summary File 1

LEGEND

- | | |
|---------------------------------|--------------------------|
| STUDY AREA WATERSHEDS | Study Area Boundary |
| 1 Little Sewickley Creek | Watershed Boundaries |
| 2 "Fern Hollow" | Municipal Boundary |
| 3 Edgeworth Run | Rivers/Streams (Open) |
| 4 Hoy's Run | Rivers/Streams (Covered) |
| 5 Davis Run | |
| 6 Park Run | |
| 7 Hayes Run | |
| 8 Ohio River 1 | |
| 9 Ohio River 2 | |
| 10 Kilbuck Run | |
| 11 Ohio River 3 | |
| 12 Toms Run | |
| 13 Ohio River 4 | |
-
- | | | |
|--|--|------------------------------|
| POPULATION DENSITY BY 2000 CENSUS BLOCK GROUP | | 0.21 - 0.47 Persons per Acre |
| | | 0.48 - 1.55 Persons per Acre |
| | | 1.56 - 3.03 Persons per Acre |
| | | 3.04 - 9.25 Persons per Acre |



POPULATION DENSITY MAP SEWICKLEY VALLEY RIVERS CONSERVATION AND MANAGEMENT PLAN

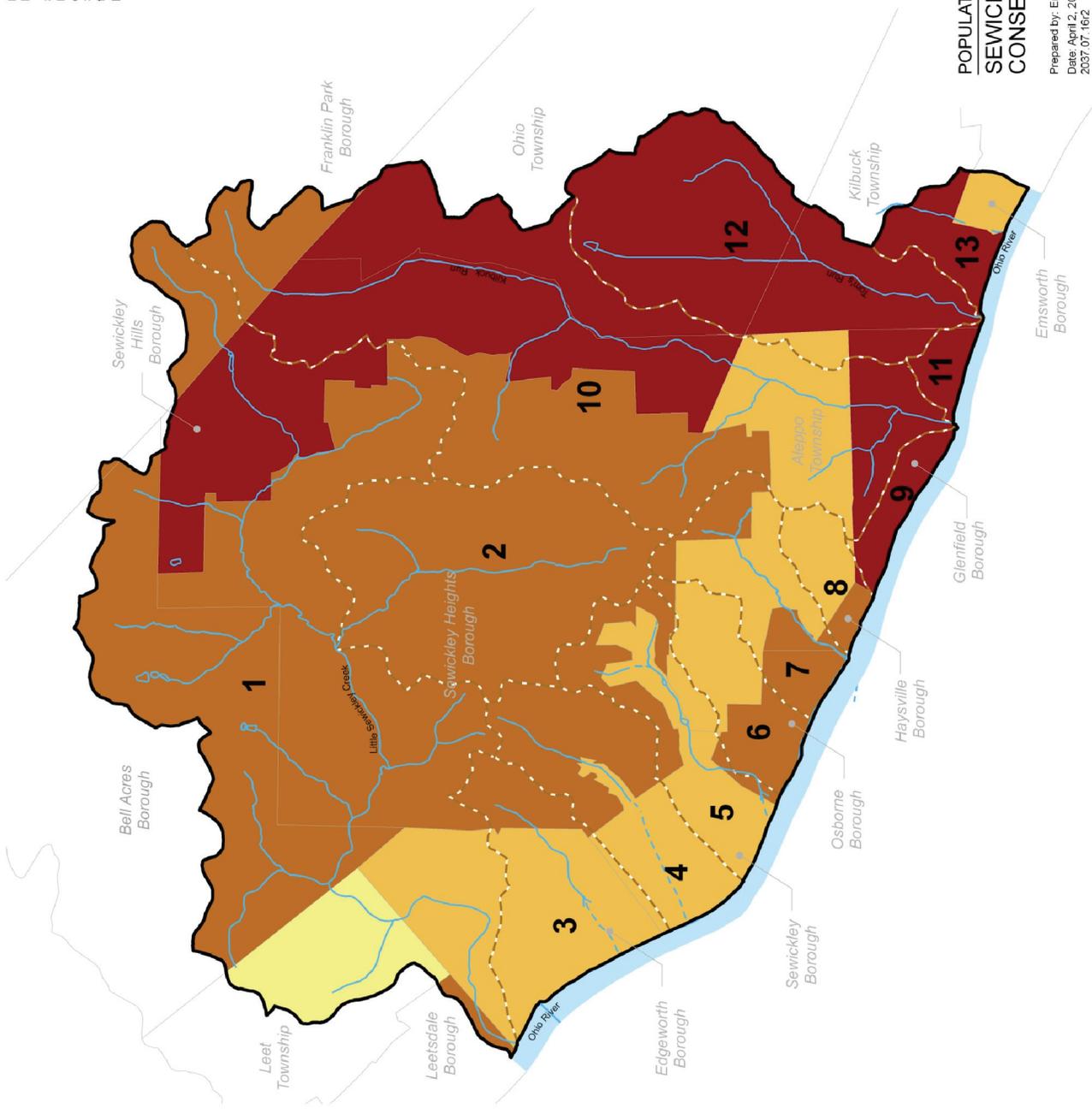
Prepared by: Environmental Planning and Design, LLC
 Date: April 2, 2008
 2037.07.3172



Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributions.
 Sources: Base GIS information provided by the Allegheny County Division of Computer Services and the Pennsylvania Department of Environmental Protection. Population forecasts provided by the Southwestern Pennsylvania Commission (Cycle 6 population forecast). Percent population change calculated based on 2005 population estimates and 2035 forecasts.

LEGEND

- STUDY AREA WATERSHEDS**
- 1 Little Sewickley Creek
 - 2 "Fern Hollow"
 - 3 Edgeworth Run
 - 4 Hoey's Run
 - 5 Davis Run
 - 6 Park Run
 - 7 Hayes Run
 - 8 Ohio River 1
 - 9 Ohio River 2
 - 10 Kilbuck Run
 - 11 Ohio River 3
 - 12 Toms Run
 - 13 Ohio River 4
- POPULATION FORECASTS**
- Percent Population Change 2005 - 2035
- 45% - 0%
 - 1% - 15%
 - 16% - 30%
 - 31% - 55%
- STUDY AREA BOUNDARIES**
- Study Area Boundary
 - Watershed Boundaries
 - Municipal Boundary
 - Rivers/Streams (Open)
 - Rivers/Streams (Covered)



POPULATION FORECAST MAP
SEWICKLEY VALLEY RIVERS
CONSERVATION AND MANAGEMENT PLAN

Prepared by: Environmental Planning and Design, LLC
 Date: April 2, 2008
 2037.07.16r2

0 100 200 feet

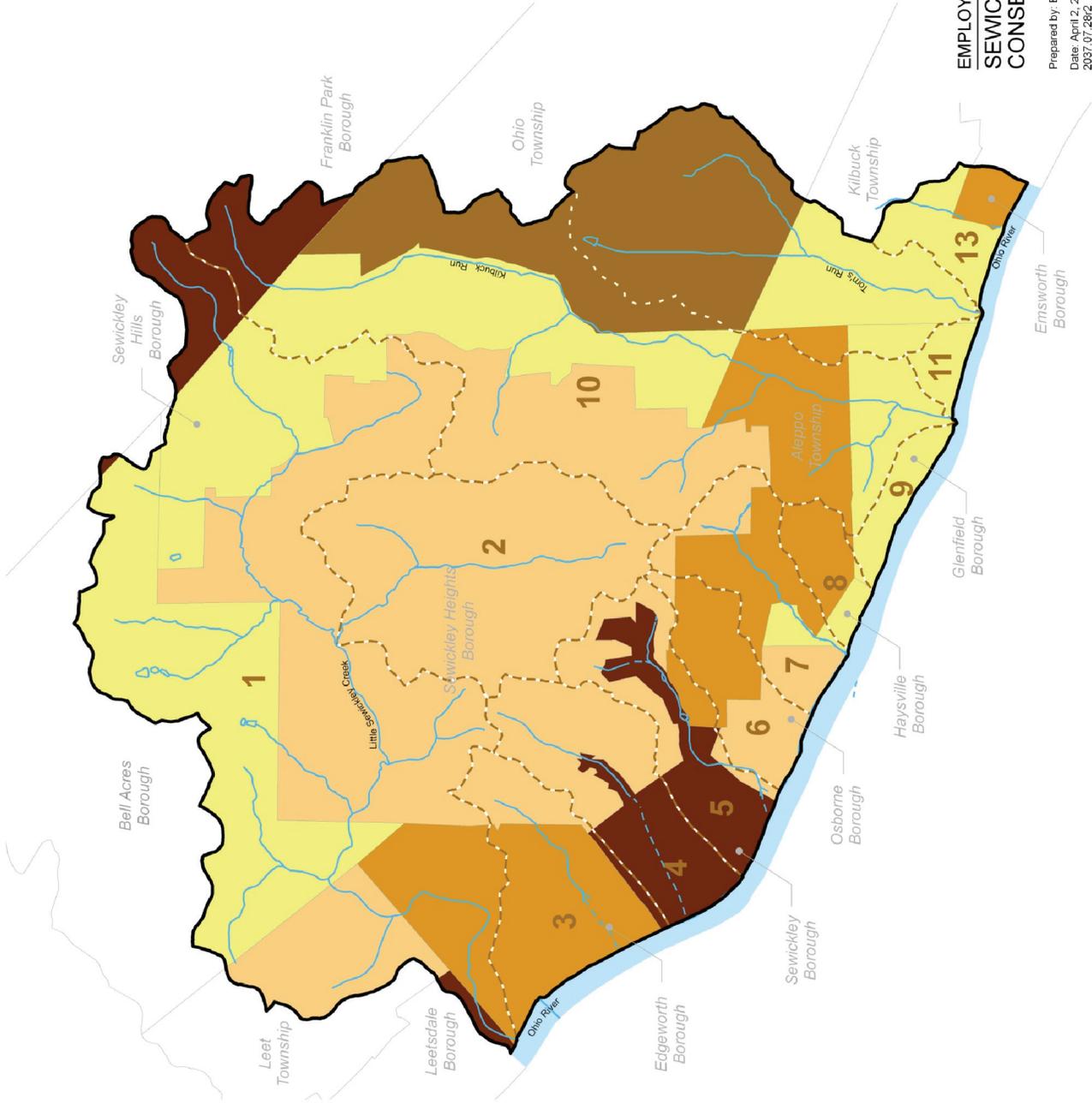
NORTH ↑

PHASE I

Funded by Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributions.
 Sources: Base GIS information provided by the Allegheny County Division of Computer Services and the Pennsylvania Department of Environmental Protection. Employer information provided by the Census 2000 Micro-Census, Division County-to-Minor Civil Division County Worker flow. US Census Bureau.

LEGEND

- | | | | |
|---|--------------------------|---|--|
|  | Study Area Boundary |  | Watershed Boundaries |
|  | Municipal Boundary |  | Rivers/Streams (Open) |
|  | Rivers/Streams (Covered) |  | Number of Employees in Each Municipality |
-
- | | |
|------------------------------|---|
| STUDY AREA WATERSHEDS | Number of Employees in Each Municipality |
| 1 Little Sewickley Creek | 0-250 |
| 2 "Firm-Hollow" | 251-500 |
| 3 Edgeworth Run | 501-1000 |
| 4 Hoye & Run | 1001-2000 |
| 5 Davis Run | 2001-4000 |
| 6 Park Run | |
| 7 Hayes Run | |
| 8 Ohio River-1 | |
| 9 Ohio River-2 | |
| 10 Kilbuck Run | |
| 11 Ohio River-3 | |
| 12 Toms Run | |
| 13 Ohio River-4 | |



EMPLOYMENT BY MUNICIPALITY MAP SEWICKLEY VALLEY RIVERS CONSERVATION AND MANAGEMENT PLAN

Prepared by: Environmental Planning and Design, LLC
 Date: April 2, 2008
 2037.07.28/2

0 100 200 Feet

NORTH ↑

C. Green Infrastructure Maps

Map Exhibit 5: Bedrock Geology

Bedrock is made up of the solid rock which underlies the earth's surface materials and is a major determinant of the rate of drainage, presence of aquifers and location of potential. Mapping the location of each type of bedrock is important for the analysis of water-flow, slope stability and infiltration. The project's bedrock geology information has been approximated using Geographic Information System (GIS) base map information provided by the Allegheny County Department of Computer Services GIS Group.



Photograph 5: Bedrock outcropping in the Davis Run watershed, Sewickley Borough.

The map shows two (2) predominant bedrock types that make up the geology of project study area: sandstone (pale yellow) and silt stone (pale green). Both sandstone and siltstone are sedimentary formations which have been laid down and compressed in layers. The distinctive pattern illustrated on the map emphasizes the relationship of topography and hydrology to underlying geologic formations. The sandstone (Casselman formation of the Pennsylvanian Age) is located in all of the lowlands along the streams and adjacent to the Ohio River. The siltstone (Glenshaw formation of the Pennsylvanian Age) is present on all of the lands rising from the stream and river valleys.

The pattern formed by the two formations on the map indicates the ways in which the rock has been weathered and eroded by the streams and their tributaries and clearly indicates the conveyance of water from the study area uplands to the Ohio River. This pattern will, to a large degree, impact the direction of future planning and development within the Sewickley Valley.

Map Exhibit 6: Oil and Gas Resources

The map identifies permitted gas and oil field locations and wells. Well sites are located based on data from the most up to date source. Although the data source is more than ten (10) years old and additional wells have been drilled, this map offers a starting point in portraying the gas and oil resources in the region. Seven (7) active oil/gas extraction sites are shown dispersed throughout the study area with some adjacent or close to exposed streams. Planning decisions to control negative environmental impacts of existing wells will be crucial to the future health of study area watersheds. Of equal importance is the presence of potential untapped oil and gas resources (shown in pink) on the western half of the Map which indicate possible locations of future extraction activities. Understanding the environmental impacts of future extraction locations should be

PHASE I

central to the development of future land use policies and management strategies.

Map Exhibit 7: Soil Condition

Soil is made up of particles of broken rock that have been altered by chemical and environmental processes including weathering and erosion. Soil types identified for an area are often related to hydrologic and geologic factors and the Map illustrates soil conditions present in the study area which indicate the floodway/floodplain locations (hatched), areas of conspicuous soil creep (yellow), landslide prone areas (orange), wetland environments (blue) and Pennsylvania red beds (red) locations. Steep slope red beds are prone to deep weathering and pose a serious landslide threat within the study area.

All of the soil conditions mapped are locationally related to each other and to the network of streams. These patterns and relationships demonstrate the effects of the movement of water through the landscape and the patterns of erosion and deposition of sediment which result from that movement. The thirteen (13) project area watersheds show, at various scales depending on their size, similar patterns of valley stream, floodplain and wetland environments bordered by uplands of landslide prone areas and Pittsburgh red beds which pose real threats to the health of the low lying ecologies.

The overall soil pattern reflects the geology and landform of the region and illustrates the sensitive nature of the lands that border the study area streams.

Map Exhibit 8: Steep Slopes

Slope is the rate of rise or fall of the natural terrain in a single direction expressed as a percentage. Slopes have been calculated based on a two foot (2') contour interval as represented on Lidar based topographic data obtained from the Pennsylvania Department of Environmental Protection (PA DEP).

Steep slopes are generally defined as those above 25% and are fragile ecosystems that are sensitive to disturbance. Steep slopes which are altered by natural events or human activities can be vulnerable to erosion and landslides and are therefore considered unsuitable for development. The Map illustrates two (2) categories of steep slopes, those between 25 and 40% and those 40% in gold and red respectively. Like soils and bedrock, steep slope locations reflect the overall landform patterns of the project study area.

Table 5 illustrates the acreage of steep slopes land area slopes within the Sewickley Valley region.

Table 5: Steep Slopes Acreage Summary

	SLOPE %	ACRES
	>25-40%	2,797
	>40%	2,121
	TOTAL	4,918

Because, of the vulnerability of these natural features and their potential impact on watershed health, policies and regulations for steep slope land use an issue of great importance and one that must addressed on a regional basis by Sewickley Valley communities.

Map Exhibit 9: Agricultural Suitability

The Agriculture Suitability Map illustrates locations where farm operations would most likely thrive as a result of the presence relatively deep, well-drained and moderately-sloped soil conditions. Lands suitable for agriculture are typically also well suited for development. Each use presents different environmental risks. The information presented on this map will aid in the development of a strategy for rural land management in the Sewickley Valley.

Agricultural operations provide local economic activity and open space; they can also act as a conduit for increased storm water run-off and can contribute to agricultural-related groundwater pollution when chemical fertilizers, animal waste and other agricultural bi-products leach into the soil. A different set of opportunities and challenges are presented when these lands are developed for active human use (athletic fields, housing, commercial etc.) including loss of open lands and natural habitat and increased storm water run-off caused by removal of vegetation and the addition of impermeable surfaces in the form of grass fields, roads and/or buildings.

The map shows approximately 2,000 acres of suitable agricultural lands. However, these lands are not large contiguous areas, but rather are widely distributed throughout the project study area in 131 pockets ranging from .7 acres to approximately 350 acres and with an average size of fifteen (15) acres. Many of these lands occur both alongside streams and along ridge tops and so in addition to the fact that they are lands with deep soils and of very high value for conservation, they are also bound on all sides by steep slopes, streams, woodlands and other sensitive features. Policies and strategies for their future

PHASE I

access and use must be carefully considered jointly by participating municipalities.

Map Exhibit 10: Aquatic Habitat

The presence of cold water (trout) and warm water (bass) fish in study area streams provides an indication of the overall health of the hydrologic systems. Larger numbers of these fish indicate that the species they consume are also at sustainable population levels and that a stream is healthy. i.e. there is a generally low level of pollutants and an increased potential for water related recreation activities.

The map identifies streams and watersheds that have been studied and found to be favorable to coldwater and warm water fish by the Pennsylvania Department of Environmental Protection (PA DEP) The map also identifies high quality streams. The solid light blue color indicates that the Little Sewickley Creek (1), Fern Hollow (2), Kilbuck Run (10) and Tom's Run (12) watersheds contain favorable fish habitats. The hatched areas in watersheds 1, 2 and 12 and in watershed 10 respectively indicate high quality cold water fish and warm water fish habitat for a total of over 7500 acres of cold water habitat and over 3,200 acres of warm water habitat. Additionally, Little Sewickley Creek is indicated in bright blue as a high quality coldwater stream suitable for sport fishing and water recreation.

These recreation and habitat assets are indicators of the shared resources of the region show conservation and management will be addressed on a watershed rather than on a municipal basis.

Map Exhibit 11: Riparian Corridors

A riparian corridor is a plant community growing near a water body or wetland which acts as an interface between water and land. Left in their natural state, riparian corridors provide important habitat diversity and habitat interconnectivity. They increase storm water infiltration and filter impurities and pollutants thereby protecting aquatic resources from erosion and degradation. Poor management of these areas has a reverse effect, contributing to increased storm water run-off, pollutants and flooding, and decreased wildlife habitat.

A prime riparian corridor indicates the existence of a high quality stream, or a stream that exhibits chemical and biological water quality exceeding federal "fishable and swimmable" standards. The corridor also includes all stream orders above such streams (headwaters). The map indicates a 300 foot wide high quality riparian corridor for the entire length of Little Sewickley Creek and its tributaries including Fern Hollow totaling 1,800 acres of protective buffer for these waterways. Additional 300 foot corridors are indicated for portions of other study

area streams and consist of more than 1,000 acres of land or protective vegetative cover.

Map Exhibit 12: Habitable Woodlands

Habitable woodlands are defined by contemporary study as wooded areas large enough to contain a self-sustained eco-system of flora and fauna. These woodlands are typically large contiguous forested areas at least 300 feet removed from existing development.



Photograph 6: Project study area wildlife depends on the ecological health of the watersheds.

Habitable woodlands provide ample open space for recreation purposes as well as appropriate “critical mass” or core forest areas needed to accommodate wildlife habitats. Due to the abundance of vegetation, these lands provide excellent naturally created passive storm water management increasing infiltration of water and reducing run-off quantity and acceleration. Based on the size and contiguity, these lands may also be prime areas for biodiversity defined in the description of Map Exhibit 13 following.

Study area habitable woodlands occur in two (2) main areas. 2500 acres is contained mostly in the Tom’s Run (No. 12) watershed and includes parts of Ohio and Kilbuck Townships. 1,600 acres of habitable woodlands are contained in the Little Sewickley Creek watershed and include portions Sewickley Heights, Bell Acres and Edgeworth Boroughs.

Map Exhibit 13: Biological Diversity Areas (BDAs)

Biological Diversity Areas (BDAs) are defined as areas that support several important biological species. The project study BDAs have been delineated by the Pennsylvania Natural Heritage Inventory (PNHI) program as most critical for conservation due to the presence of key species of vegetation and wildlife. Three (3) BDAs have been designated in the study area as the Ohio River, Tom’s Run Valley and Camp Meeting Woods.

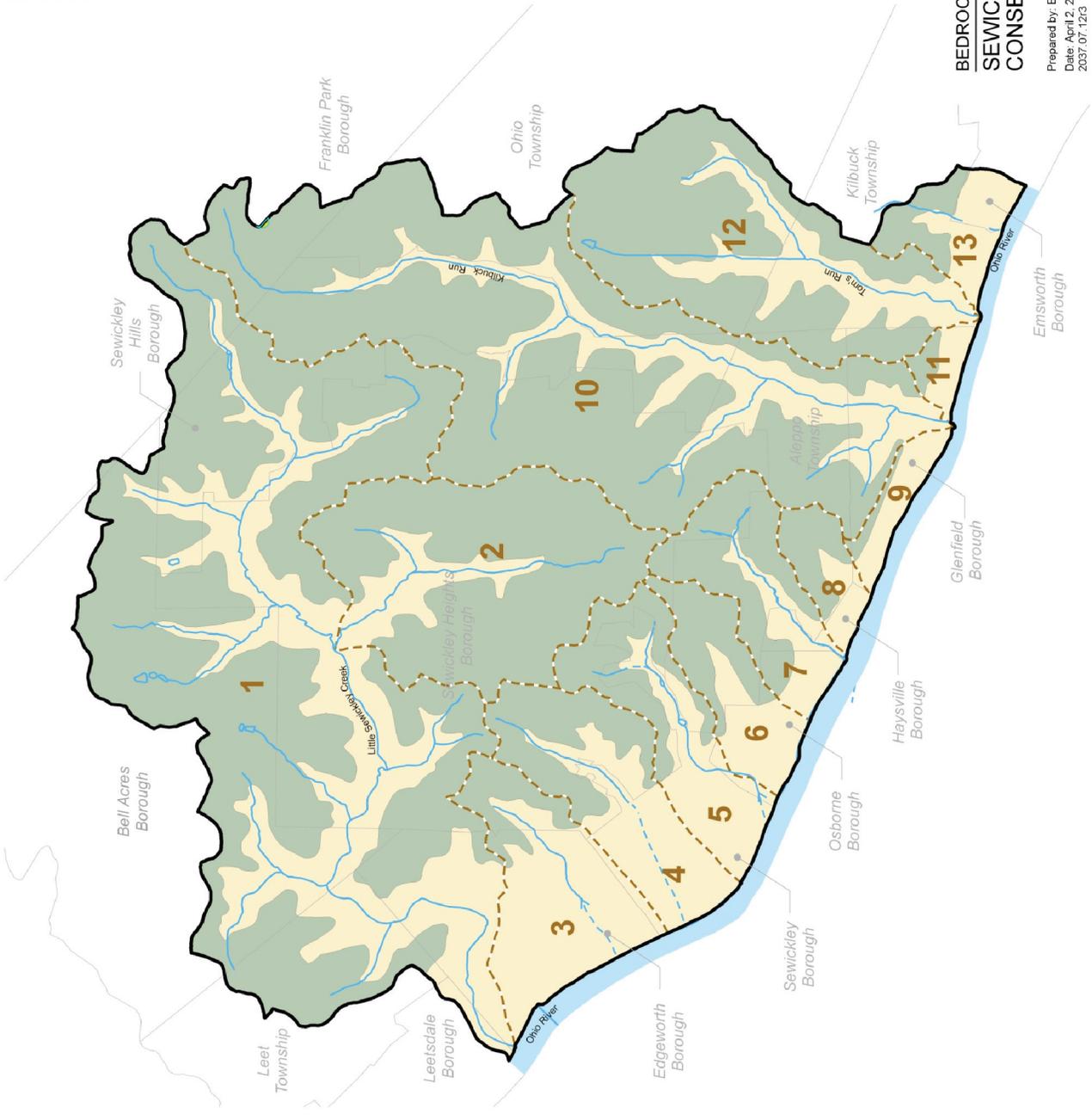
Two study area BDAs are located within or in close proximity to the habitable woodland areas within the Little Sewickley Creek (Camp Meeting Woods) and the Tom’s Run (Tom’s Run Valley) watersheds. The third (Ohio River) is indicated as vegetative buffer of the Ohio River, emphasizing the symbiotic relationship of aquatic habitats and riparian corridors.

PHASE I

Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributions.
 Sources: Base GIS information provided by the Allegheny County Division of Computer Services and the Pennsylvania Department of Environmental Protection. Bedrock types provided by the Pennsylvania Bureau of Topographic and Geologic Survey, 2001

LEGEND

- | | |
|---------------------------------|--------------------------|
| STUDY AREA WATERSHEDS | Study Area Boundary |
| 1 Little Sewickley Creek | Watershed Boundaries |
| 2 "Fern Hollow" | Municipal Boundary |
| 3 Edgeworth Run | Rivers/Streams (Open) |
| 4 Hoy's Run | Rivers/Streams (Covered) |
| 5 Davis Run | BEDROCK GEOLOGY |
| 6 Park Run | Sandstone |
| 7 Hayes Run | Siltstone |
| 8 Ohio River 1 | |
| 9 Ohio River 2 | |
| 10 Kilbuck Run | |
| 11 Ohio River 3 | |
| 12 Toms Run | |
| 13 Ohio River 4 | |



BEDROCK GEOLOGY MAP SEWICKLEY VALLEY RIVERS CONSERVATION AND MANAGEMENT PLAN

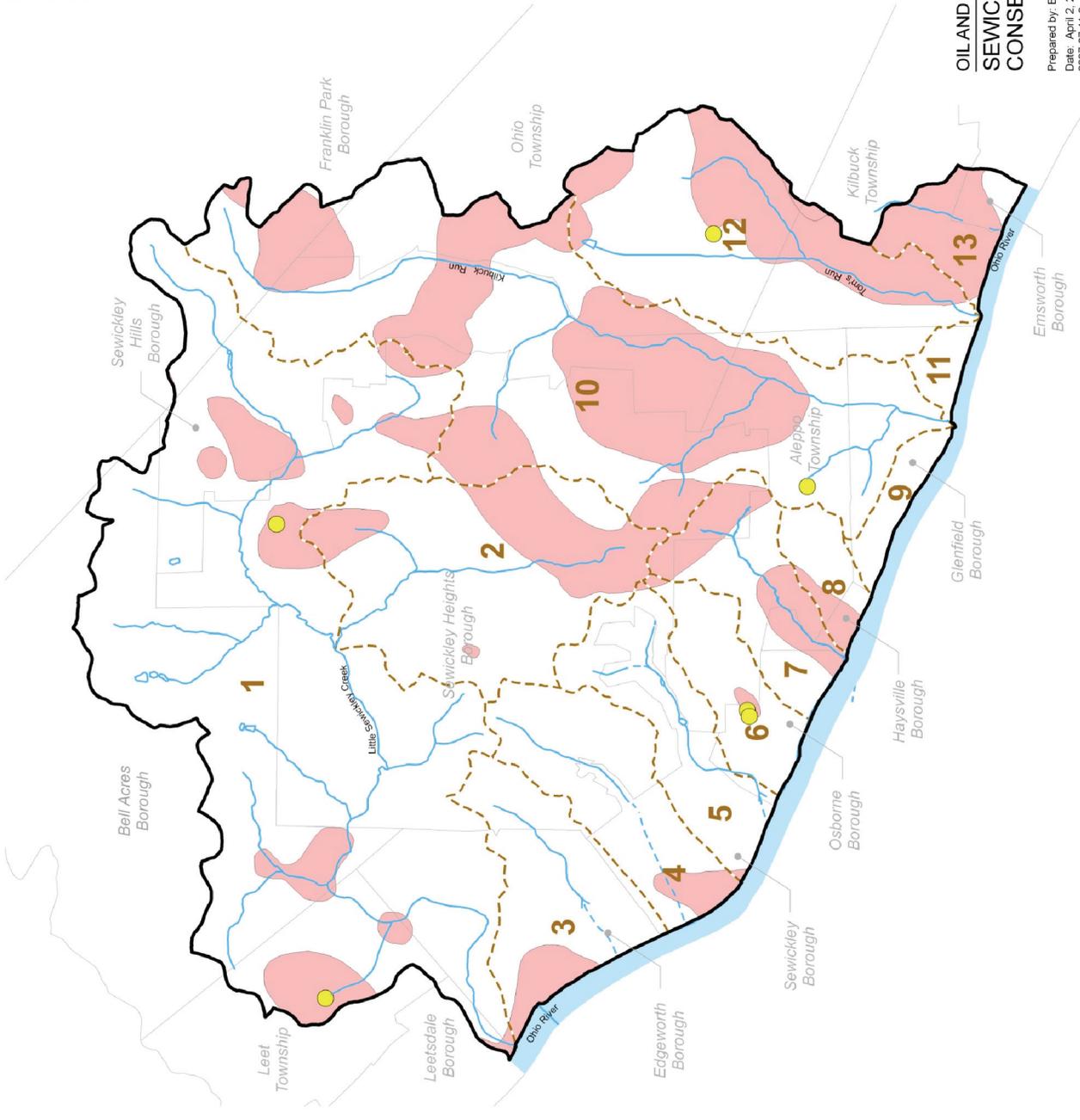
Prepared by: Environmental Planning and Design, LLC
 Date: April 12, 2008
 2037 07 1213



Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributions.
 Sources: Base GIS information provided by the Allegheny County Division of Computer Services and the Pennsylvania Department of Environmental Protection. Oil and gas resources provided by the Pennsylvania Department of Environmental Protection

LEGEND

- STUDY AREA WATERSHEDS**
- 1 Little Sewickley Creek
 - 2 "Fern Hollow"
 - 3 Edgeworth Run
 - 4 Hoy's Run
 - 5 Davis Run
 - 6 Park Run
 - 7 Hayes Run
 - 8 Ohio River 1
 - 9 Ohio River 2
 - 10 Kibuck Run
 - 11 Ohio River 3
 - 12 Toms Run
 - 13 Ohio River 4
- Study Area Boundary
 Watershed Boundaries
 Municipal Boundary
 Rivers/Streams (Open)
 Rivers/Streams (Covered)
 Oil / Gas Reserves
 Existing Oil and Gas Wells



OIL AND GAS RESOURCES MAP
SEWICKLEY VALLEY RIVERS
CONSERVATION AND MANAGEMENT PLAN

Prepared by: Environmental Planning and Design, LLC
 Date: April 2, 2008
 2037.07.1172

0 1000 2000 Feet
 NORTH

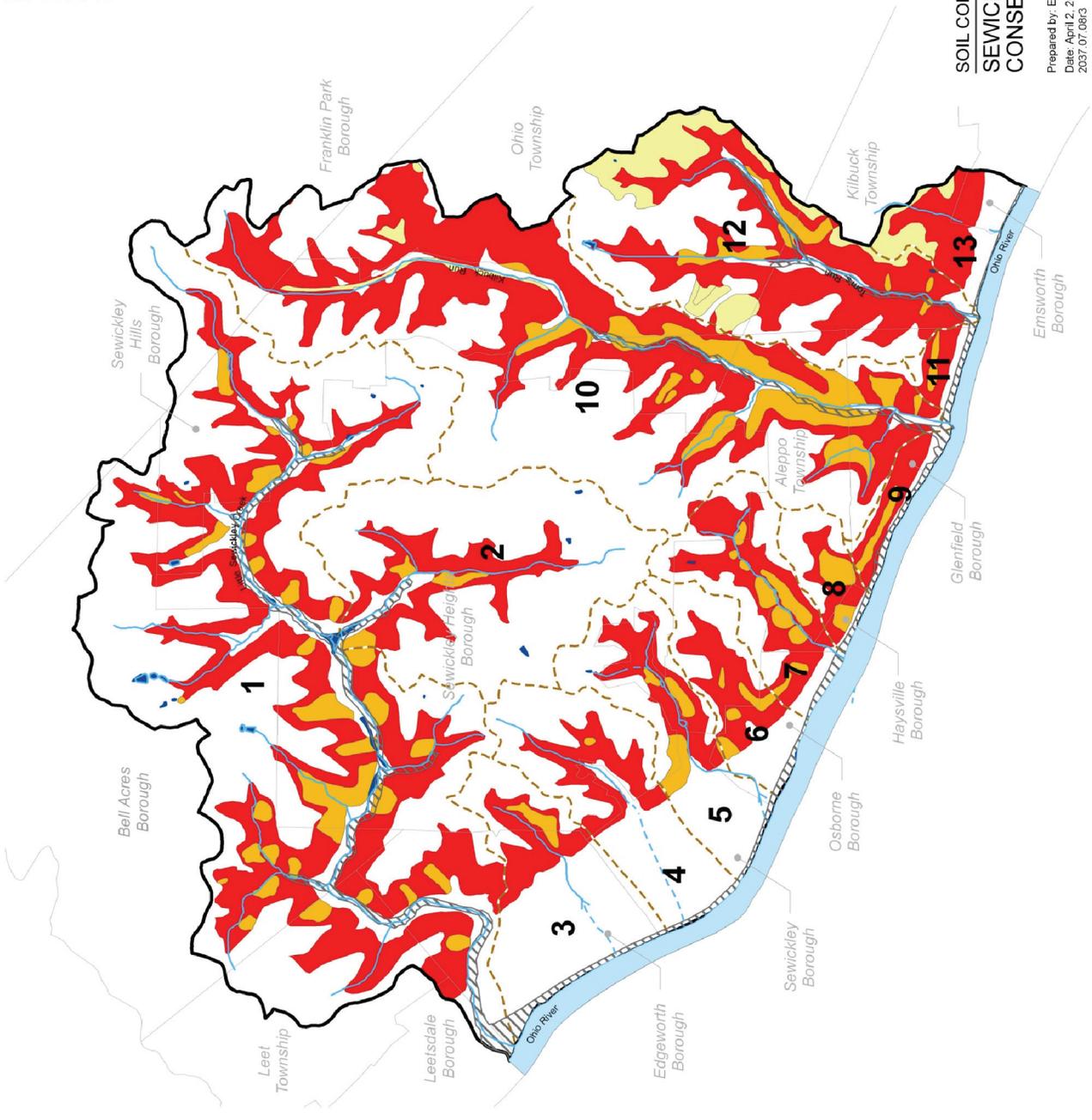
PHASE I

Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributions.

Sources: Base GIS information provided by the Allegheny County Division of Computer Services and the Pennsylvania Department of Environmental Protection. Flood-prone areas, Red Bed Outcrops, and Soils with Conspicuous Soil Creep provided by U.S. Resources, Allegheny, 1974. Floodplain and Wetland data provided by the Southwestern Pennsylvania Commission.

LEGEND

- | | |
|---------------------------------|-----------------------------------|
| STUDY AREA WATERSHEDS | Study Area Boundary |
| 1 Little Sewickley Creek | Watershed Boundaries |
| 2 "Firm Hollow" | Municipal Boundary |
| 3 Edgeworth Run | Rivers/Streams (Open) |
| 4 Hoy's Run | Rivers/Streams (Covered) |
| 5 Davis Run | Flood-Prone Areas |
| 6 Park Run | Soils with Conspicuous Soil Creep |
| 7 Hayes Run | Landslide Prone Areas |
| 8 Ohio River 1 | Red Bed Outcrops |
| 9 Ohio River 2 | Wetlands |
| 10 Ohio River 3 | |
| 11 Kibuck Run | |
| 12 Ohio River 4 | |
| 13 Toms Run | |



SOIL CONDITION MAP SEWICKLEY VALLEY RIVERS CONSERVATION AND MANAGEMENT PLAN

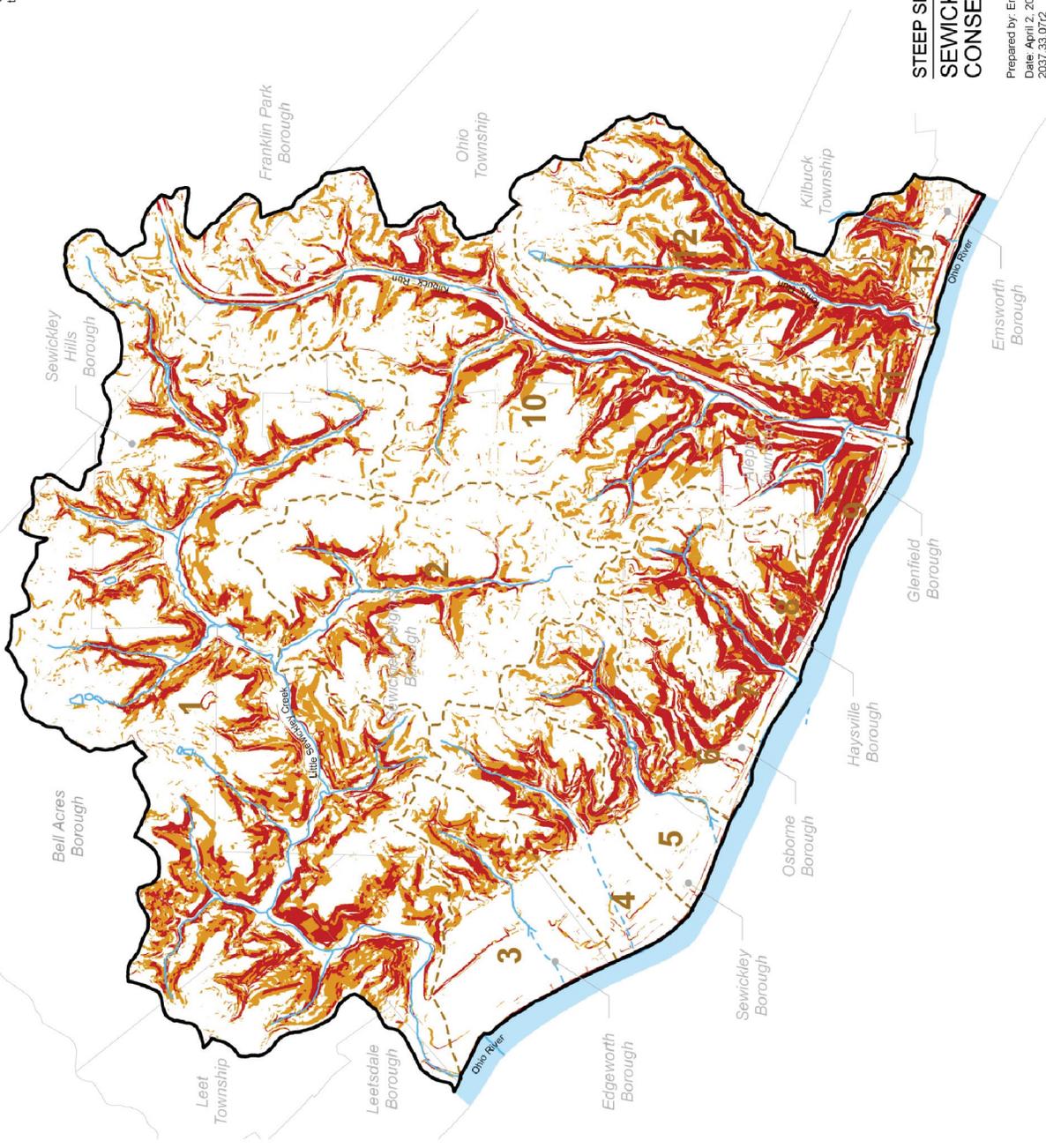
Prepared by: Environmental Planning and Design, LLC
Date: April 12, 2008
2037 07 0613



Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributions.
 Source: Steep Slopes is based on topography provided by the Allegheny County Division of Computer Services. Base GIS information provided by the Allegheny County Division of Computer Services.

LEGEND

- | | |
|---------------------------------|--------------------------|
| STUDY AREA WATERSHEDS | Study Area Boundary |
| 1 Little Sewickley Creek | Watershed Boundaries |
| 2 "Firm Hollow" | Municipal Boundary |
| 3 Edgeworth Run | Rivers/Streams (Open) |
| 4 Hoy's Run | Rivers/Streams (Covered) |
| 5 Davis Run | |
| 6 Park Run | |
| 7 Hayes Run | |
| 8 Ohio River 1 | |
| 9 Ohio River 2 | |
| 10 Kibuck Run | >25-40% 2,797 AC. |
| 11 Ohio River 3 | >40% 2,121 AC. |
| 12 Toma Run | Total 4,918 AC. |
| 13 Ohio River 4 | |



STEEP SLOPES MAP
SEWICKLEY VALLEY RIVERS
CONSERVATION AND MANAGEMENT PLAN

Prepared by: Environmental Planning and Design, LLC
 Date: April 2, 2008
 2037-35-072

0 1000 2000 Feet

NORTH

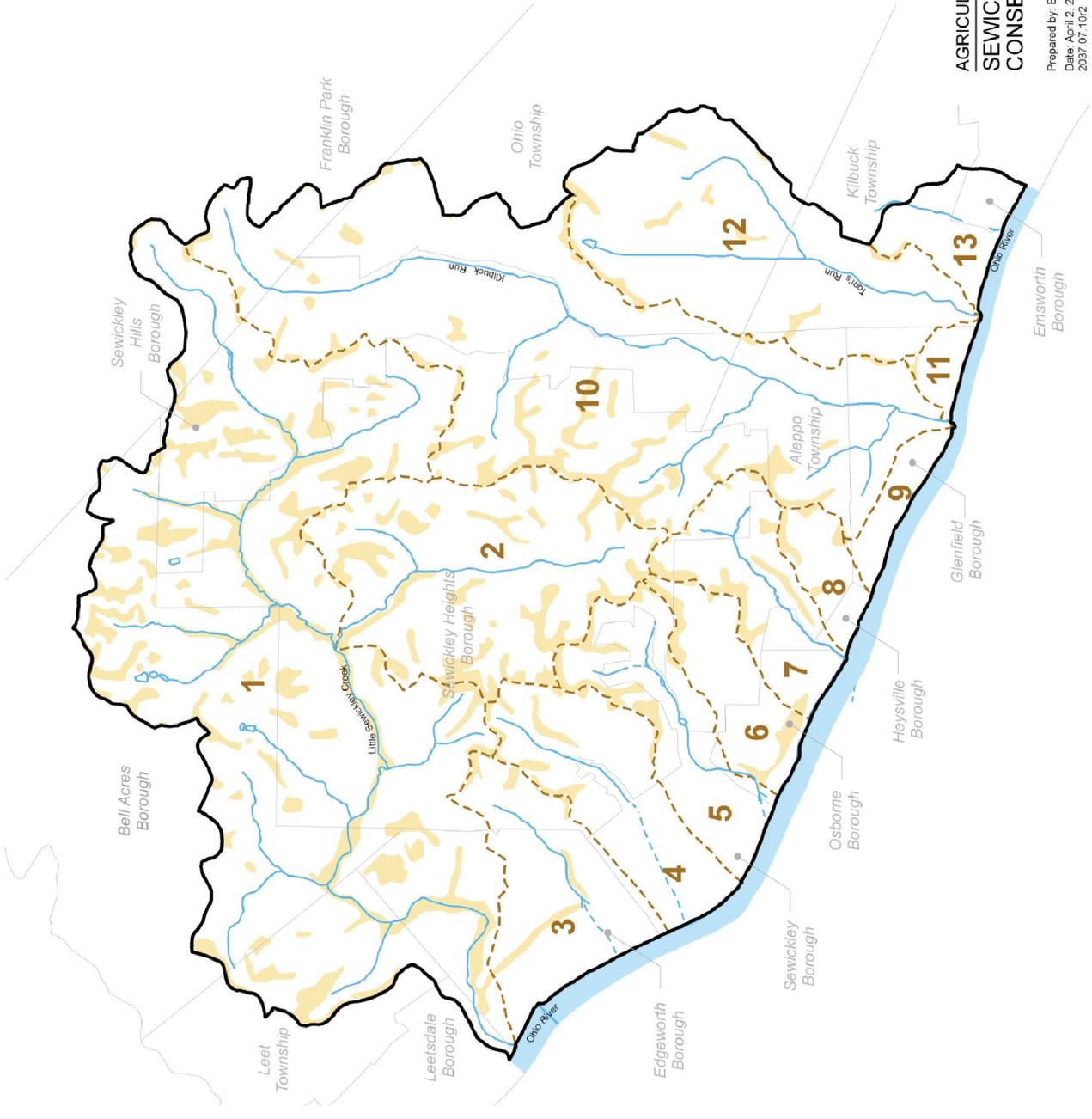
PHASE I

Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributions.

Sources: Base GIS information provided by the Allegheny County Division of Computer Services and Pennsylvania Department of Environmental Protection.

LEGEND

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|---------------------------------|--|
| STUDY AREA WATERSHEDS |  Study Area Boundary |
| 1 Little Sewickley Creek |  Watershed Boundaries |
| 2 "Fern Hollow" |  Municipal Boundary |
| 3 Edgeworth Run |  Rivers/Streams (Open) |
| 4 Hoy's Run |  Rivers/Streams (Covered) |
| 5 Davis Run |  Prime Agricultural Areas |
| 6 Park Run | |
| 7 Hayes Run | |
| 8 Ohio River 1 | |
| 9 Ohio River 2 | |
| 10 Kilbuck Run | |
| 11 Ohio River 3 | |
| 12 Toms Run | |
| 13 Ohio River 4 | |



AGRICULTURAL SUITABILITY MAP SEWICKLEY VALLEY RIVERS CONSERVATION AND MANAGEMENT PLAN

Prepared by: Environmental Planning and Design, LLC
Date: April 2, 2008
2037.07.1012

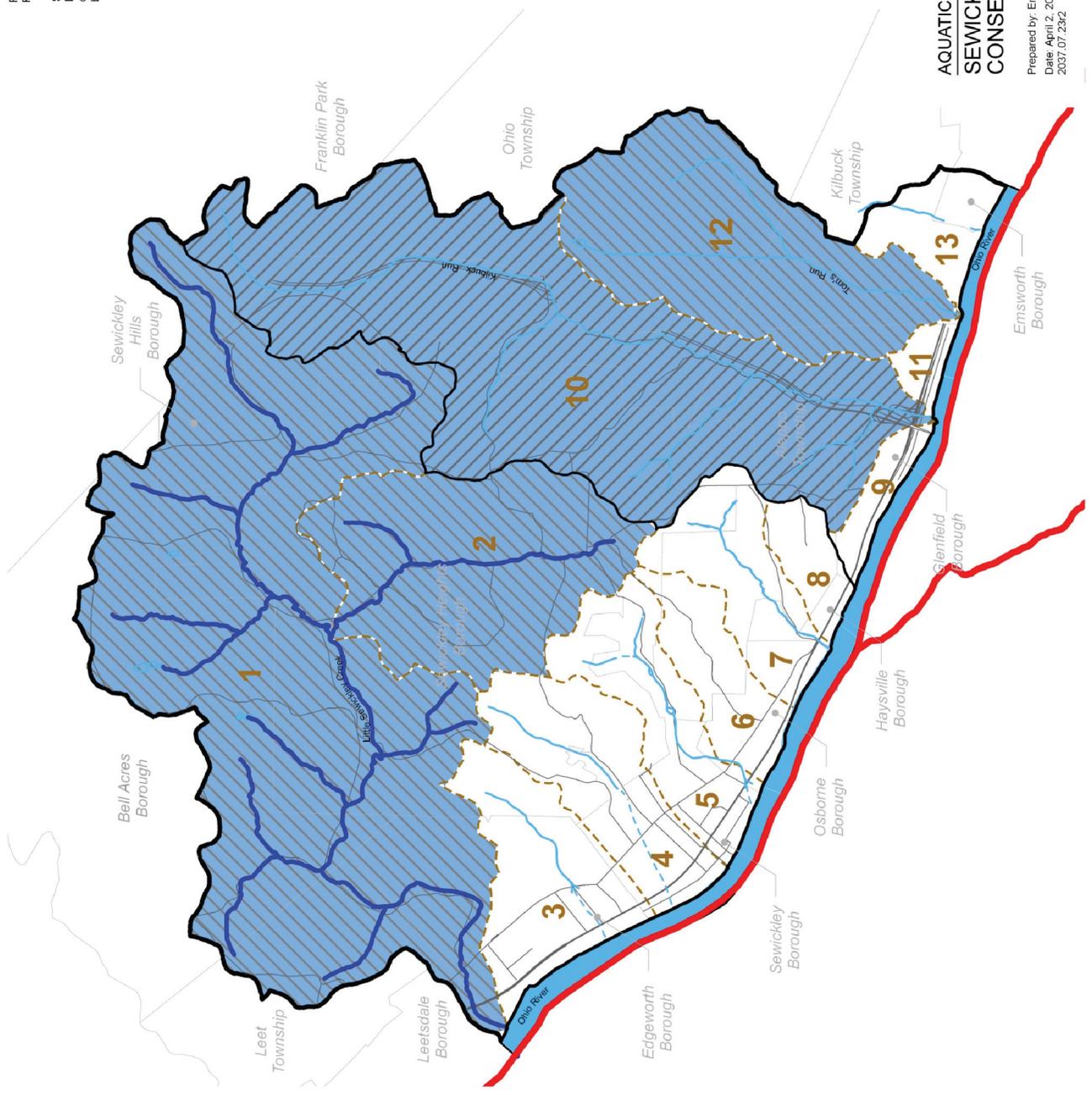


Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributions.

Sources: Base GIS information provided by the Allegheny County Division of Computer Services and the Pennsylvania Department of Environmental Protection. Stream quality designations provided by the Pennsylvania Department of Environmental Protection.

LEGEND

- | | |
|--|--------------------------|
| | Study Area Boundary |
| | Watershed Boundaries |
| | Municipal Boundary |
| | Rivers/Streams (Open) |
| | Rivers/Streams (Covered) |
| | Fish Habitat |
| | Cold Fish |
| | Warm Fish |
| | High Quality Streams |
| | 300ft Streams |
-
- | | |
|------------------------------|------------------------|
| STUDY AREA WATERSHEDS | |
| 1 | Little Sewickley Creek |
| 2 | "Fern Hollow" |
| 3 | Edgeworth Run |
| 4 | Hoey's Run |
| 5 | Davis Run |
| 6 | Park Run |
| 7 | Hayes Run |
| 8 | Ohio River 1 |
| 9 | Ohio River 2 |
| 10 | Kilbuck Run |
| 11 | Ohio River 3 |
| 12 | Toms Run |
| 13 | Ohio River 4 |



AQUATIC HABITAT MAP
SEWICKLEY VALLEY RIVERS
CONSERVATION AND MANAGEMENT PLAN

Prepared by: Environmental Planning and Design, LLC
 Date: April 2, 2008
 2037.07.2392

0 1000 2000 Feet

NORTH ↑

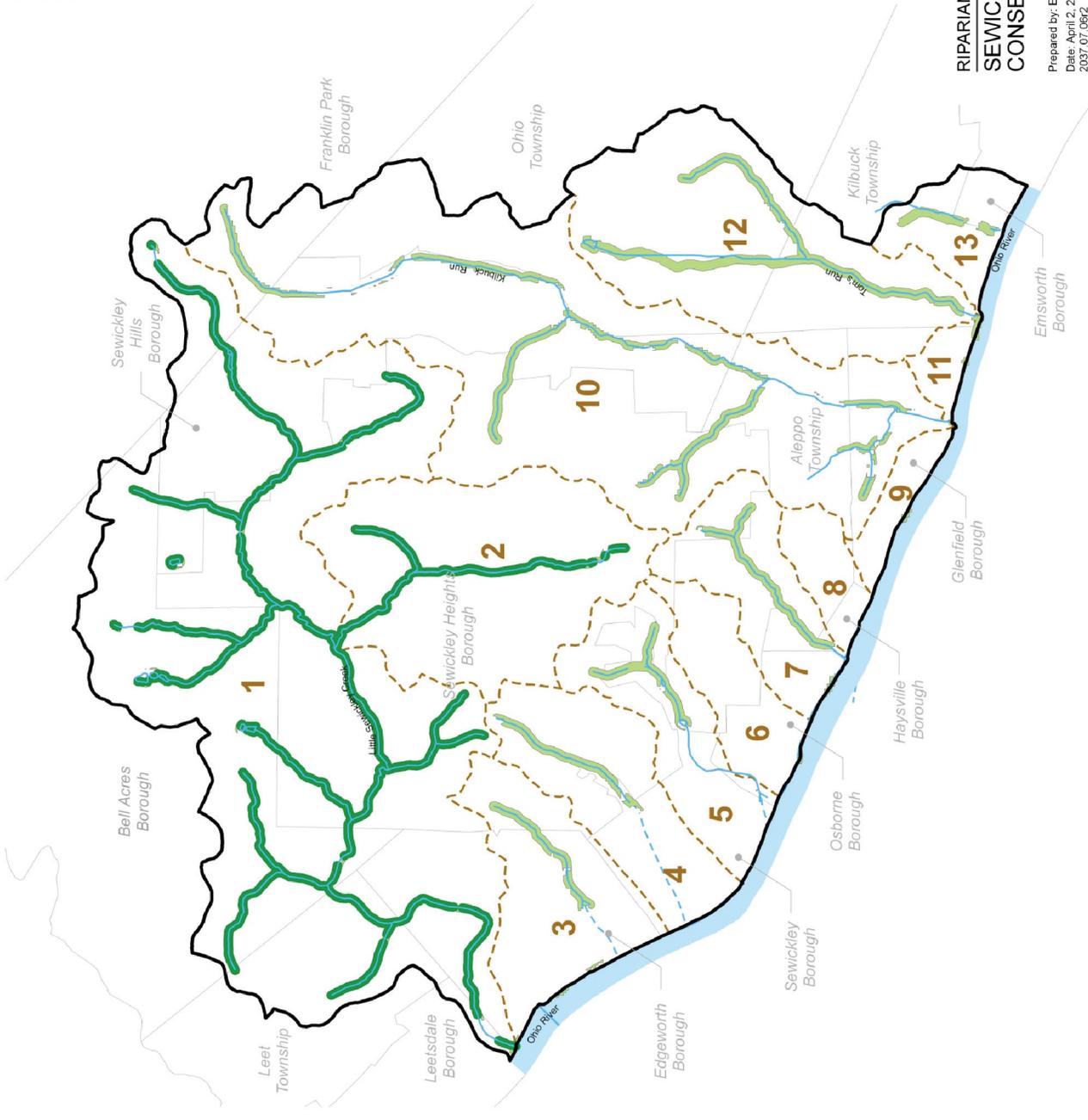
PHASE I

Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributions.
 Sources: GIS information provided by the Allegheny County Division of Computer Services and the Pennsylvania Department of Environmental Protection.

LEGEND

- | | |
|---------------------------------|---|
| STUDY AREA WATERSHEDS |  Study Area Boundary |
| 1 Little Sewickley Creek |  Watershed Boundaries |
| 2 "Fern Hollow" |  Municipal Boundary |
| 3 Edgeworth Run |  Rivers/Streams (Open) |
| 4 Hoy's Run |  Rivers/Streams (Covered) |
| 5 Davis Run |  Existing Prime Riparian Corridors |
| 6 Park Run |  Other Existing Riparian Corridors |
| 7 Hayes Run | |
| 8 Ohio River 1 | |
| 9 Ohio River 2 | |
| 10 Ohio River 3 | |
| 11 Kibuck Run | |
| 12 Ohio River 4 | |
| 13 Ohio River 4 | |

The Riparian buffer is a 50' wide buffer adjacent to the stream.
 Note: Prime riparian areas denote the existence of high quality and/or exceptional value streams plus all stream orders above such streams (headwaters).



RIPARIAN CORRIDOR MAP SEWICKLEY VALLEY RIVERS CONSERVATION AND MANAGEMENT PLAN

Prepared by: Environmental Planning and Design, LLC
 Date: April 2, 2008
 2007.07.0672

0 1000 2000 Feet

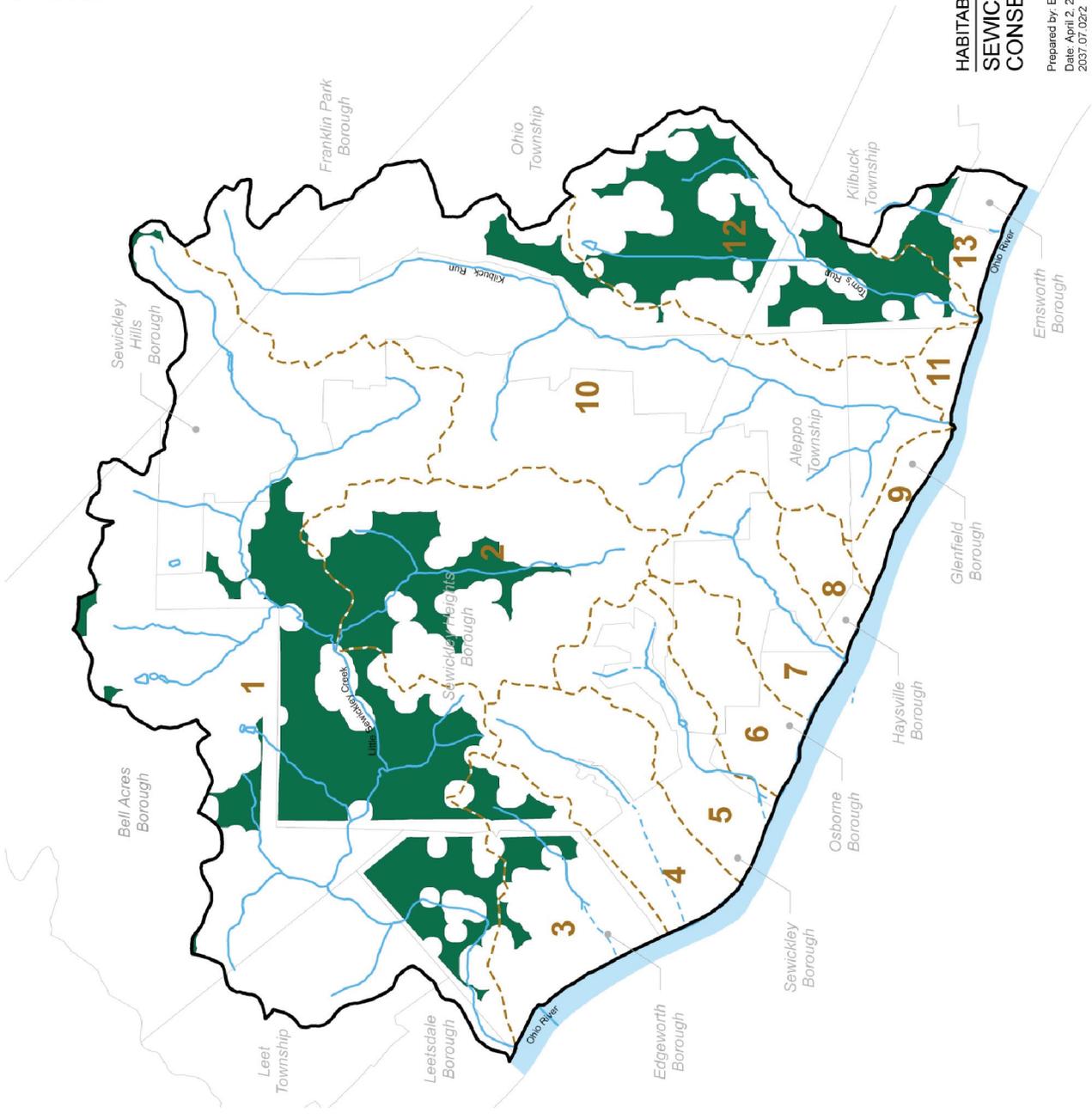
 NORTH

Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributions.

Sources: Base GIS information provided by the Allegheny County Division of Computer Services and Pennsylvania Department of Environmental Protection. Habitata Woodlands derived from base information provided by the Southwestern Pennsylvania Commission

LEGEND

- STUDY AREA WATERSHEDS**
- 1 Little Sewickley Creek
 - 2 "Firm Hollow"
 - 3 Edgeworth Run
 - 4 Heley's Run
 - 5 Davis Run
 - 6 Park Run
 - 7 Hayes Run
 - 8 Ohio River 1
 - 9 Ohio River 2
 - 10 Kibuck Run
 - 11 Ohio River 3
 - 12 Toms Run
 - 13 Ohio River 4
- Study Area Boundary
 Watershed Boundaries
 Rivers/Streams (Open)
 Rivers/Streams (Covered)
 Municipal Boundary
 Forested Areas at Least 300 Feet Above Road Development



**HABITABLE WOODLANDS MAP
SEWICKLEY VALLEY RIVERS
CONSERVATION AND MANAGEMENT PLAN**

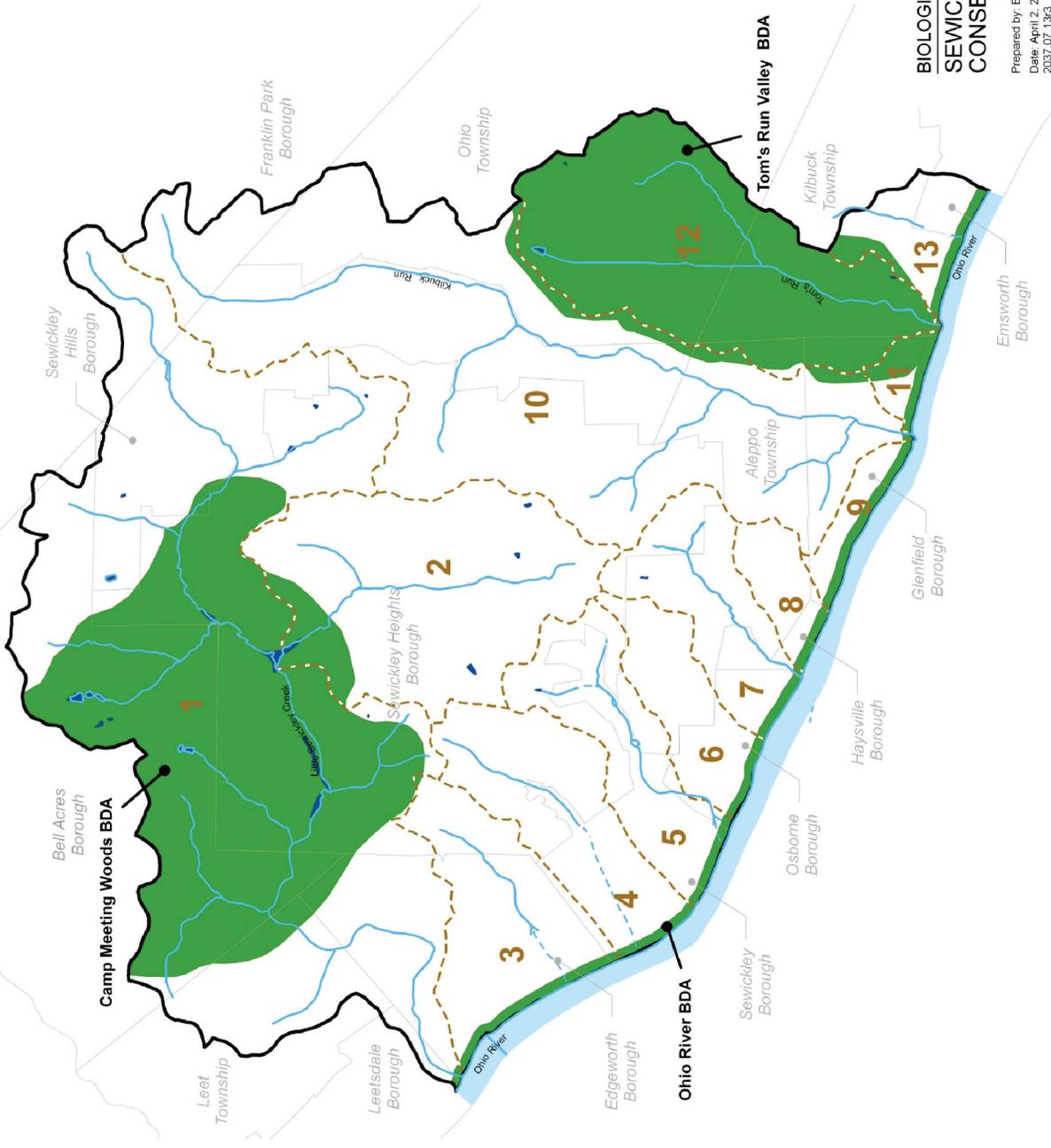
Prepared by: Environmental Planning and Design, LLC
 Date: April 2, 2008
 2037.07.0272

PHASE I

Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributions.
 Sources: Base GIS information provided by the Allegheny County Division of Computer Services and the Pennsylvania Department of Environmental Protection, Biological Diversity Area information provided by the Western Pennsylvania Conservancy.

LEGEND

- | | |
|---|----------------------------|
|  | Study Area Boundary |
|  | Watershed Boundaries |
|  | Municipal Boundary |
|  | Rivers/Streams (Open) |
|  | Rivers/Streams (Covered) |
|  | Biological Diversity Areas |
|  | Wetlands |
-
- | | |
|------------------------------|------------------------|
| STUDY AREA WATERSHEDS | |
| 1 | Little Sewickley Creek |
| 2 | "Firm Hollow" |
| 3 | Edgeworth Run |
| 4 | Hoey's Run |
| 5 | Davis Run |
| 6 | Park Run |
| 7 | Hayes Run |
| 8 | Ohio River 1 |
| 9 | Ohio River 2 |
| 10 | Kibuck Run |
| 11 | Ohio River 3 |
| 12 | Toma Run |
| 13 | Ohio River 4 |



BIOLOGICAL DIVERSITY AREA MAP SEWICKLEY VALLEY RIVERS CONSERVATION AND MANAGEMENT PLAN

Prepared by: Environmental Planning and Design, LLC
 Date: April 2, 2008
 2007.07.13.93



D. Gray Infrastructure Maps

Map Exhibit 14: Public Sewer Water Service

The Map shows project study area locations that are served by existing public sewer (hatched) and water (blue). Public sewer and water infrastructure overlap in many areas and predominate in the most densely developed areas adjacent to the Ohio River.

The adequacy and safety of water and Sewer infrastructure is closely integrated with the management of water quality and storm drainage within the Sewickley Valley. Moreover, the expansion of infrastructure can have significant environmental impacts by increasing the potential for development within the expanded service area. For example the recent PA DEP approval of Aleppo Township's Act 537 plan for sewage disposal and anticipated construction schedule (2010) will result in the improvement and expansion of the Township's sewer infrastructure. Such an expansion will facilitate development of lands previously undevelopable or appropriate only for very low density development due to lack of sewer service. Policies for infrastructure expansion must be defined on a regional level in order to prevent the occurrence of development that is contrary to conservation goals.

Map Exhibit 15: Existing Water Pollution Control Facilities

The Map illustrates sites of water pollution control facilities included in the Pennsylvania Department of Environmental Protection (PA DEP) Water Pollution Control Program. These facilities are industrial and storm water waste sites. Water pollution control facilities may be emitters of point source pollution sources and can directly impact local water quality. Water quality degradation in turn impacts recreation sites and activities and local aquatic ecology.

Six (6) water pollution control facilities are shown on the Map. Two (2) facilities, both industrial discharge points, are located in Ohio Township adjacent to the Tom's Run Valley BDA. The other four (4) are located along the Ohio River in Edgeworth, Haysville and Sewickley Boroughs, and include treatment facilities, discharge points, and storage facilities. This map will be used in the preparation of recommendations for future land use and environmental policies in the Sewickley Valley.

Exhibit 16: Existing Captive Hazardous Waste Sites

The map shows the locations of hazardous waste facilities within the project study area and is based on the Pennsylvania Hazardous Waste Facilities Plan prepared by the Pennsylvania Department of Environmental Protection

PHASE I

(PA DEP) to meet the requirements of the state's Solid Waste Management Act. The hazardous waste program regulates the generation, storage, transportation, treatment, and disposal of hazardous waste. Under this plan, captured hazardous waste sites need ongoing pollution monitoring due to the on-site waste accumulation.

Eight (8) sites are illustrated on the map; all are located in Ohio River municipalities of Edgeworth, Sewickley, Glen Osborne and Haysville. Wastes stored include those from local medical facilities, oil companies, and the United States Coast Guard.

Map Exhibit 17: Impervious Surface Coverage

The Impervious Surface Coverage Map is based on GIS data provided by the Pennsylvania Department of Transportation (PennDOT). Impervious surfaces are those which allow little to no rainwater to seep into the soil. They include lands and buildings, paved areas and some types of grass lawns. Impervious surfaces directly affect water infiltration, storm water run-off and water quality. Urban areas generally have a higher ratio of impervious to permeable areas due to the presence of major streets, buildings, parking lots, and reduced vegetative cover. Rural lands typically have a much greater proportion of permeable surfaces which can reduce and slow storm water run-off and increase groundwater recharge.

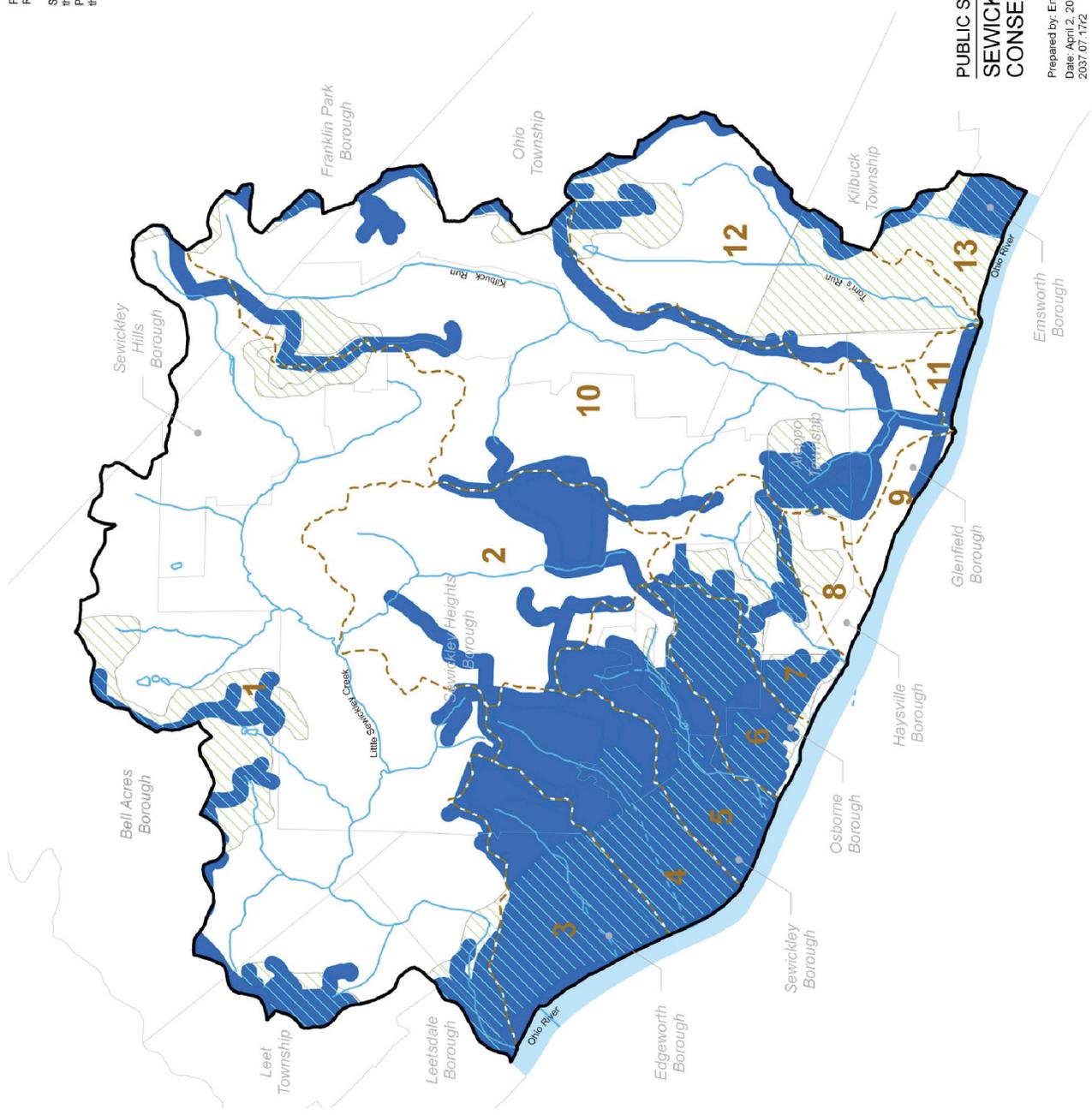
The level of impermeability of the locations mapped is indicated with a range of zero (0) (white) to one hundred (100) (red). The large majority of impervious surfaces are shown in the lowlands of Edgeworth and Sewickley, between Route 65 (Ohio River Boulevard) and the River edge, and along State Route 79. Overall, the level of impervious surfaces for the region is not very high, and interestingly even in the most urbanized portions impervious surfaces appear to be less prevalent than some of the areas across the Ohio River perhaps indicating the "small town/rural feel" of the study area.

Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributions.

Source: Base GIS information provided by the Allegheny County Division of Computer Services, Public Sewer and Water information provided by the Natural Infrastructure Atlas of Southwestern Pennsylvania.

LEGEND

- | | |
|---------------------------------|--------------------------|
| STUDY AREA WATERSHEDS | Study Area Boundary |
| 1 Little Sewickley Creek | Watershed Boundaries |
| 2 "Farm Hollow" | Municipal Boundary |
| 3 Edgeworth Run | Rivers/Streams (Open) |
| 4 Hoyey's Run | Rivers/Streams (Covered) |
| 5 Davis Run | Public Water Service |
| 6 Park Run | Public Sewer Service |
| 7 Hayes Run | |
| 8 Ohio River 1 | |
| 9 Ohio River 2 | |
| 10 Ohio River 3 | |
| 11 Kibuck Run | |
| 12 Toms Run | |
| 13 Ohio River 4 | |



**PUBLIC SEWER/WATER SERVICE MAP
SEWICKLEY VALLEY RIVERS
CONSERVATION AND MANAGEMENT PLAN**

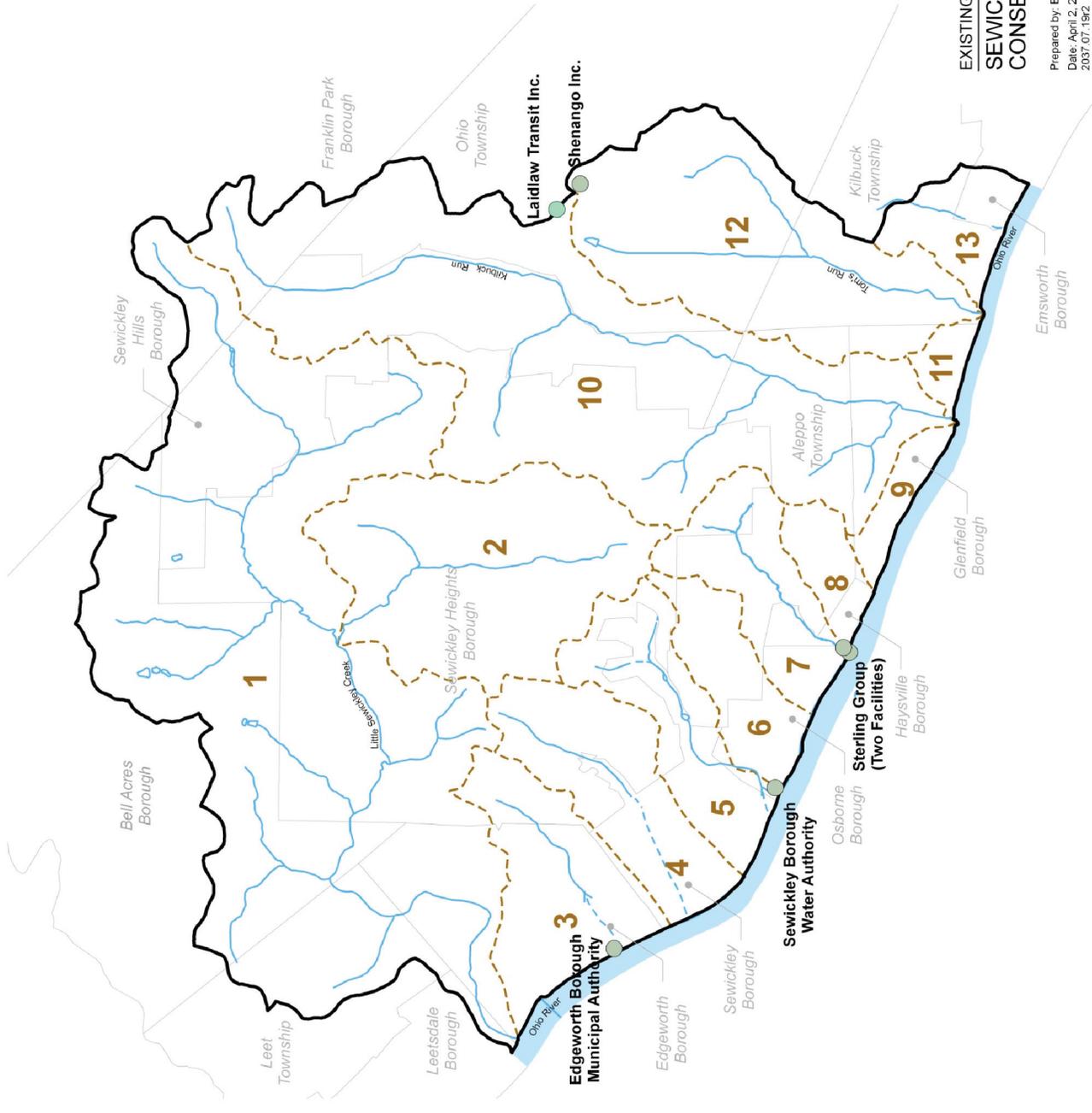
Prepared by: Environmental Planning and Design, LLC
Date: April 2, 2006
2037.07-1772

PHASE I

Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributions.
 Sources: GIS information provided by the Allegheny County Division of Computer Services and the Pennsylvania Department of Environmental Protection.

LEGEND

- STUDY AREA WATERSHEDS**
- 1 Little Sewickley Creek
 - 2 "Fern Hollow"
 - 3 Edgeworth Run
 - 4 Hoy's Run
 - 5 Davis Run
 - 6 Park Run
 - 7 Hayes Run
 - 8 Ohio River 1
 - 9 Ohio River 2
 - 10 Kilbuck Run
 - 11 Ohio River 3
 - 12 Toms Run
 - 13 Ohio River 4
- CONTROL FACILITIES**
- Industrial Waste
 - Stormwater-Industrial
- Other Symbols:**
- Study Area Boundary
 - Watershed Boundaries
 - Municipal Boundary
 - Rivers/Streams (Open)
 - Rivers/Streams (Covered)



EXISTING WATER POLLUTION CONTROL FACILITIES MAP SEWICKLEY VALLEY RIVERS CONSERVATION AND MANAGEMENT PLAN

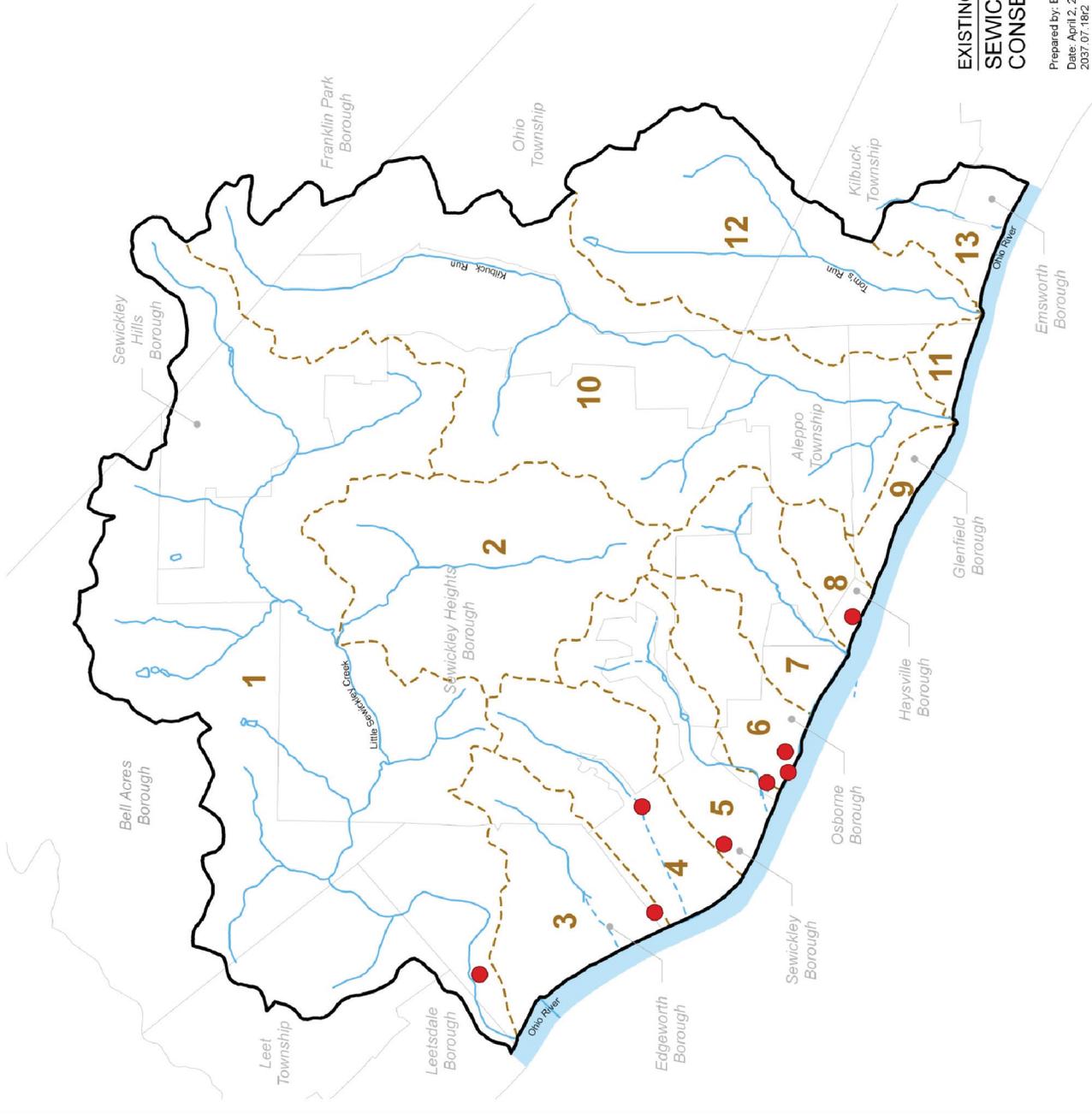
Prepared by: Environmental Planning and Design, LLC
 Date: April 2, 2008
 2007.07.19r2



Funded by Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributions.
 Sources: GIS information provided by the Allegheny County Division of Computer Services and the Pennsylvania Department of Environmental Protection.

LEGEND

- STUDY AREA WATERSHEDS**
- 1 Little Sewickley Creek
 - 2 "Fern Hollow"
 - 3 Edgeworth Run
 - 4 Hoy's Run
 - 5 Davis Run
 - 6 Park Run
 - 7 Hayes Run
 - 8 Ohio River 1
 - 9 Ohio River 2
 - 10 Killbuck Run
 - 11 Ohio River 3
 - 12 Toms Run
 - 13 Ohio River 4
- Study Area Boundary
 Watershed Boundaries
 Municipal Boundary
~ Rivers/Streams (Open)
~ Rivers/Streams (Covered)
● Captive Hazardous Waste Sites



**EXISTING CAPTIVE HAZARDOUS WASTE SITES MAP
 SEWICKLEY VALLEY RIVERS
 CONSERVATION AND MANAGEMENT PLAN**

Prepared by: Environmental Planning and Design, LLC
 Date: April 2, 2008
 2037.07.18r2

0 100 200 Feet

↑
NORTH

E. Land Use and Habitat Maps

Map Exhibit 18: Land Coverage

The Land Coverage Map provides a general illustration of current development patterns in the project study area. The map portrays data generated from satellite and aerial photographic imagery as a series of general land use categories including development (residential, commercial and industrial / transportation), agricultural, vegetated (forest, grasslands), non-vegetated and water.



Photograph 7: Recreational public access point to the Ohio River, Sewickley Borough

Land cover is neither an adopted zoning map nor a detailed assessment of individual land uses at the parcel level and therefore some discrepancies may exist between land cover and other types of land analyses. However, the general information portrayed on the map is useful in assessing future development opportunities and potential subsequent impacts upon recreation and conservation lands.

The predominant color on the map is green which symbolizes in its different shades forest cover (dark green), farm lands (light green) and grasslands. Developed areas categories symbolized in yellows (residential), red (commercial) and industrial (purples) are secondary on the map, and are focused in the portions of the study area that have been previously described as the populated centers where most of the region's goods and services are provided. The two (2) main transportation routes of the region, Ohio River Boulevard (State Route 65) and Interstate Route 79, are shown in light purple. The map emphasizes that the natural features and environmental resources of the Sewickley Valley are its most outstanding elements running across both municipal and watershed boundaries.

Map Exhibit 19: Parks and Conserved Lands

The Map shows the distribution of public parklands, conserved lands and points of public access to the Ohio River. Parks and conserved lands include lands typically set aside for active and passive recreation and/or habitats for area wildlife or for the conservation of public natural resources.

Five (5) existing river access points are shown on the map located in the River boroughs of Edgeworth, Glen Osborne, Sewickley and Emsworth Boroughs. These points emphasize that while there are fewer open lands in this area than further north in the region, the Ohio River itself is a major recreation and open space feature if visual and physical access are provided. Parks and conserved

PHASE I

lands are distributed throughout the project with the largest acreage of both land uses located in Sewickley Heights Borough and the Little Sewickley Creek watershed. Most of these areas are wooded and function as valuable buffers to waterways adjacent to or within their boundaries. The Parks and Conservation Lands Map can be used to visualize relationship of area parks and open space to other types of existing development and can be used in decision making regarding future development in the vicinity of these areas

Table 6 below provides information as to the names and ownership of the conserved lands within the project study area.

Table 6: Conserved Lands

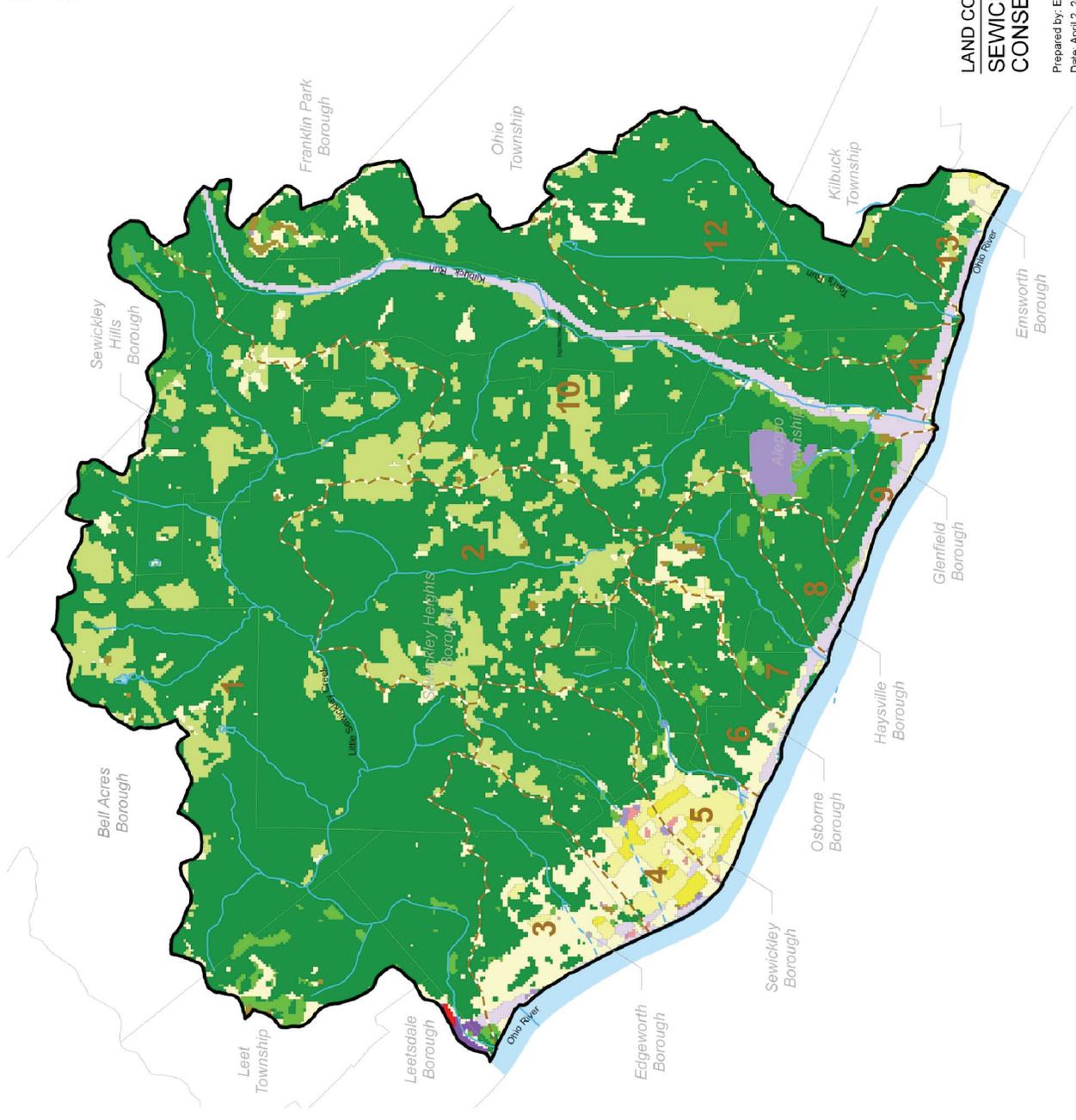
	Name	Owner
1	Fern Hollow Greenway	Allegheny Land Trust
2	Unknown	To be Confirmed
3	Unknown	Sewickley Heights Borough
4	Tom's Run	Western Pennsylvania Conservancy
5	Audobun Greenway Phase I	Allegheny Land Trust
6	Audobun Greenway Phase II	Allegheny Land Trust
7	Unknown	Sewickley Hills Borough
8	Zupcic Easement	Allegheny Land Trust
9	Unknown	Little Sewickley Creek Watershed Association
10	Unknown	Little Sewickley Creek Watershed Association
11	Unknown	Bell Acres Borough
12	Unknown	Little Sewickley Creek Watershed Association

Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributors.

Sources: GIS information provided by the Allegheny County Division of Computer Services.

LEGEND

- | | |
|---------------------------------|-------------------------------|
| STUDY AREA WATERSHEDS | Study Area Boundary |
| 1 Little Sewickley Creek | Watershed Boundaries |
| 2 "Farm Hollow" | Municipal Boundary |
| 3 Edgeworth Run | Rivers/Streams (Open) |
| 4 Hoye's Run | Rivers/Streams (Covered) |
| 5 Davis Run | EXISTING LAND COVERAGE |
| 6 Park Run | Low Density Residential |
| 7 Hayes Run | Medium Density Residential |
| 8 Ohio River 1 | High Density Residential |
| 9 Ohio River 2 | Commercial |
| 10 Ohio River 3 | Identified Mills |
| 11 Ohio River 4 | Transportation |
| 12 Toms Run | Light Industry |
| 13 Ohio River 4 | Heavy Industry |
| | Agricultural/ Pasture |
| | Grassland/ Open Space |
| | Forest |
| | Non-Vegetated |
| | Water |



LAND COVERAGE MAP
SEWICKLEY VALLEY RIVERS
CONSERVATION AND MANAGEMENT PLAN

Prepared by: Environmental Planning and Design, LLC
 Date: April 2, 2008
 2037.07.1172



PHASE I

Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributions.

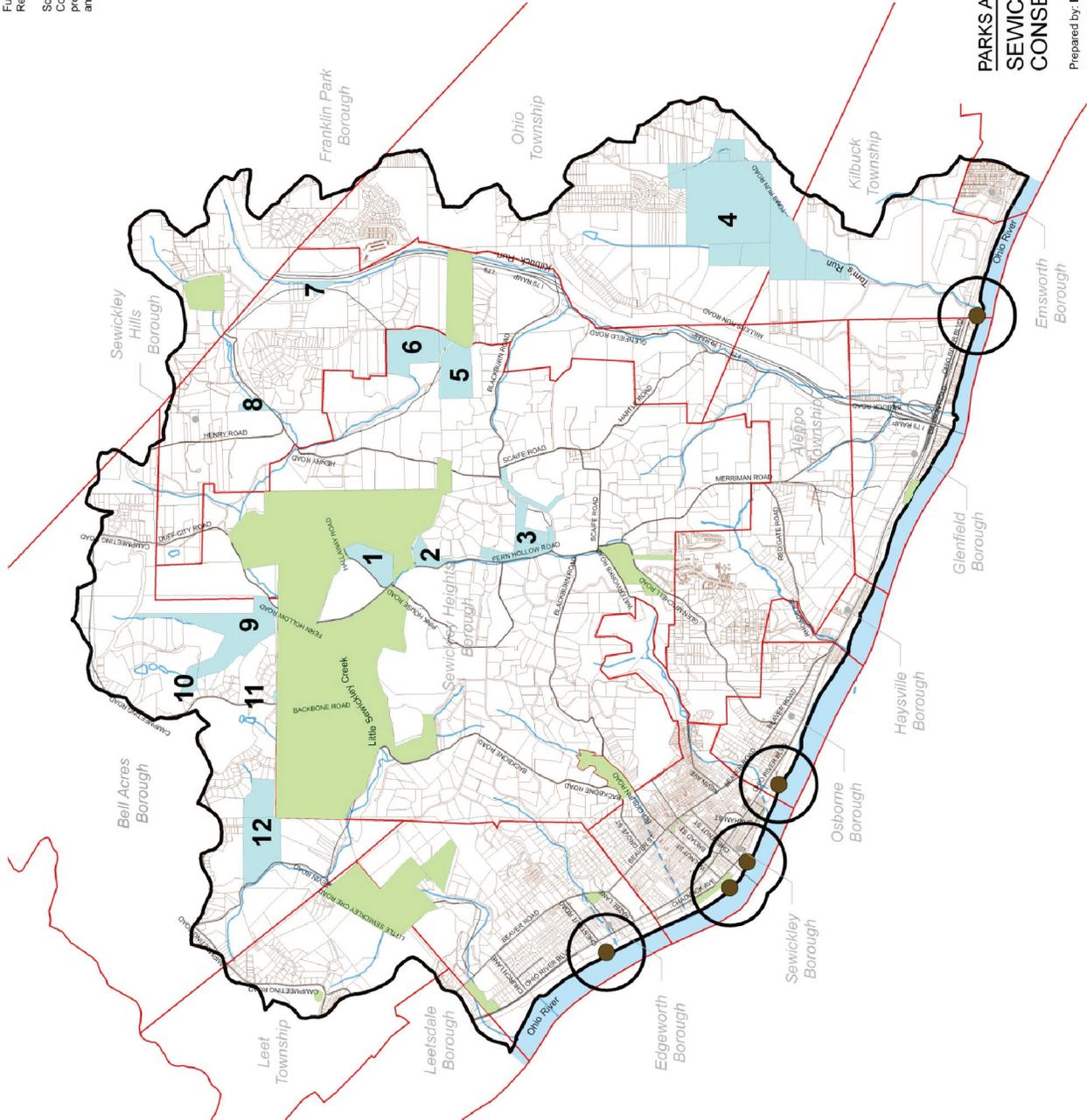
Source: Base parcel and road data provided by the Allegheny County Division of Computer Services. Conservation land data provided by Allegheny Land Trust, Little Sewickley Creek Watershed Association, and Sewickley Valley Visioning and Economic Impact Study Phase II Report (2004).

LEGEND

- Study Area Boundary
- Parcel Boundary
- Municipal Boundary
- Streets/Roads
- Rivers/Streams (Open)
- Rivers/Streams (Covered)
- Boat Access Points
- Parkland
- Conservation Land

CONSERVED LAND

Name	Owner
1 Fern Hollow Greenway	Allegheny Land Trust
2 Unknown	To Be Confirmed
3 Unknown	Sewickley Heights Borough
4 Tom's Run	Western Pennsylvania Conservancy
5 Audubon Greenway	Allegheny Land Trust
6 Audubon Greenway	Allegheny Land Trust
7 Unknown	Sewickley Hills Borough
8 Zupic Easement	Allegheny Land Trust
9 Unknown	Little Sewickley Creek Watershed Association
10 Unknown	Little Sewickley Creek Watershed Association
11 Unknown	Bell Acres Borough
12 Unknown	Little Sewickley Creek Watershed Association



PARKS AND CONSERVED LAND MAP SEWICKLEY VALLEY RIVERS CONSERVATION AND MANAGEMENT PLAN

Prepared by: Environmental Planning and Design, LLC

Date: April 2, 2008

2007.08.0173



Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributors.

Source: Base GIS information provided by the Pennsylvania Department of Environmental Protection.

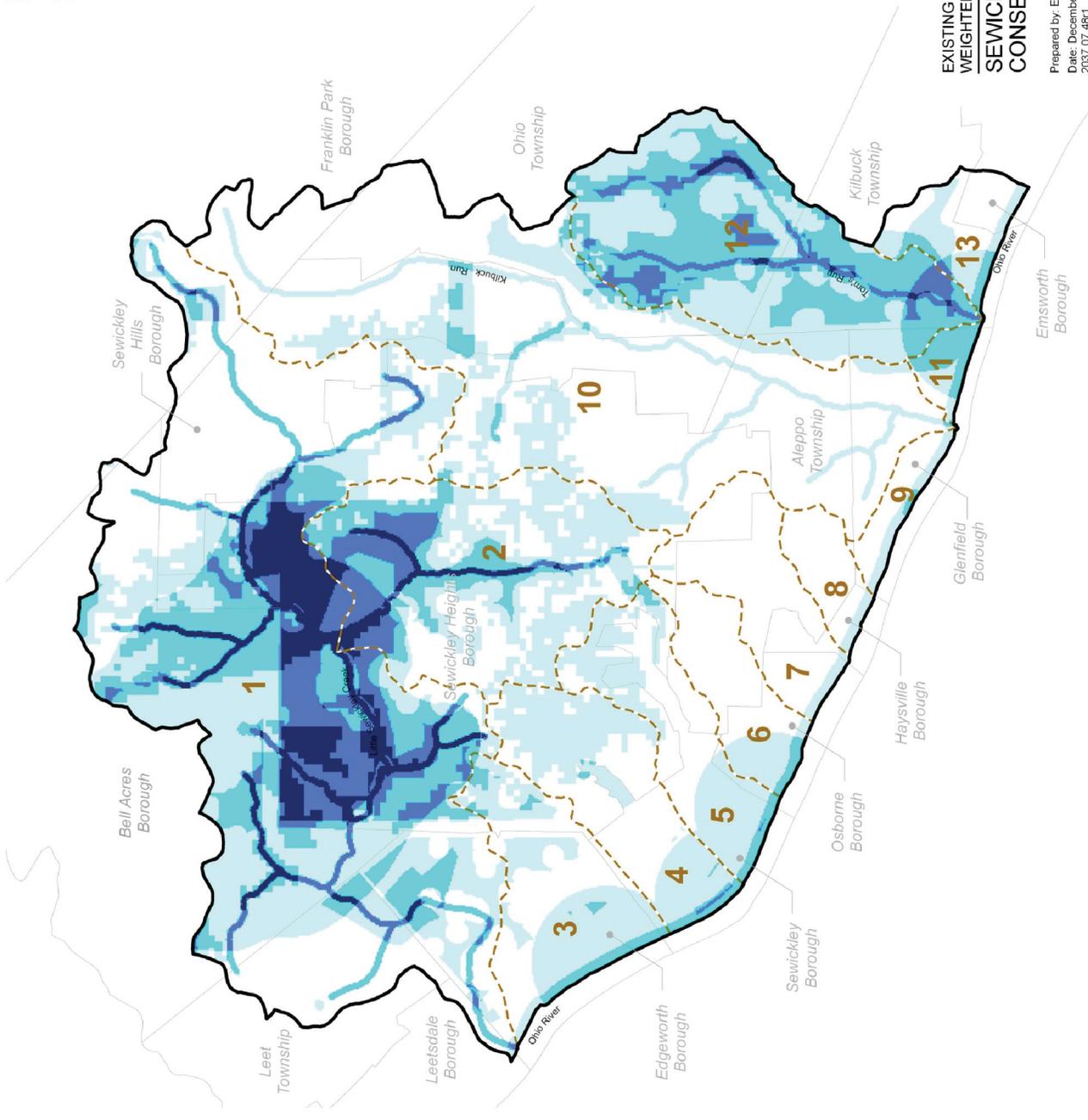
LEGEND

- STUDY AREA WATERSHEDS**
- 1 Little Sewickley Creek
 - 2 "Farm Hollow"
 - 3 Edgeworth Run
 - 4 Hoy's Run
 - 5 Davis Run
 - 6 Park Run
 - 7 Hayes Run
 - 8 Ohio River 1
 - 9 Ohio River 2
 - 10 Kilbuck Run
 - 11 Ohio River 3
 - 12 Toms Run
 - 13 Ohio River 4

- Study Area Boundary
- Watershed Boundaries
- Municipal Boundary



- COMPOSITE ELEMENTS WEIGHT**
- 1 High Quality Streams 3
 - 2 Habitable Woodlands 3
 - 3 Biological Diversity Areas 3
 - 4 Parklands 3
 - 5 Areas within 100 feet of streams classified as warm/cold water fish habitat 2
 - 6 Boat Access Points 2
 - 7 Primitive Camping Areas 2
 - 8 Vehicular Camping Areas 2
 - 9 Cold Water Fish Habitat 1
 - 10 Warm Water Fish Habitat 1



**EXISTING HABITAT/ RECREATIONAL AREAS
WEIGHTED COMPOSITE MAP
SEWICKLEY VALLEY RIVERS
CONSERVATION AND MANAGEMENT PLAN**

Prepared by: Environmental Planning and Design, LLC
Date: December 21, 2007
2007.07.4611

0 100 200 Feet
NORTH ↑

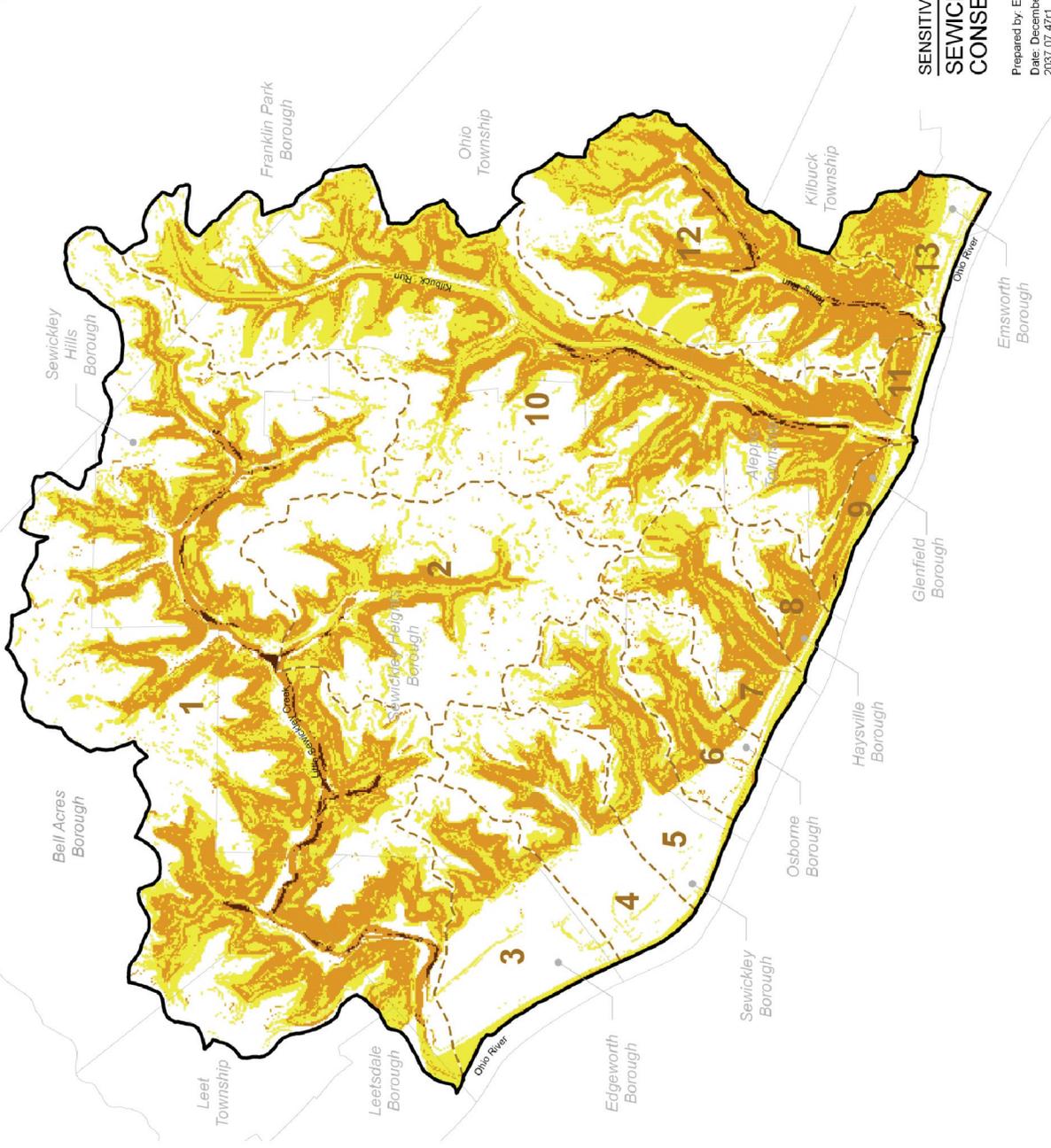
PHASE I

Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributors.

Source: Base GIS information provided by the Pennsylvania Department of Environmental Protection.

LEGEND

- | | |
|---------------------------------|----------------------|
| STUDY AREA WATERSHEDS | Study Area Boundary |
| 1 Little Sewickley Creek | Watershed Boundaries |
| 2 "Farm Hollow" | Municipal Boundary |
| 3 Edgeworth Run | |
| 4 Hoye's Run | |
| 5 Davis Run | |
| 6 Park Run | |
| 7 Hayes Run | |
| 8 Ohio River 1 | |
| 9 Ohio River 2 | |
| 10 Kilbuck Run | |
| 11 Ohio River 3 | |
| 12 Toms Run | |
| 13 Ohio River 4 | |
-
- | | |
|---------------------------------|------|
| WEIGHTED COMPOSITE SCORE | 0-1 |
| | 2-4 |
| | 5-6 |
| | 7-11 |
-
- | | |
|-----------------------------------|---------------|
| COMPOSITE ELEMENTS | WEIGHT |
| 1 Steep Slopes | 3 |
| 2 Wetlands | 3 |
| 3 Flood Prone Areas | 3 |
| 4 Landslide Prone Areas | 2 |
| 5 Soil Creep | 2 |
| 6 Red Bed Soils | 2 |
| 7 Prime Agricultural Areas | 1 |



SENSITIVE AREAS WEIGHTED COMPOSITE MAP SEWICKLEY VALLEY RIVERS CONSERVATION AND MANAGEMENT PLAN

Prepared by: Environmental Planning and Design, LLC
 Date: December 21, 2007
 2007.07.4711



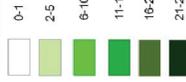
Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributions.

Source: Base GIS information provided by the Pennsylvania Department of Environmental Protection.

LEGEND

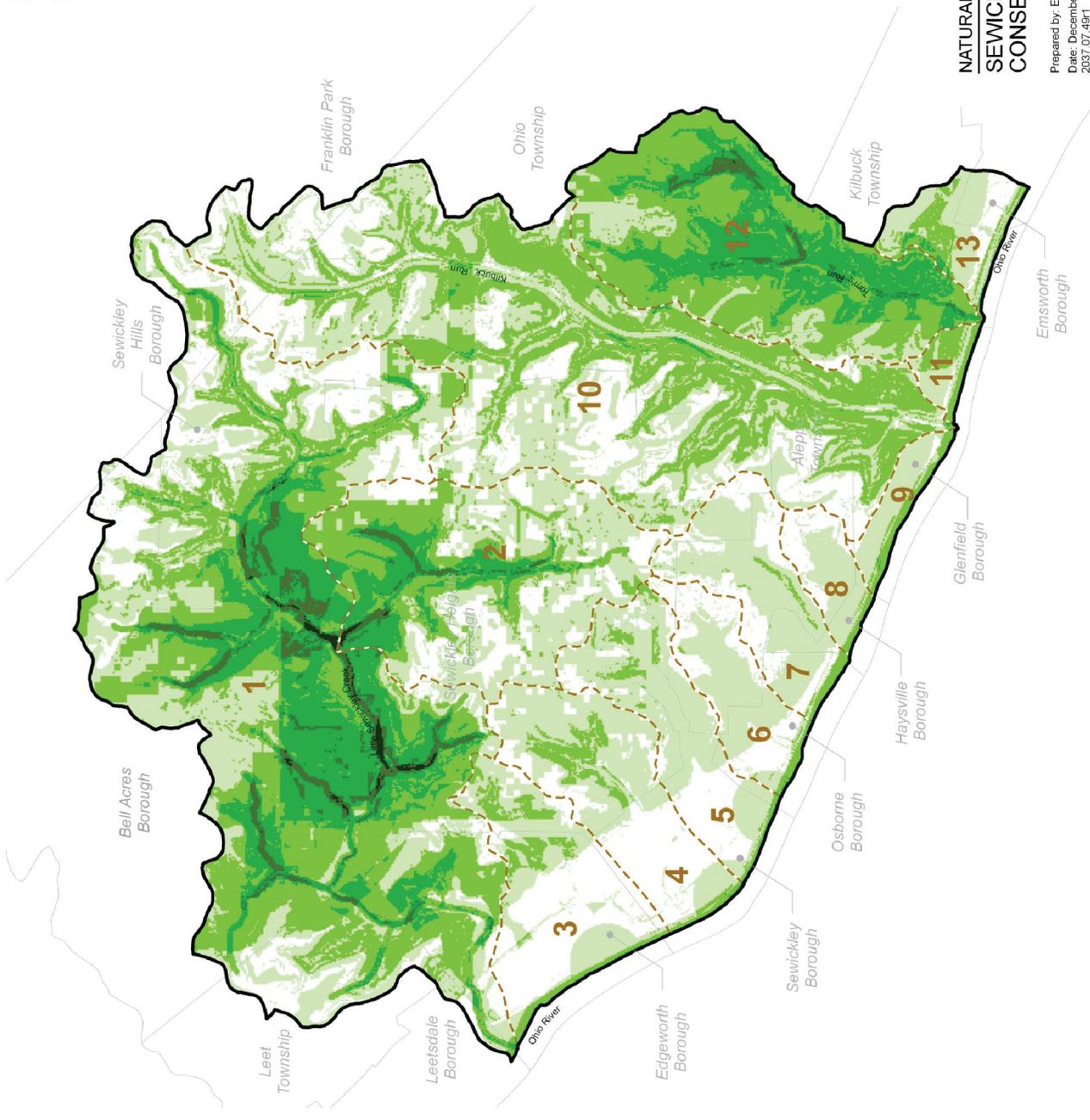
- STUDY AREA WATERSHEDS**
- 1 Little Sewickley Creek
 - 2 "Farm Hollow"
 - 3 Edgeworth Run
 - 4 Hoy's Run
 - 5 Davis Run
 - 6 Park Run
 - 7 Hayes Run
 - 8 Ohio River 1
 - 9 Ohio River 2
 - 10 Kilbuck Run
 - 11 Ohio River 3
 - 12 Toms Run
 - 13 Ohio River 4
- Study Area Boundary
Watershed Boundaries
Municipal Boundary

COMPOSITE



COMPOSITE ELEMENTS

- 1 Parkland 3
- 2 Conserved Land 3
- 3 High Quality Streams 3
- 4 Wetlands 3
- 5 Biological Diversity Areas 3
- 6 Steep Slopes 3
- 7 Habitabile Woodland 3
- 8 River Access Points 2
- 9 Flood Prone Areas 2
- 10 Landslide Prone Areas 2
- 11 Soil Creep 2
- 12 Red Bed Soils 2
- 13 Vehicular Camping Areas 2
- 14 Primitive Camping Areas 2
- 15 Areas within 100 feet of streams classified as warm/cold water fish habitat 2
- 16 Cold Water Fish Habitat 1
- 17 Warm Water Fish Habitat 1
- 18 Prime Agricultural Land 1



**NATURAL RESOURCES WEIGHTED COMPOSITE
SEWICKLEY VALLEY RIVERS
CONSERVATION AND MANAGEMENT PLAN**

Prepared by: Environmental Planning and Design, LLC

Date: December 21, 2007
2007.07.49F1



PHASE I

Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributions.
 Source: Base GIS information provided by the Pennsylvania Department of Environmental Protection, the Pennsylvania Department of Conservation and Natural Resources and the Allegheny County Division of Computer Services Geographic Information Systems Group.

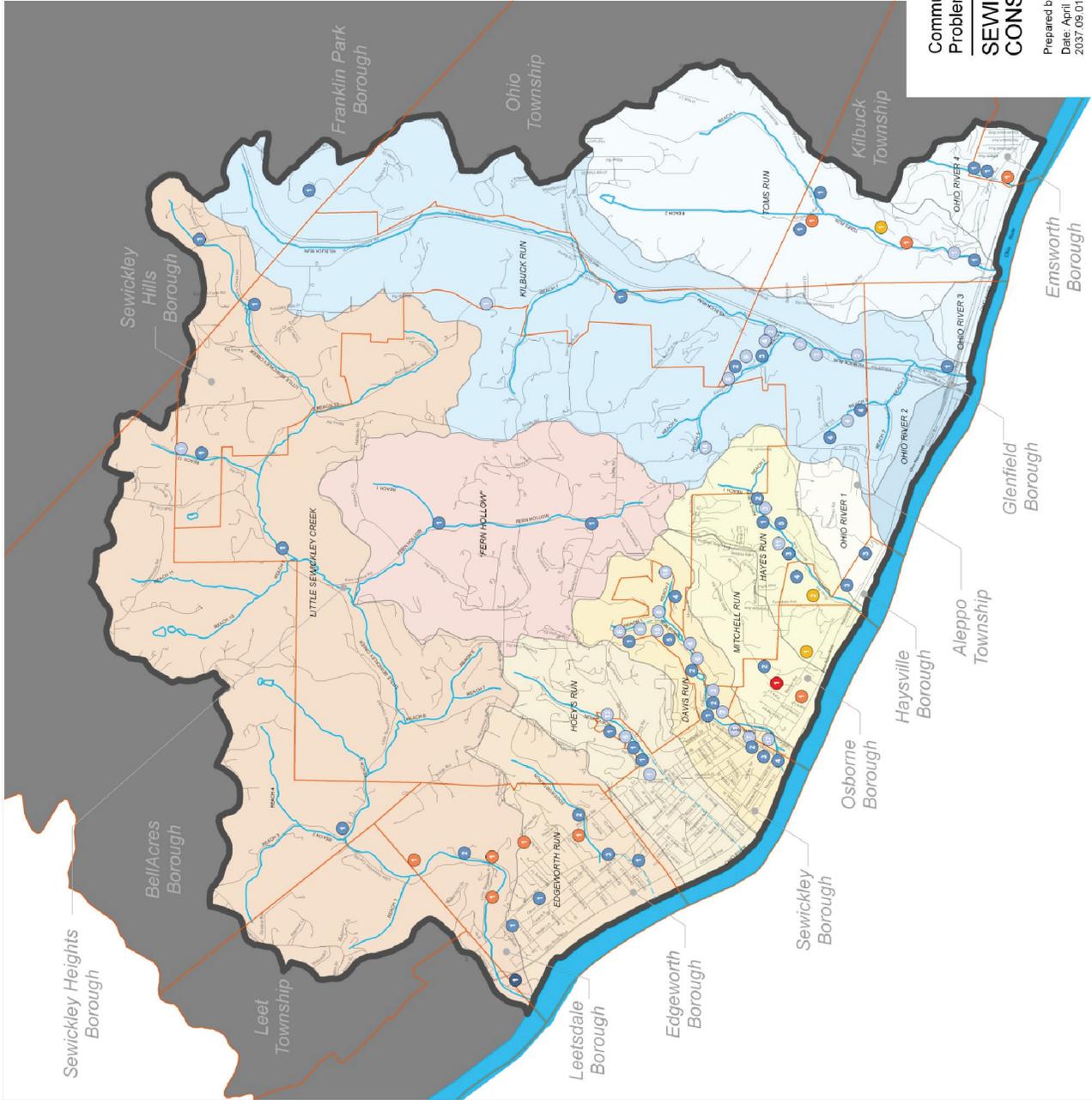
LEGEND

- Study Area Boundary
- Municipal Boundary
- Streets/Roads
- Rivers/Streams (Exposed)
- Rivers/Streams (Enclosed)

Stormwater Problem Categories

- Flooding - Backwater
- Flooding - Existing/Potential Constrictions
- Flooding - Inadequate Maintenance
- Erosion - Stream Bank
- Erosion - Uncontrolled Runoff/Spring Seep
- Contamination - Chemical/Oil Spill
- Number of Problem Occurrences

Study Area Watersheds	# of Problem Occurrences
Little Sewickley Creek	13
Fern Hollow	2
Edgeworth Run	9
Hayes's Run	22
Davis Run	120
Park Run	4
Hayes Run	7
Ohio River 1	8
Ohio River 2	62
Kilbuck Run	7
Ohio River 3	7
Toms Run	3
Ohio River 4	3



Community Survey
 Problem Areas by Watershed
**SEWICKLEY VALLEY RIVERS
 CONSERVATION AND MANAGEMENT PLAN**
 Prepared by: Environmental Planning and Design, LLC
 Date: April 13, 2009
 2037.06.01r5



Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributions.
 Source: Base GIS information provided by the Pennsylvania Department of Environmental Protection, the Pennsylvania Department of Conservation and Natural Resources and the Allegheny County Division of Computer Services Geographic Information Systems Group.

LEGEND

- Study Area Boundary
- Watershed Boundary
- Rivers/Streams (Exposed)
- Rivers/Streams (Enclosed)

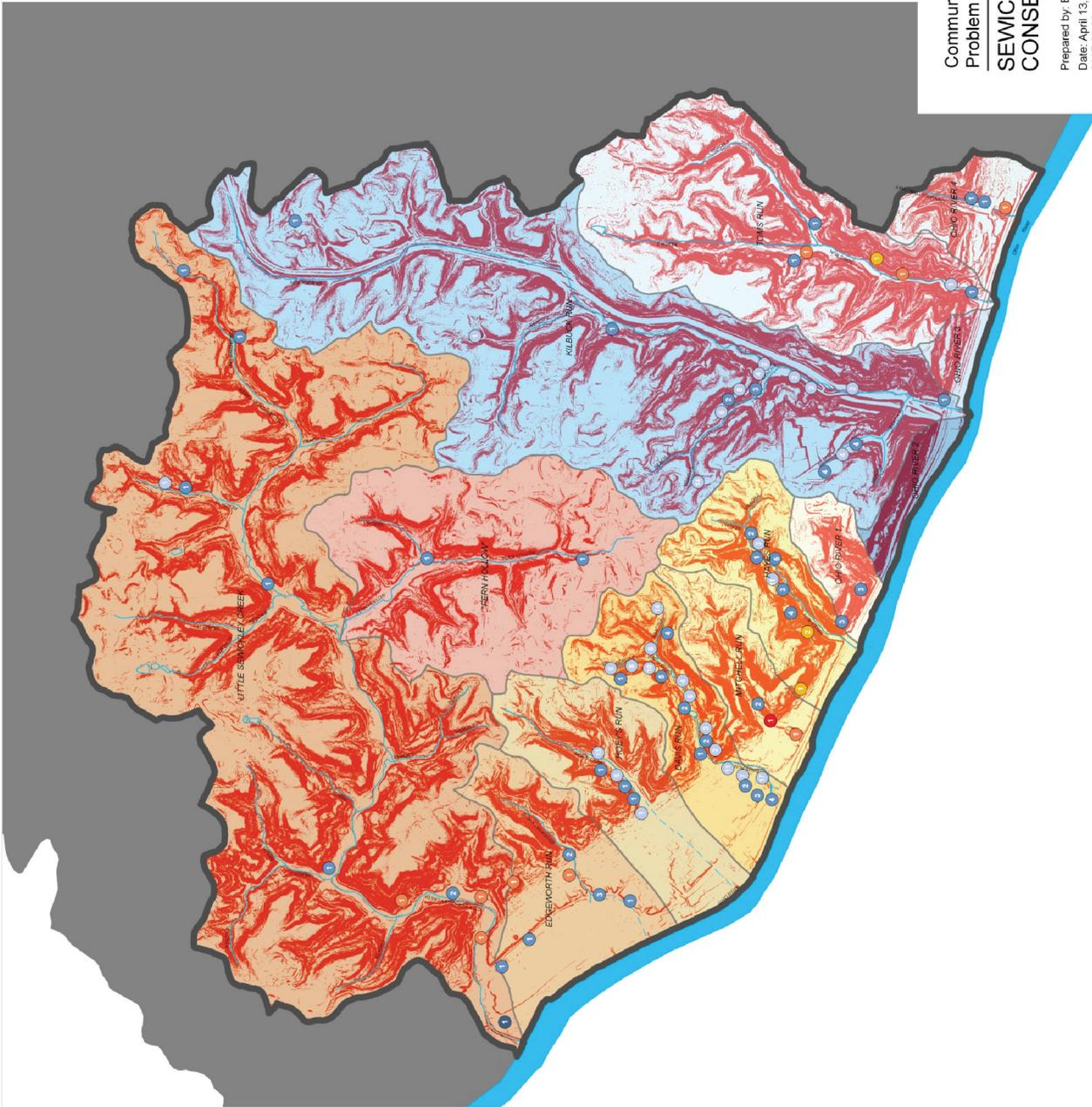
Stormwater Problem Categories

- Flooding - Backwater
- Flooding - Existing Potential Conditions
- Flooding - Inadequate Maintenance
- Erosion - Stream Bank
- Erosion - Uncontrolled Runoff/Spring Seep
- Contamination - Chemical/Oil Spill
- Number of Problem Occurrences

Slopes greater than 25%

% of Slopes Greater than 25% within Overall Watershed

Study Area Watersheds	# of Problem Occurrences	% of Slopes Greater than 25% within Overall Watershed
Little Sewickley Creek	13	36%
Fern Hollow	2	21%
Edgeworth Run	9	20%
Heey's Run	22	27%
Davis Run	120	32%
Park Run	4	36%
Hayes Run	7	44%
Ohio River 1	8	35%
Ohio River 2	62	57%
Kilbuck Run	62	36%
Ohio River 3	7	47%
Tom's Run	7	45%
Ohio River 4	3	41%



Community Survey
 Problem Areas by Steep Slopes

**SEWICKLEY VALLEY RIVERS
 CONSERVATION AND MANAGEMENT PLAN**

Prepared by: Environmental Planning and Design, LLC
 Date: April 13, 2009
 2007.05.02



PHASE I

Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributions.

Source: Base GIS information provided by the Pennsylvania Department of Environmental Protection, the Pennsylvania Department of Conservation and Natural Resources and the Allegheny County Division of Computer Services Geographic Information Systems Group.

LEGEND

- Study Area Boundary
- Watershed Boundary
- Rivers/Streams (Exposed)
- Rivers/Streams (Enclosed)

Stormwater Problem Categories

- Flooding - Backwater
- Flooding - Existing/Potential Constrictions
- Flooding - Inadequate Maintenance
- Erosion - Stream Bank
- Erosion - Uncontrolled Runoff/Spring Seep
- Contamination - Chemical/Oil Spill
- Number of Problem Occurrences

Soil Category

- Poor Soils - Gleys-Upshur complex
- Very steep; Silty clay loam to silt loam
- Run-off: rapid to very rapid
- Springs/ground seeps commonly found



Community Survey Problem Areas by Poor Soils SEWICKLEY VALLEY RIVERS CONSERVATION AND MANAGEMENT PLAN

Prepared by: Environmental Planning and Design, LLC

Date: April 13, 2009
2037.05.03



Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributions.
 Source: Base GIS information provided by the Pennsylvania Department of Environmental Protection, the Pennsylvania Department of Conservation and Natural Resources and the Allegheny County Division of Computer Services Geographic Information Systems Group.

LEGEND

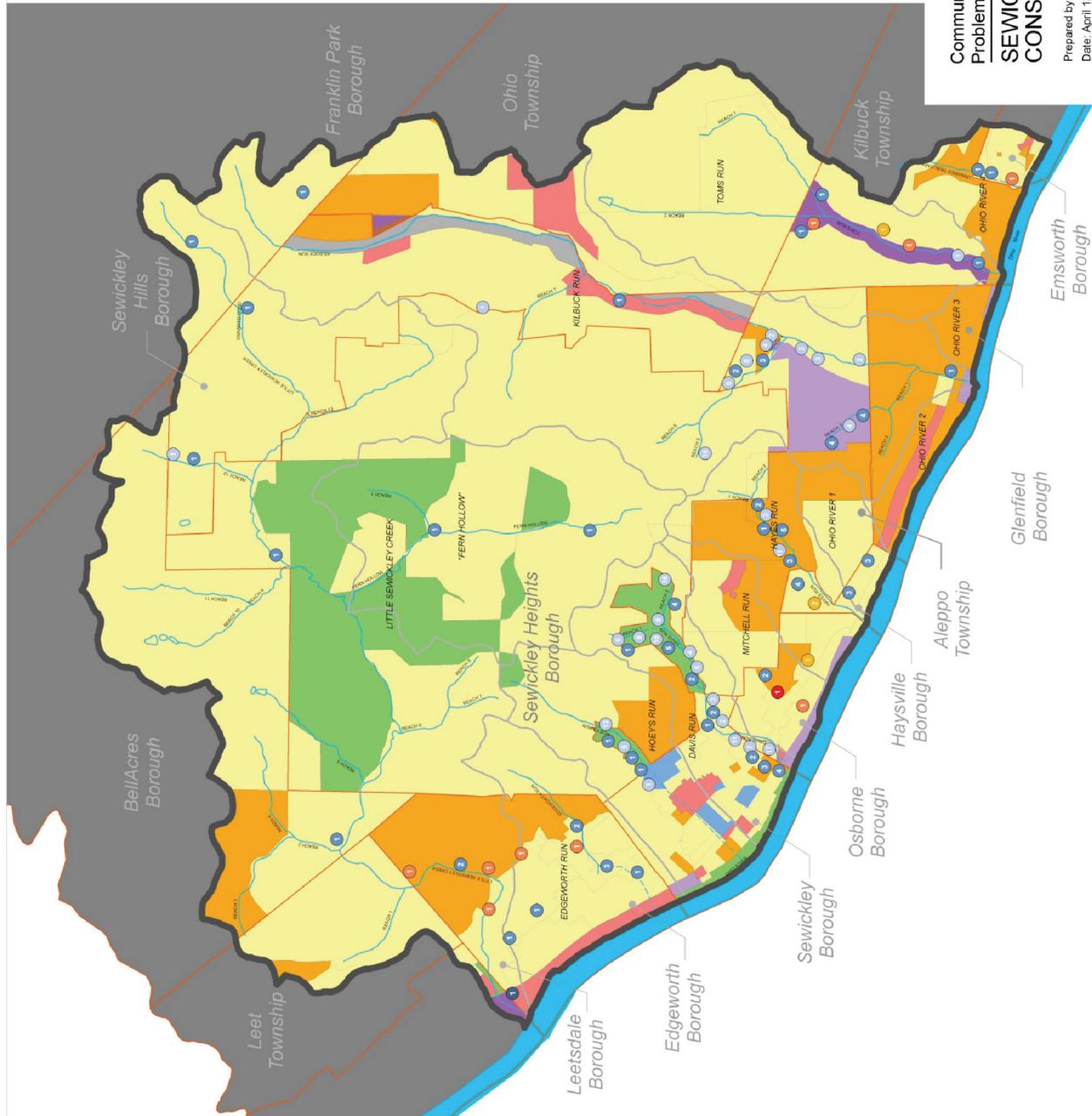
- Study Area Boundary
- Watershed Boundary
- Municipal Boundary
- Rivers/Streams (Exposed)
- Rivers/Streams (Enclosed)

Stormwater Problem Categories

- Flooding - Backwater
- Flooding - Existing/Potential Constrictions
- Flooding - Inadequate Maintenance
- Erosion - Stream Bank
- Erosion - Uncontrolled Runoff/Spring Seep
- Contamination - Chemical/Oil Spill
- Number of Problem Occurrences

Generalized Zoning Classification

- Open Space/Conservation
- Single Family Residential
- Multi-Family Residential
- Institutional
- Commercial
- Commercial/Industrial
- Industrial
- River
- Transportation



Community Survey
 Problem Areas by Generalized Zoning Classification
**SEWICKLEY VALLEY RIVERS
 CONSERVATION AND MANAGEMENT PLAN**

Prepared by: Environmental Planning and Design, LLC
 Date: April 13, 2009
 2037.09.04



PHASE II MAPPING

Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributions.
 Sources: Base GIS information provided by the Allegheny County Division of Computer Services Geographic Information Systems Group, the Pennsylvania Department of Environmental Protection, and the Pennsylvania Department of Transportation

LEGEND

- Study Area Boundary
- Municipal Boundary
- Ohio River
- Watershed Boundary
- Roads
- Streams (Open)
- Streams (Covered)

Presently Permitted Non-Marcellus Shale Oil and Gas Well Locations

- Active Non-Marcellus Shale Oil and Gas Well Operations
 - Inactive Non-Marcellus Shale Oil and Gas Well Operations
- Note: There are no Marcellus Shale drilling sites currently permitted in the Sewickley Valley area

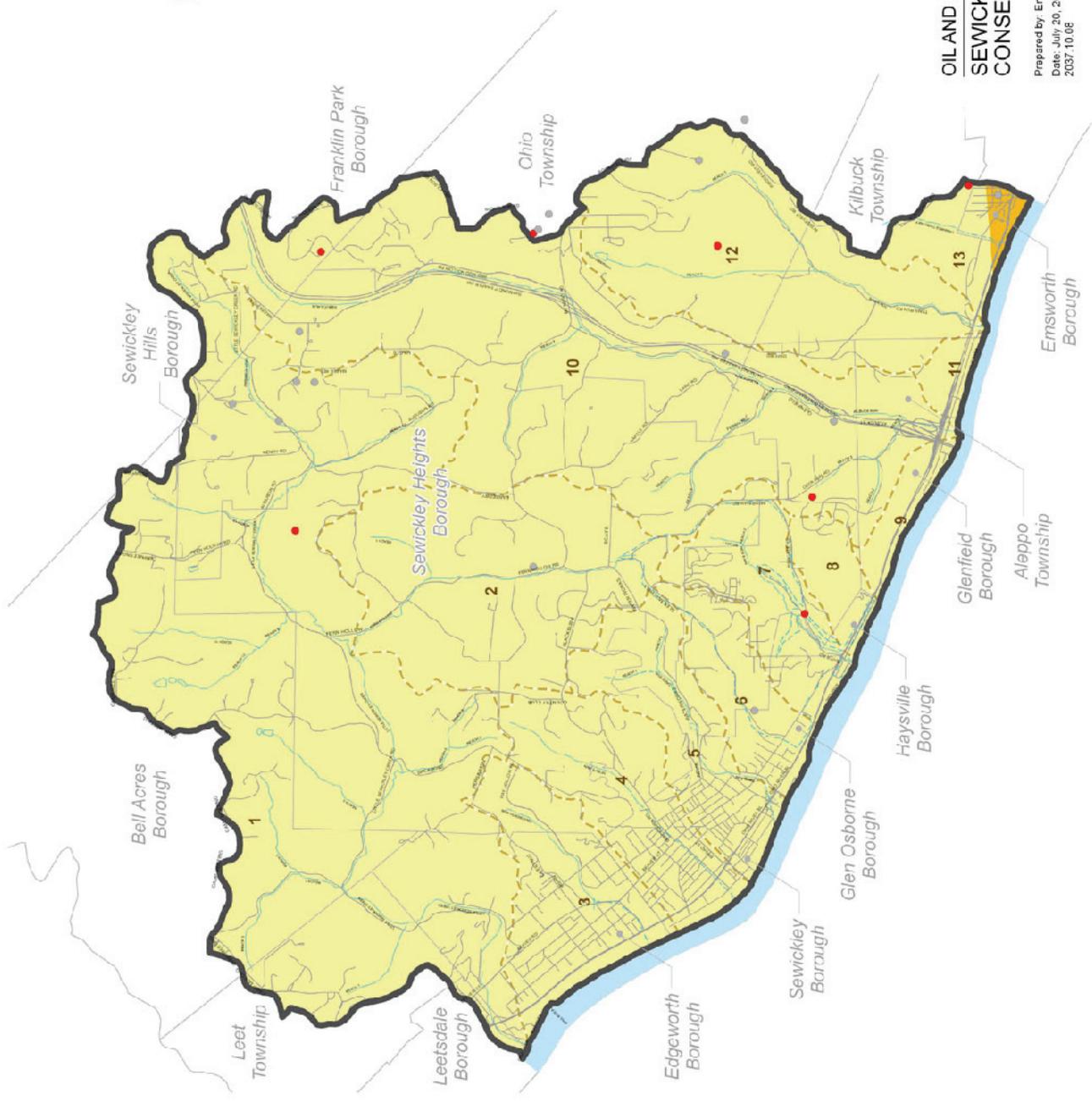
Marcellus Shale Locations

- > 50' - 75' Thick
- > 75' - 100' Thick

Note: The depth of Marcellus Shale within the Sewickley Valley varies from between 5,000' - 9,000' below surface elevations.

Study Area Watersheds

- 1 Little Sewickley Creek
- 2 Fern Hollow Run
- 3 Edgeworth Run
- 4 Hoy's Run
- 5 Davis Run
- 6 Park Run
- 7 Hays Run
- 8 Ohio River 1
- 9 Ohio River 2
- 10 Kilbuck Run
- 11 Ohio River 3
- 12 Toma Run
- 13 Ohio River 4



**OIL AND GAS RESOURCE ANALYSIS
 SEWICKLEY VALLEY RIVERS
 CONSERVATION AND MANAGEMENT PLAN**

Prepared by: Environmental Planning and Design, LLC
 Date: July 20, 2010
 2007.10.06



PHASE II

Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributions.
 Sources: Base GIS information provided by the Allegheny County Division of Computer Services Geographic Information Systems Group, the Pennsylvania Department of Environmental Protection, and the Pennsylvania Department of Transportation.

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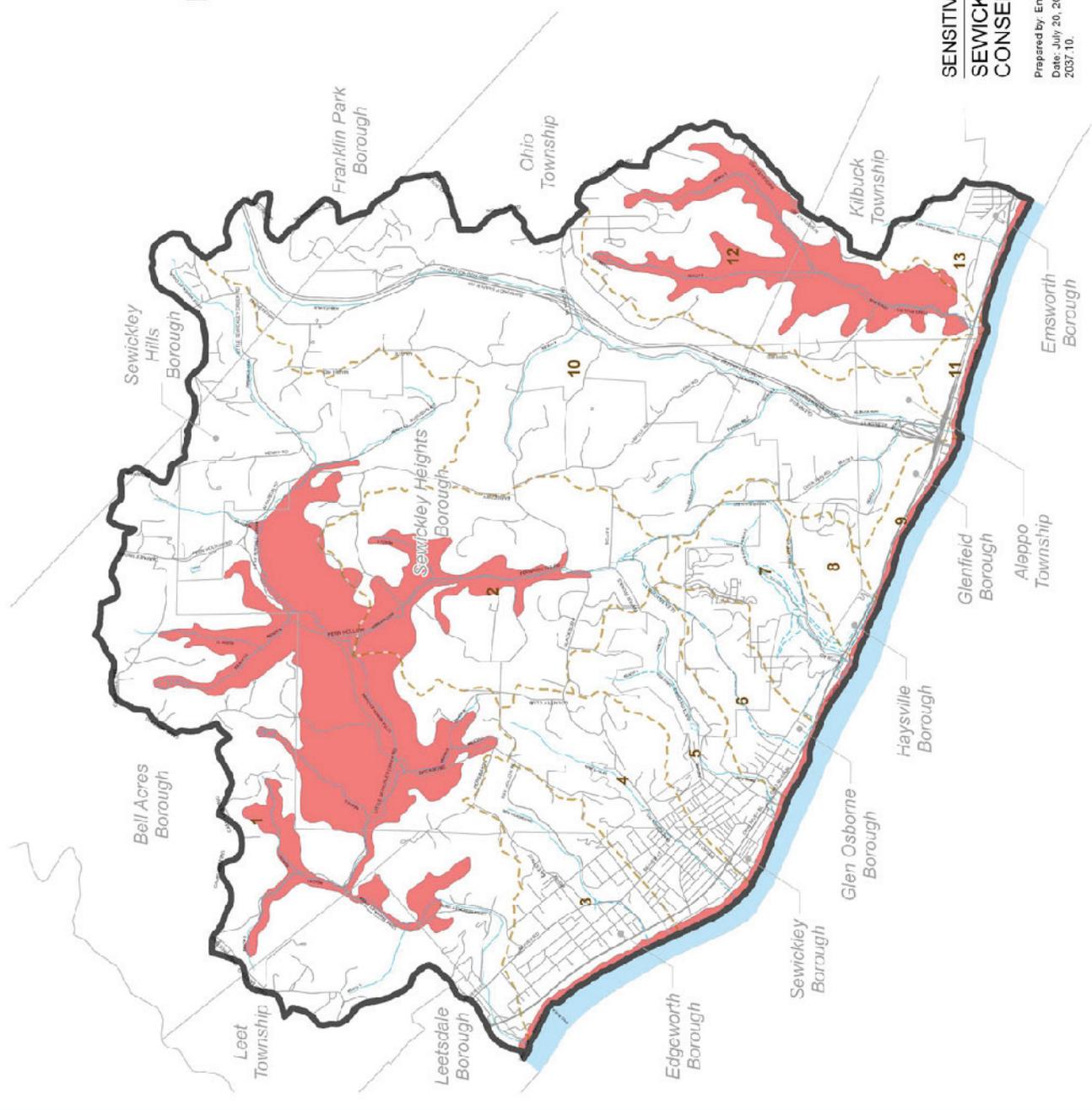
- Study Area Boundary
- Municipal Boundary
- Ohio River
- Watershed Boundary
- Roads
- Streams (Open)
- Streams (Covered)

Sensitive Resource Areas

- Sensitive Resources
- 1** Forested Areas
- 2** High Quality Streams
- 3** Biological Diversity Areas
- 4** Riparian Buffers
- 5** Cold Water Fish Habitat
- 6** Wetlands
- 7** Steep Slopes
- 8** Food Frame Areas
- 9** Landslide Prone Areas
- 10** Soil Creep
- 11** Red Bed Soils

Study Area Watersheds

- 1** Little Sewickley Creek
- 2** Fern Hollow Run
- 3** Edgworth Run
- 4** Hey's Run
- 5** Davis Run
- 6** Park Run
- 7** Hays Run
- 8** Ohio River 1
- 9** Ohio River 2
- 10** Kilbuck Run
- 11** Ohio River 3
- 12** Tom's Run
- 13** Ohio River 4



SENSITIVE RESOURCE OVERLAY MAP SEWICKLEY VALLEY RIVERS CONSERVATION AND MANAGEMENT PLAN

Prepared by: Environmental Planning and Design, LLC
 Date: July 20, 2010
 2007.10

Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributions.
 Sources: Base GIS information provided by the Allegheny County Division of Computer Services, the Pennsylvania Department of Environmental Protection, the Pennsylvania Department of Conservation and Natural Resources and the Carnegie Mellon University Student/Creative Inquiry "3 Rivers 260 NATURE" Study.

LEGEND

- Study Area Boundary
- Municipal Boundary
- Ohio River
- Watershed Boundary
- Streams (Open)
- Streams (Covered)

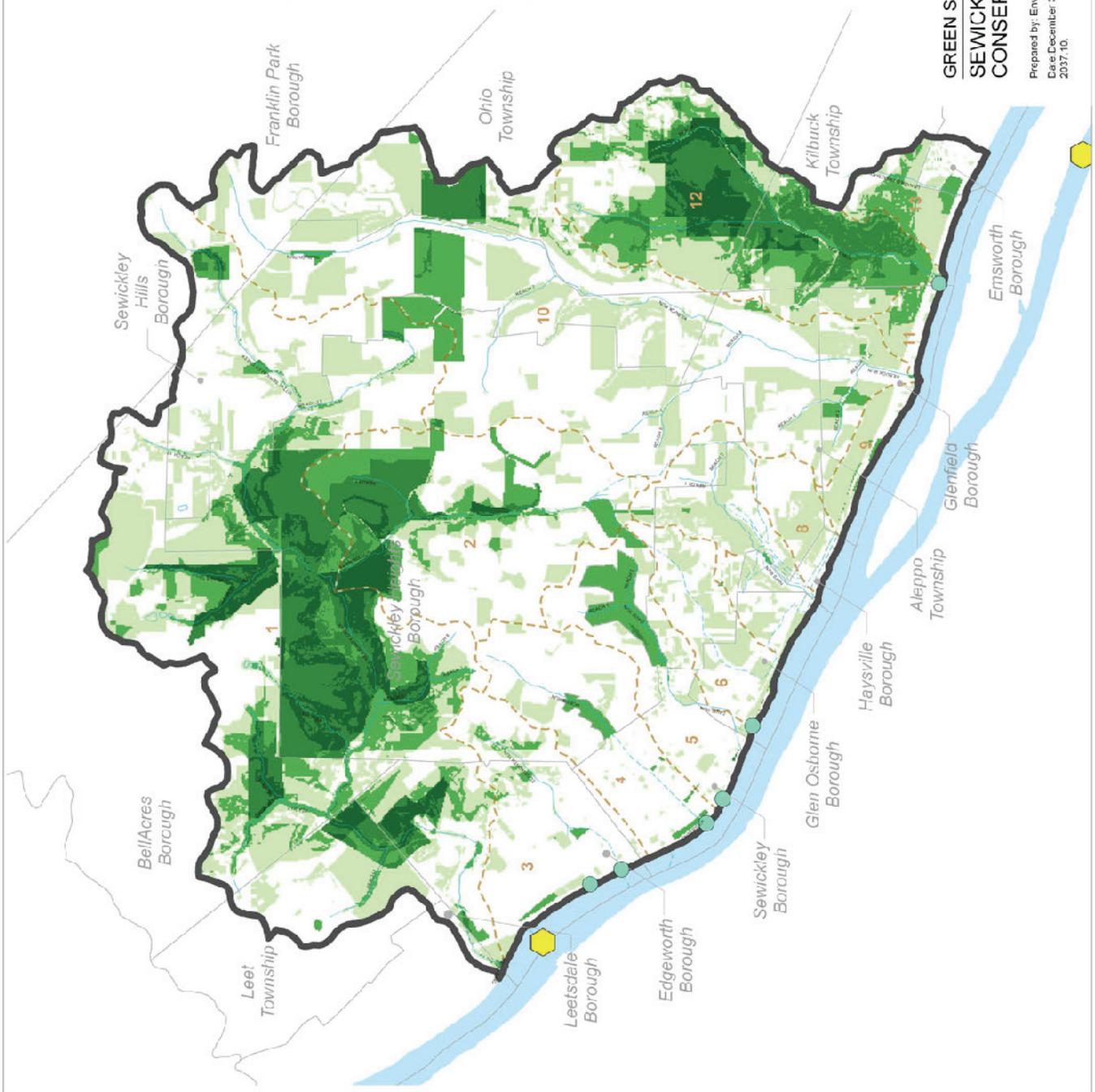
LAND SUITABLE FOR GREENWAY DEVELOPMENT

- 0-1
- 2-3
- 4-6
- 7-9
- 10-15

- COMPOSITE ELEMENTS WEIGHT**
- 1 Parkland 4
 - 2 Conserved Land 4
 - 3 Open Space 2
 - 4 Vacant Land 2
 - 5 Prime Habitat 1
 - 6 Prime Natural Resources 1
 - 7 Prime Sensitive Resources 1
 - 8 Biological Diversity Areas 1
 - 9 Habitable Woodlands 1
 - 10 Active Agricultural Land 1

Study Area Watersheds

- 1 Little Sewickley Creek
- 2 Fern Hollow Run
- 3 Edgewood Run
- 4 Hoey's Run
- 5 Davis Run
- 6 Park Run
- 7 Hays Run
- 8 Ohio River 1
- 9 Ohio River 2
- 10 Kilbuck Run
- 11 Ohio River 3
- 12 Toms Run
- 13 Ohio River 4



**GREEN SPACE OPPORTUNITIES MAP
 SEWICKLEY VALLEY RIVERS
 CONSERVATION AND MANAGEMENT PLAN**

Prepared by: Environmental Planning and Design, Inc.
 Date: December 3, 2010
 0 1170 2200 Feet



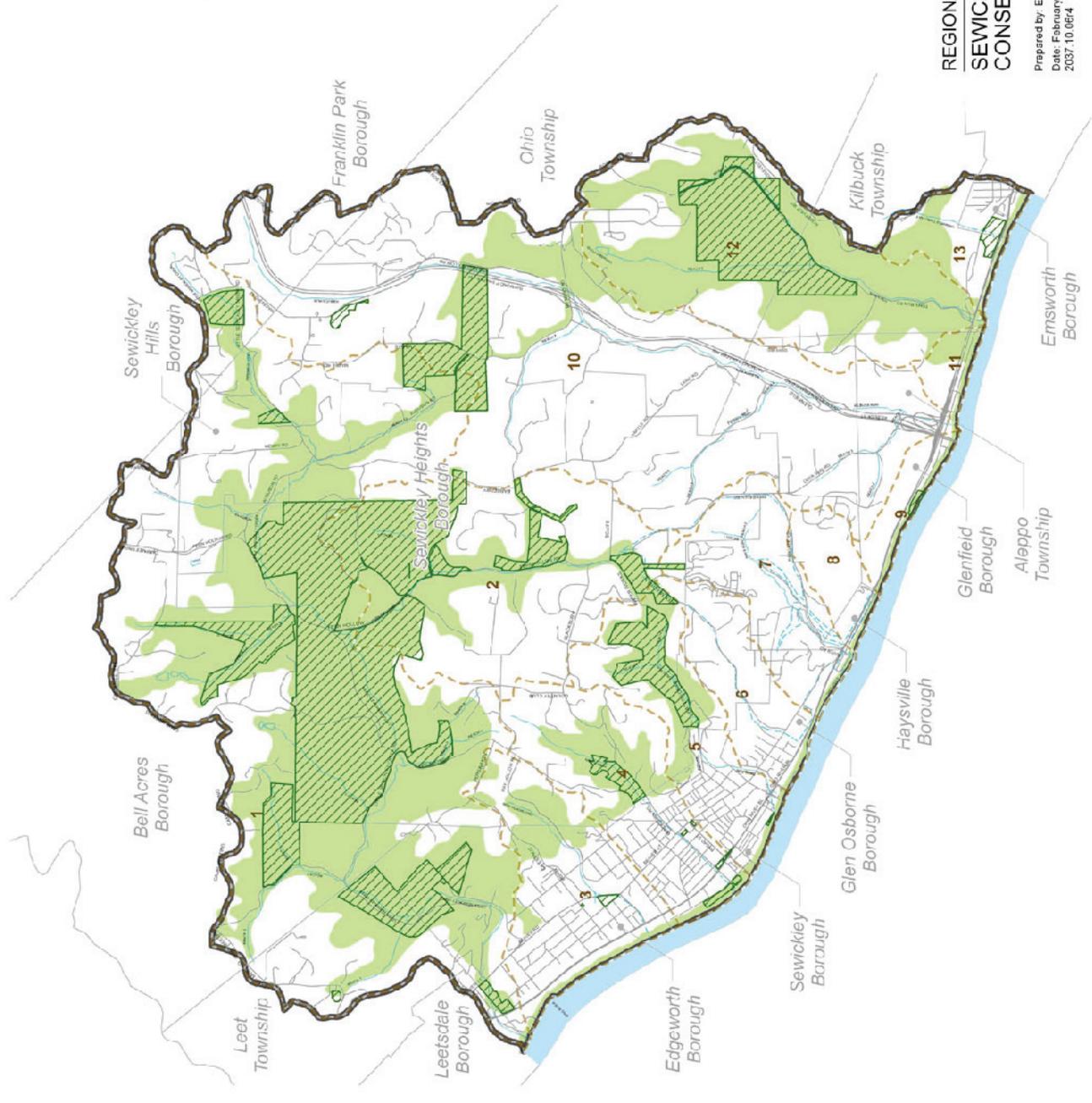
PHASE II

Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributions.
 Sources: Base GIS information provided by the Allegheny County Division of Computer Services Geographic Information Systems Group, the Pennsylvania Department of Environmental Protection and the Pennsylvania Department of Transportation

LEGEND

- Study Area Boundary
- Municipal Boundary
- Ohio River
- Watershed Boundary
- Roads
- Streams (Open)
- Streams (Covered)
- Proposed Greenways**
- Protected Public/Quasi-Public Lands
- Conservation Overlay Imposed on Private Lands

- ### Study Area Watersheds
- | | |
|--------------------------|-----------------|
| 1 Little Sewickley Creek | 8 Ohic River 1 |
| 2 Fern Hollow Run | 9 Ohic River 2 |
| 3 Edgeworth Run | 10 Kilbuck Run |
| 4 Hoop's Run | 11 Ohic River 3 |
| 5 Davis Run | 12 Tom's Run |
| 6 Park Run | 13 Ohic River 4 |
| 7 Hays Run | |



REGIONAL GREENBELT CONCEPT PLAN SEWICKLEY VALLEY RIVERS CONSERVATION AND MANAGEMENT PLAN

Prepared by: Environmental Planning and Design, LLC
 Date: February 14, 2011
 2007.10.0614

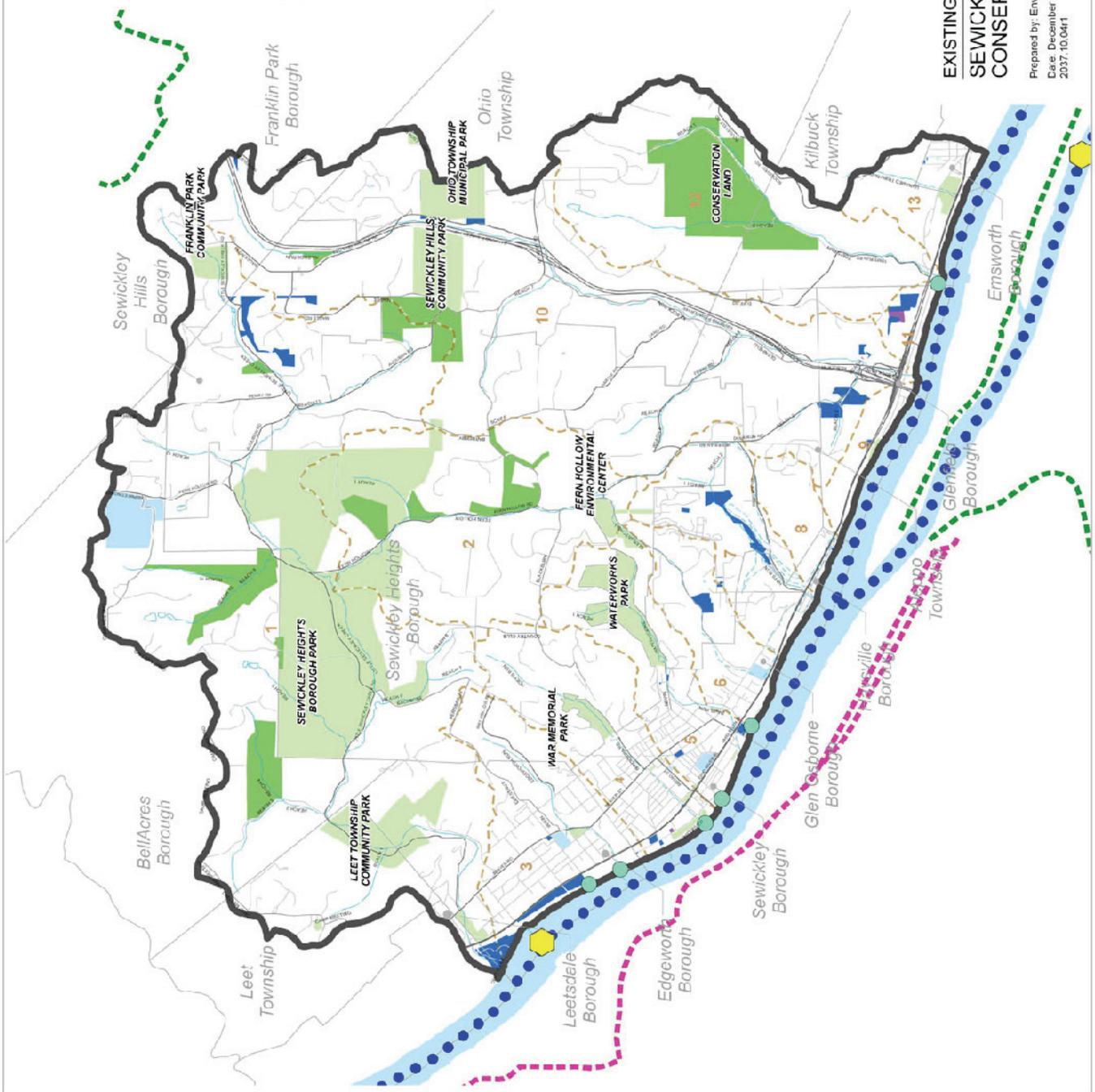


Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributions.
 Sources: Base GIS information provided by the Allegheny County Division of Computer Services, the Pennsylvania Department of Environmental Protection, the Pennsylvania Department of Conservation and Natural Resources and the Carnegie Mellon University Studio for Creative Inquiry "3 Rivers 260 NATURE" Study.

LEGEND

- PUBLIC LANDS**
- Study Area Boundary
 - Municipal Boundary
 - Ohio River
 - Watershed Boundary
 - Streams (Open)
 - Streams (Covered)
 - Lock/Dam
 - River Access Points
- TRAILS**
- Trail
 - Designated Bike Route
 - Water Trail

- STUDY AREA WATERSHEDS**
- 1 Little Sewickley Creek
 - 2 Fern Hollow Run
 - 3 Edgeworth Run
 - 4 Hoey's Run
 - 5 Davis Run
 - 6 Park Run
 - 7 Hays Run
 - 8 Ohio River 1
 - 9 Ohio River 2
 - 10 Kilbuck Run
 - 11 Ohio River 3
 - 12 Toms Run
 - 13 Ohio River 4



**EXISTING RECREATIONAL OPPORTUNITIES MAP
 SEWICKLEY VALLEY RIVERS
 CONSERVATION AND MANAGEMENT PLAN**

Prepared by: Environmental Planning and Design, Inc.
 Date: December 2, 2010
 2037-10-0411



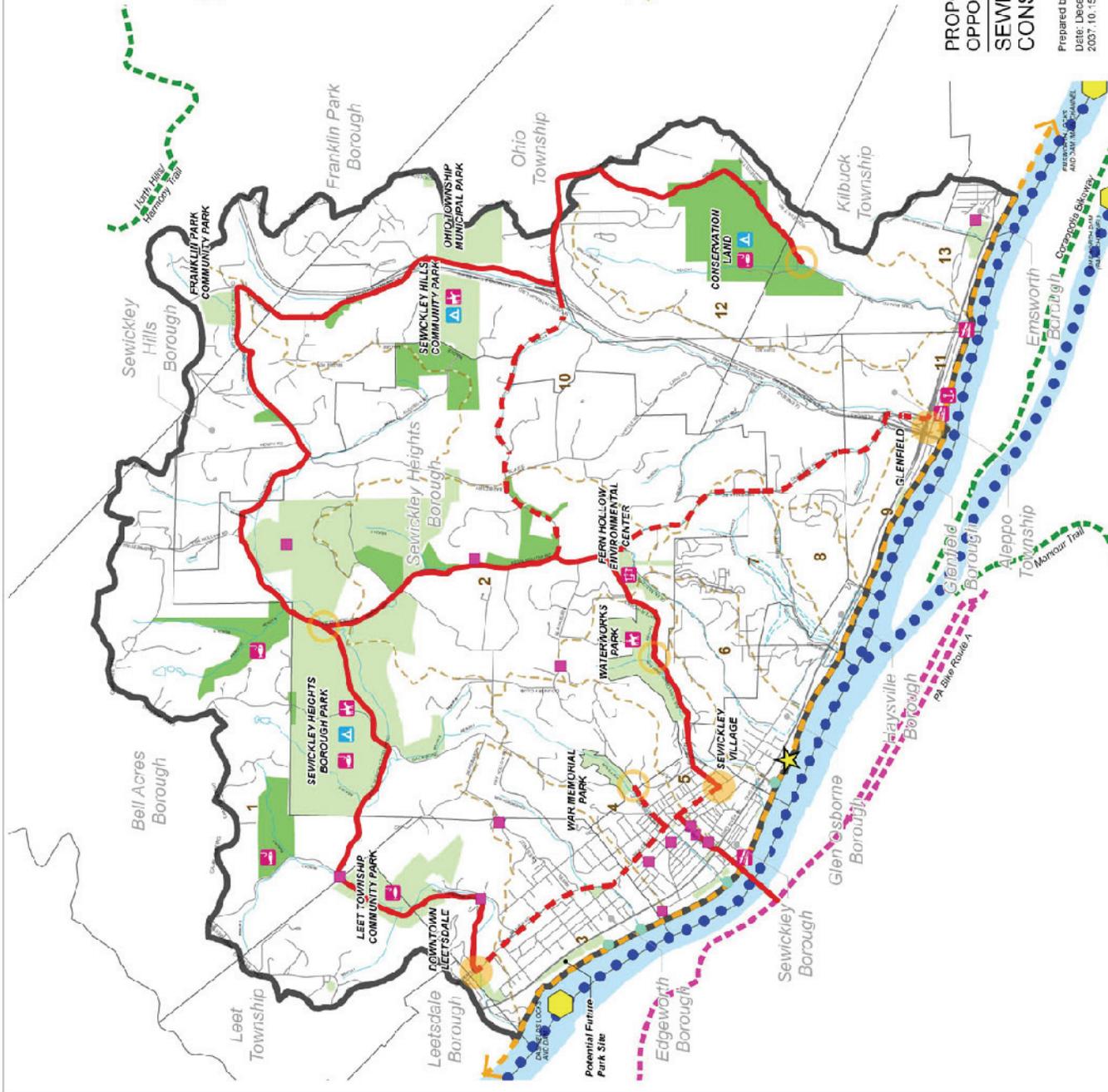
PHASE II

Funded by: Pennsylvania Department of Conservation and Natural Resources, the Sewickley Valley municipalities and private contributions.
 Sources: Base GIS information provided by the Allegheny County Division of Computer Services Geographic Information Systems Group, the Pennsylvania Department of Environmental Protection and the Pennsylvania Department of Transportation

LEGEND

	Study Area Boundary		Lock/Dam
	Municipal Boundary		Coast Guard Station (Potential Future Park)
	Ohio River		River Access Points
	Watershed Boundary		Marina
	Roads		Boat Launch Ramp
	Streams (Open)		Fishing Access Points
	Streams (Covered)		Camping Access Points
	Proposed Bicycle Route		Herseback Riding Trails
	Primary Bicycle Route		Environmental Center Locations
	Secondary Bicycle Route (Challenge Route)		Historic Sites
	Destinations		Public Lands
	Riverfront Destinations		Parks and Open Space
	Recreational Destinations		Conservation Lands
	Trail		
	Designated Blue Route		
	Water Trail		
	Proposed River Trail		

- ### Study Area Watersheds
- | | | | |
|---|------------------------|----|--------------|
| 1 | Little Sewickley Creek | 8 | Ohio River 1 |
| 2 | Fern Hollow Run | 9 | Ohio River 2 |
| 3 | Edgeworth Run | 10 | Kilbuck Run |
| 4 | Hoag's Run | 11 | Ohio River 3 |
| 5 | Davis Run | 12 | Toms Run |
| 6 | Park Run | 13 | Ohio River 4 |
| 7 | Hays Run | | |



PROPOSED RECREATIONAL OPPORTUNITIES PLAN SEWICKLEY VALLEY RIVERS CONSERVATION AND MANAGEMENT PLAN

Prepared by: Environmental Planning and Design, LLC
 Date: December 2, 2010
 0 1100 2200 Feet
 NORTH

Appendix C: Municipal Officials Survey

Community Survey and Map Instructions

The Community Survey marks the culmination of Phase I of the Sewickley Valley Rivers Conservation and Management Plan, and has been developed in order to obtain a general consensus of what the Sewickley Valley's stormwater management priorities should be. Secondly, the Community Survey will help to identify where, geographically, the problem areas are and what issues are causing those problems. The Survey should be completed in the context of the attached base map.

The base maps have been prepared to be specific to your community while tying into the Project Study Area to enable you to view the bigger picture. The Project Study Area has been identified on each map located under the Legend. Your community's boundary is highlighted with a red dashed line. Rivers, streams, parks, open spaces, topography contour lines and roads have been identified within the municipal boundary. The purpose of the map is twofold. First, the map should be used as a tool to help each municipality identify specific stormwater, drainage or run-off problem areas within the township/borough. Secondly, the maps will be collected and analyzed on a regional basis to identify how each issue affects the region as a whole. Please note that these maps will be held in strict confidentiality and will not be directly provided to either PA DCNR or PA DEP. The information provided by the township/borough will be dealt with in a more general nature and will not identify specific problems of each community. The following items should be identified on each map:

- Specific causes to stormwater drainage or runoff problem areas – Please mark on the map where obstructions exist relating to localized stormwater management problem areas. As obstructions are noted in Question 2 of the survey clearly identify the obstruction on the map using the same numeric/alpha-numeric code.
- Specific stormwater drainage or runoff problem areas - Please mark on the map accordingly by clearly identifying any problem areas within the community. As specific problem areas are noted in Question 3 of the survey, clearly demarcate the areas on the map using the same numeric/alpha-numeric annotation on the map.

As noted in the Cover Letter, your feedback on the Community Survey and Map is imperative for the Project's continuing success. **Again, the Partnership is requesting that each community return their completed survey and marked-up map to the Project Coordinator, Kevin Flannery, by March 18, 2009.**

3. Please provide the requested detail regarding the stormwater management problem areas listed on the previous page.

**Sewickley Valley Rivers Conservation and Stormwater Management Plan
Problem Area Summary**

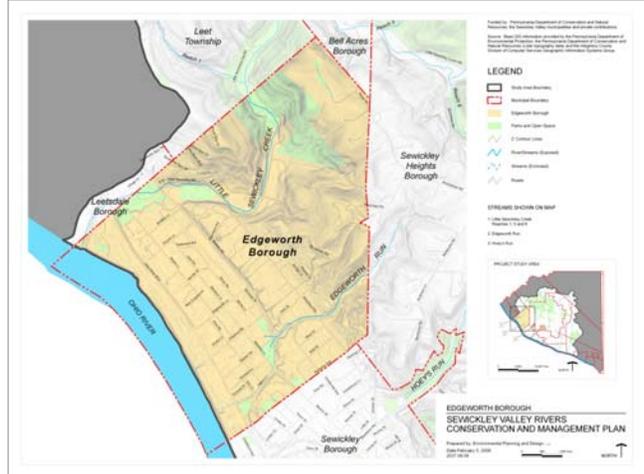
ID #	Description	Frequency				Possible Causes				
		Frequently	Semi-Annually	Annually	Major Events	Inadequately Controlled Runoff	Obstructions	Inadequate Maintenance	Undersized Conveyance System	Other (Please Identify)

4. Past experiences – and ones elsewhere in the region – have taught us that we need to be prepared for the impacts of big storms. Please describe the extend of flooding/other stormwater damage that occurred from Hurricane Ivan.

Please submit completed survey and map **NO LATER THAN MARCH 18, 2009** to Kevin Flannery, Sewickley Borough Manager/Secretary.

I. Community Survey Contents Summary

Following is a summary of the content, responses and outcomes of the Community Survey. The survey in its entirety along with the tabulations of the results can be viewed in Appendix A of this report.



A. Content

The content of the survey was based on the map and on tabular and textual data collected relating to the information recorded on the map.

1. Mapping

Survey participants located and mapped locations of obstructions relating to localized storm water management problem areas. The purpose of the maps was two-fold. First, the map served as a tool for each municipality to identify specific storm water, drainage or run-off problem areas within the township/borough. Second, the maps were collected and analyzed on a regional basis to identify how each issue affects the Sewickley Valley as a whole.

2. Tabular/Textual

The problem locations mapped were further described by participants in their responses to Questions 2 and 3. Survey participants located and mapped specific storm water drainage or run-off problem areas within their communities. These locations were further described by participants in their Question 3 survey responses.

B. Question 1: Municipal Prioritization of Water Quality and Flooding Issues

In Question 1 communities were asked to rank the magnitude of specific problems related to water quality and flooding on a scale of one (1) to five (5) as follows:

- 5 (very important);
- 4;
- 3 (somewhat important);
- 2; and
- 1 (relatively un-important).

Water Quality Issues were categorized as:

- Erosion & Sedimentation on Disturbed Lands (farmlands and construction sites)
- Erosion & Sedimentation from Stream banks
- Erosion & Sedimentation downstream from disturbances
- Nutrients
- Other:

Flooding issues were categorized as:

- Development-Related Storm water Increases
- Inadequate Groundwater Recharge Area
- Other (please identify):

- C. Question 2: Identification of key obstructions (i.e. bridges, culverts, dams, buildings, river walls, embankments, etc) that relate to localized storm water management problem areas.

In Question 2 communities were asked to record in tabular form the following data for the key obstructions marked on the map:

- ID #,
- Description (i.e. 36" CMP, etc.)
- Location (Road/Nearest Landmark
- Associated Problem ID# (if any)
-

- D. Question 3: Problem Area Summary

In Question 3 communities were asked to record in tabular form the following data for the problem areas marked on the map:

- ID #
- Description
- Frequency (Frequently, Semi- Annually, Annually, Major Events)

In question 4 participants were asked to describe extent of flooding and other storm related water damage than occurred as a result of Hurricane Ivan in 2004 which had widespread impacts in Allegheny County.

- E. Participation

Each community received a cover letter, a Community Map, Community Survey and instruction sheet in early February 2009 to be completed and returned to Kevin Flannery of Sewickley Borough by 2/25/09. Community representatives undertook field reconnaissance and coordinated with Mr. Flannery and the

planning team to complete the written and graphic (map) documentation of municipal storm water and run-off issues. Thirteen (13) of the fifteen (15) municipalities completed the surveys.

F. Response

Subsequent to the completion and return of the surveys, responses were tabulated and a series of maps was prepared illustrating problem areas as related to significant project area conditions including zoning, slopes, and soils types. These exhibits, along with a summary of all the maps produced in the Phase I Plan were presented at a municipal managers meeting held at the Borough of Sewickley on April 4, 2009. Complete packets of these materials were subsequently mailed to each community representative.

Summaries of the Survey responses are as follows.

1. Question 1: *Municipal Prioritization of Water Quality and Flooding Issues*

In Table 8 on the following page, the number of responses in the “Very Important” column indicates that erosion and sedimentation on disturbed lands and flooding are important priorities to the communities. Because the responses are weighted on a scale of 1 – 5, with “Relatively Unimportant” having a weight of 1 and “Very Important” having a weight of 5, the numbers in the cells of Table 7 were multiplied by the associated weight. A response of “Very Important” received a weighted score of 5 producing Table 9.

Initial Response Tabulations

Municipal Survey Survey Tabulation - Question 1e					
Municipal Prioritization					
Water Quality: Other ¹					
¹ Range: (5) Very Important; (4); (3) Important; (2); (1) Relatively Unimportant					
	Priority				
Municipality	5	4	3	2	1
Aleppo					
Bell Acres					
Edgeworth					
Emsworth					
Franklin Park					
Glen Osborne					
Haysville					
Kilbuck - Outflow from Development	1				
Ohio					
Sewickley					
Sewickley Heights					
Emsworth					
TOTAL	1	0	0	0	0

Municipal Survey Survey Tabulation - Question 2a					
Municipal Prioritization					
Flooding ¹					
¹ Range: (5) Very Important; (4); (3) Important; (2); (1) Relatively Unimportant					
	Priority				
Municipality	5	4	3	2	1
Aleppo			1		
Bell Acres	1				
Edgeworth	1				
Emsworth					
Franklin Park	1				
Glen Osborne	1				
Haysville		1			
Kilbuck					
Kilbuck	1				
Ohio				1	
Sewickley					
Sewickley Heights	1				
TOTAL	6	1	1	1	0

Initial Response Tabulations

Municipal Survey Survey Tabulation - Question 2b					
Municipal Prioritization					
Developmen Related Stormwater Increases ¹					
¹ Range: (5) very important; (4); (3) Important; (2); (1)Relatively Unimportant					
	Priority				
Municipality	5	4	3	2	1
Aleppo		1			
Bell Acres	1				
Edgeworth				1	
Emsworth					
Franklin Park	1				
Glen Osborne					1
Haysville	1				
Kilbuck		1			
Ohio		1			
Sewickley					
Sewickley Heights	1				
TOTAL	4	3	0	1	1

Municipal Survey Survey Tabulation - Question 2c					
Municipal Prioritization					
Inadequate Groundwater Recharge Area ¹					
¹ Range: (5) Very Important; (4); (3) Important; (2); (1) Relatively Unimportant					
	Priority				
Municipality	5	4	3	2	1
Aleppo			1		
Bell Acres			1		
Edgeworth					1
Emsworth					
Franklin Park	1				
Glen Osborne					1
Haysville -Did not answer					
Kilbuck	1				
Ohio					1
Sewickley - Did not answer					
Sewickley Heights	1				
TOTAL	3	0	2	0	3

Combined Response Tabulations

Thirteen (13) of the fifteen (15) communities in the study area responded to the survey. In Question 1 of the survey we asked the communities to prioritize the stormwater-related issues listed in the table. The Planning Team tallied the responses as shown in the table below.

Table 1

Description	Number of Responses by Priority				
	Very Important (5)	(4)	Moderately Important (3)	(2)	Relatively Unimportant (1)
Water Quality:					
Erosion & Sedimentation on Disturbed Lands (farmlands and construction sites)	6	0	1	0	3
Erosion & Sedimentation from Streambanks	4	4	1	1	0
Erosion & Sedimentation downstream from disturbances	2	7	1	0	0
Nutrients	1	3	3	1	2
Other: *Outflow from development	1	0	0	0	0
Flooding	6	1	2	1	0
Development-Related Stormwater Increases	4	3	1	1	1
Inadequate Groundwater Recharge Area	3	0	3	0	3
Other (please identify):					

The number of responses in the “Very Important” column indicates that erosion and sedimentation on disturbed lands and flooding are important priorities to the communities. Because the responses are weighted on a scale of 1 – 5, with “Relatively Unimportant” having a weight of 1 and “Very Important” having a weight of 5, the numbers in the cells of Table 1 were multiplied by the associated weight. A response of “Very Important” received a weighted score of 5 producing the following table.

Table 2

Description	Weighted Priorities					Totals
	Very Important (5)	(4)	Moderately Important (3)	(2)	Relatively Unimportant (1)	
Water Quality:						
Erosion & Sedimentation on Disturbed Lands (farmlands and construction sites)	30	0	3	0	3	36
Erosion & Sedimentation from Streambanks	20	16	3	2	0	41
Erosion & Sedimentation downstream from disturbances	10	28	3	0	0	41
Nutrients	5	12	9	2	2	30
Other: *Outflow from development	5	0	0	0	0	5
Flooding	30	4	6	2	0	42
Development-Related Stormwater Increases	20	12	3	2	1	38
Inadequate Groundwater Recharge Area	15	0	9	0	3	27
Other (please identify):	0	0	0	0	0	0

The stormwater-related issues can then be prioritized based on the total of the weighted score in the following order:

- 1) Flooding
- 2) Erosion & Sedimentation from Streambanks
- 3) Erosion & Sedimentation Downstream from Disturbances
- 4) Development-Related Stormwater Increases
- 5) Erosion & Sedimentation on Disturbed Lands (farmlands and construction sites)

In Question 2 of the survey the communities were asked to identify key obstructions (i.e. bridges, culverts, dams, buildings, riverwalls, embankments, etc.) in their municipality that relate to localized stormwater management problem areas. The communities were then asked to mark the location(s) on the individual Borough/Township Map provided, assign an identification number to each obstruction, and complete the table. The answers to Question 2 were to be used as a tool to help the communities answer Question 3 and to demonstrate in graphic form on the Borough/Township Maps the nature and location of the problem areas.

The responses from the various communities had similar patterns and were, therefore, grouped into those categories. Those categories are flooding, erosion and contamination. There were also subcategories noted within the three main categories. Flooding was broken down by general cause into backwater, inadequate maintenance and existing/potential obstruction/constriction. Erosion was broken down by type into streambank and uncontrolled runoff/spring seep. There was one occurrence of contamination listed as an oil spill. Because of the nature of that occurrence it did not fit into either flooding or erosion and, therefore, a separate category was created.

Table 3

Summary of Stormwater Problem Areas by Category							
Description		Frequency				Total	Percent (%) of Total
		Frequently	Semi-Annually	Annually	Major Events		
Flooding	Backwater	0	0	0	1	1	0.6%
	Inadequate Maintenance	8	0	2	48	58	35.4%
	Existing/Potential Obstruction or Constriction	13	1	7	77	98	59.8%
Erosion	Stream Bank	3	0	1	0	4	2.4%
	Uncontrolled Runoff/Spring Seep	0	0	0	2	2	1.2%
Contamination	Oil	0	0	0	1	1	0.6%
	Other					0	0.0%
Totals		24	1	10	129	164	
Percent (%) of Total		14.6%	0.6%	6.1%	78.7%		

The communities then noted the problem area's frequency of occurrence in Question 3. The Planning Team summarized those responses into a concise table as shown above. The "Percent of Total" column displays the percentage of stormwater problem area causes and types compared to the total number of all reported problem areas. The "Percent of Total" row is a percentage of the frequencies of occurrence compared to the total number of all reported problem areas. Table 3 identifies that the main cause (almost 60 percent) of flooding and, ultimately, stormwater issues in the study area are from existing or potential obstructions and constrictions. It also demonstrates that most problems or issues occur during major events like Hurricane Ivan.

Appendix D: Sample Resource Zoning Regulations

ARTICLE VI – NATURAL RESOURCE PROTECTION OVERLAY

§601. Purpose.

- A. Protect the public health and safety by mitigating potential hazards such as land subsidence that may arise due to the inappropriate development of lands with sensitive natural resources.
- B. Safeguard the public welfare by guiding future development patterns to prevent potential impacts on the region's water and stream quality.
- C. Preserve the public health safety and welfare by protecting private property from potential damages that may occur due to uncontrolled development of lands with sensitive natural resources.
- D. Promote and protect the community's existing level of quality of life by restricting development that could alter the quality and availability of ground water.

§602. Intent.

- A. The Resource Protection Overlay provides a rational methodology for:
 - 1. Inventorying, mapping and evaluating the carrying capacity of a lot based on the existing natural resources found on said lot.
 - 2. Establishing standards to define and determine the amount of development that a lot can reasonably support. The net buildable area, as determined by this overlay process, is the total acreage and general location(s) of permitted disturbance on a lot. Disturbance includes the portions of a lot where grading, construction activities and, subsequently, development occur.
- B. The use of the Resource Protection Overlay process is intended to enable:
 - 1. Developers to identify, early in the development process, the lot's development capacity and, subsequently, its development opportunities.
 - 2. Protection of persons and lots from hazards resulting from the inappropriate development of land in areas that contain sensitive existing natural resources.

§603. Applicability.

- A. For the purpose of carrying out the provisions of this Ordinance, a Resource Protection Analysis shall be completed and submitted as part of any minor or major land development, subdivision or Planned Residential Development as defined in the Borough's Subdivision and Land Development Ordinance.
- B. Development within the Natural Resource Protection Overlay requiring only a building permit such as, but not limited to, new buildings or any building addition, shall not be

required to meet the minimum standards of this Article, but shall be reviewed using the provisions of §706, Steep slope conservation.

- C. The Resource Protection Analysis shall be completed on the official Borough forms provided by the Borough Zoning Officer. The official forms required by this Article and other applicable analyses defined by the Borough shall be completed and submitted as part of any Application for Land Development (Tentative Approval). No application shall be processed or accepted as administratively complete unless or until the Borough Zoning Officer determines that the Resource Protection Analysis has been properly completed.
- D. The granting of any permit pursuant to the regulations of this section shall not constitute a representation, guarantee, or warranty of any kind by the Borough, or by any official or employee thereof, of the practicability or safety of the proposed use and shall create no liability upon the Borough, its officials or employees.
- E. This section does not imply that areas outside those encumbered by steep slopes will always be totally free from the adverse effects of erosion or other effects of nearby steep slopes.

§604. Existing natural resources.

- A. This Ordinance protects specific natural resources that are sensitive to development. These existing natural resources include:
 - 1. Steep Slopes;
 - 2. Floodplains and Floodways;
 - 3. Springs;
 - 4. Vernal Pools;
 - 5. Wetlands;
 - 6. Hydric soils;
 - 7. Natural Drainage Ways;
 - 8. Lakes/water bodies;
 - 9. Colluvial Soils; and,
 - 10. Red Bed Soils.
- B. Refer to the following agencies for information regarding the location of resources listed in 604.A for previous land disturbances of a lot. Additional contact information is available at the Borough office; however, the applicant is responsible for contacting or

referencing all sources, listed below or otherwise, to obtain information related to the assessment of existing natural resources.

1. Commonwealth of Pennsylvania;
2. Bureau of Topographic and Geologic Survey;
3. Pennsylvania Department of Environmental Protection, Southwest Regional Offices;
4. Allegheny County Division of Computer Sciences Geographic Information Systems Groups; and
5. National Wetland Inventory.

§605. Initial development ratios.

- A. Protection of the Borough's existing natural resources is governed by the development ratio for each sensitive existing natural resource. Initial development ratios represent the maximum amount of disturbance or alteration that a sensitive existing natural resource can sustain without posing a hazard to persons or a lot. Development ratios are specific to the existing natural resources and are further affected by the slope of the natural topography where a sensitive existing natural resource may be found.
- B. For the purposes of this Article, slopes used in Table 4: Resource Protection Overlay Worksheet shall be at least twenty-five (25) feet in length, measured on a horizontal plane.

§606. Analysis procedures and implementation.

- A. The Resource Protection Analysis is designed to determine the location and amount of development permitted within any given lot or contiguous lots under common ownership or control, which shall be determined in the following manner:
 1. Create a 1"=100' scale Slope Map based on a contour interval of not more than five (5) feet where the slope is greater than fifteen (15) percent and at intervals of not more than two (2) feet where the slope is fifteen (15) percent or less. The Slope Map shall delineate the location and extent of the following four (4) slope categories:
 - (a.) 0-15%;
 - (b.) 15-25%;
 - (c.) 25-40%; and
 - (d.) 40%.
 2. Inventory floodways and wetlands/hydric soils,
 3. Inventory natural drainage ways, streams and lakes/water bodies including all land within fifty (50) feet from the centerline of any natural drainage ways or fifty (50) feet from the normal pool elevation of any lakes or water bodies, whichever is greater.
 4. Inventory natural springs and vernal pools including all land within fifty (50) feet from the waterline as established from a normal pool elevation.

5. Inventory any areas containing colluvial soils and red bed soils.
6. Indicate the location and extent of the existing natural resources defined in Subsections A (2), (3), (4) and (5) on the Slope Map. Each existing natural resource shall be uniquely illustrated on the Slope Map.
7. Official copies of Table 4: Resource Protection Worksheet of this Ordinance, as available through the Borough, shall be completed to determine the initial net buildable area of the lot.

Table 4: Resource Protection Worksheet

Sensitive Existing Conditions		Gross Lot/Site Area (acres)	Permitted Disturbance Ratio	Net Buildable Area (acres)
<i>Line 1</i>	All floodplains, wetlands, and hydric soils	0.00	x 0.0	= 0.00
<i>Line 2</i>	All lakes and waterbodies; and natural drainageways/streams	0.00	0.0	0.00
<i>Line 3</i>	All springs and vernal pools (including 100 ft buffer)	0.00	x 0.0	= 0.00
<i>Line 4</i>	Colluvial Soils and Red Beds on slopes:	<25%	x 0.00	= 0.00
		>25%	x 0.00	= 0.00
<i>Line 5</i>	Other Areas on slopes 0-25% not calculated as part of Lines 1 through 4 above	0.00	x 1.0	= 0.00
<i>Line 6</i>	Other Area on slopes ≥ 25 but $< 40\%$ not calculated as part of Lines 1 through 4 above	0.00	x 0.4	= 0.00
<i>Line 7</i>	Other Area on slopes $\geq 40\%$ not calculated as part of Lines 1 though 4 above	0.00	x 0.1	= 0.00
<i>Line 8</i>	<i>Sum of Lines 1+2+3+4+5+6+7</i>	0.00		0.00
		(Total Gross Lot/Site Area)		(Total Net Buildable Area)

- B. The layout of all proposed buildings, structures, streets and utilities shall occur only within the portions of a lot that do not contain sensitive existing natural resources documented as part of this Article as well as determined by the Borough represented by the individual permitted disturbance ratios and the Total Net Buildable Area (Table 4: Resource Protection Worksheet).

§607. Net buildable area increases.

- A. Purpose. To promote the efficient use of land, infrastructure and economic resources; to provide development flexibility; and to enhance development quality and longevity, two (2) methods of increasing the net buildable area of a lot shall be available to a developer and/or landowner. Net buildable area increases shall be granted in return for development enhancements. The two (2) methods include the following:

1. Storm water run-off reduction measures;
2. Green roof construction.

B. Applicability

1. Net buildable area increases shall be permitted only in areas located on slopes between zero (0) percent and twenty-five (25) percent in gradient. Net buildable area increases shall utilize the existing natural resources in reverse order of sensitivity in accordance with Table 4 of this Ordinance, whereas least sensitive resource areas shall be utilized first.
2. A developer and/or landowner may incorporate one (1) or more of the methods outlined in Subsection C to a land development plan.
3. When multiple methods are combined as prescribed in §607(C), the combined total net buildable area increase shall not exceed twenty-five (25) percent of the lot's "Total Net Buildable Area" as calculated in Line 8 of the Resource Protection Worksheet.
4. Net buildable area increases shall occur on the same lot where the development enhancement(s) are provided.
5. Prior to receiving Planning Commission approval of a green roof related buildable area increase, the developer and/or landowner shall complete a preliminary and/or final slope stability investigation report in conformance with Borough standards.

C. Methods

1. Stormwater run-off reduction measures. Upon incorporating any two (2) of the following stormwater run-off reduction measures into a land development, a developer and/or landowner shall receive a maximum ten (10) percent net buildable area increase. No preliminary or final slope stability investigation report shall be required to obtain the ten (10) percent net buildable area increase.
 - (a) Provide area(s) for groundwater recharge through on-site stormwater infiltration for an amount of impervious area equal to one (1) times the net buildable area increase. Unless otherwise defined by the Borough's Subdivision and Land Development Ordinance, the minimum required recharge volume shall be equal to one and one-half (1 ½) inches of run-off for the area defined.
 - (b) Preserve existing trees whose combined canopy area is equal to one (1) times the net buildable area increase. A preserved tree shall be a minimum of ten (10) inches in diameter at breast height (dbh).

- (c) Install additional landscaping area(s) equal to one and one-half (1.5) times the net buildable area increase. This additional landscaping may be used to treat any cut or fill slopes; to increase the habitat value of any on-site storm water management facility; to re-establish streamside buffers or for other on-site uses. Lawn or turf areas shall not constitute additional landscaping.
 - (d) Utilize porous pavement to reduce storm water runoff. Porous paving, with proof by engineering calculation/soils analysis, may be used if the developer/land owner can demonstrate that this method will produce zero (0) increased storm water runoff. The Borough shall review proposed design and engineering of the pavement to verify construction is in accordance with acceptable industry standards and United States Environmental Protection Agency's (EPA) Porous Pavements Phase I – Design and Operational Criteria.
 - (e) Propose on-site environmental mitigation of equal or greater environmental value. Mitigation shall include but may not be limited to the removal of landfilled hazardous materials, the remediation and treatment of abandoned mine drainage, or the establishment of quality wetlands. When such mitigation measures are proposed, the Borough shall review the proposed mitigation measures and shall make a recommendation on the relative value of the proposed mitigation to the Planning Commission and the Borough Council.
2. Green roof construction.
- (a) A developer and/or landowner that utilizes green roof construction in a building design may receive a buildable area increase equal to a maximum of forty (40) percent of the total surface area of the green roof.
 - (b) Green roof construction shall be in accordance to the standards defined by the United States Green Building Council's Leadership in Energy and Environmental Design (LEED) program or equivalent as standards may be modified in the future
 - (c) All green roofs shall be incorporated into the principal building of the lot.

§608. Cluster lot development

- A. Cluster lot development shall be permitted only within the boundaries of the Natural Resource Protection Overlay.
 - 1. No portion of any Cluster Lot Development shall be outside the boundary of the Natural Resource Protection Overlay.

2. If a lot is situated in such a manner that only a portion of that lot is within the Natural Resource Protection Overlay only that portion located within the Overlay may utilize Cluster Lot Development as described in this section.
 3. In no case may a lot contain more units than is prescribed by the base zoning district's maximum density regulations.
- B. Cluster lot development is voluntary and not required. However, if a developer/property owner does not wish to utilize the cluster development regulations, the net density for a land development contained within the boundaries of the Natural Resource Protection Overlay shall be calculated by multiplying the buildable area, as defined by the Natural Resource Protection Worksheet, by the permitted gross density stated within the applicable base zoning district regulations.
- C. Density Requirements.
1. Cluster lot developments shall utilize the development standards in Table 5 as to net density, minimum lot size, minimum lot frontage and minimum setbacks.

Table 5: Cluster Development

		R1	R2	R5
Proposed Cluster Development	Gross Density	1.2	2.2	SFR - 5.8 2 Fam - 4.4 Twnhs - 7.9 MF - 7.9
	Net Density	1.7	3	7.9
	Min. Lot Size	26,000	14,500	5,500
	Min. Lot Frontage	75	75	SFR - 60 2 Fam - 65 Twnhs - 25 MF - 80
	Setbacks (F/S/R)	30/10/40	20/10/20	20/5/15

D. Flag lots shall be permitted where necessary to provide ingress/egress access within a cluster development.

1. No more than two (2) flag lots shall be permitted per land development.

2. A flag lot shall meet minimum lot frontage requirements no further than one hundred (100) feet from the roadway in which it gains its access. The “pole” portion of a flag lot shall not be less than fifty (50) feet in width in order to provide adequate spacing for driveways.

3. The front setback requirement for flag lots shall be measured at the point where the lot meets the minimum lot frontage requirement

E. Cul-de-sacs shall be permitted to access cluster developments within the Natural Resource Protection Overlay boundaries. Roadways ending in a cul-de-sac shall be no longer than five hundred (500) feet in length.

F. The balance of the land not utilized for residential lots shall be reserved as common open space. Ownership of the common open space shall be determined prior to final application approval.

Appendix E: EPA Water Quality Scorecard

WATERQUALITY SCORECARD

Incorporating Green Infrastructure Practices at the Municipal, Neighborhood, and Site Scales

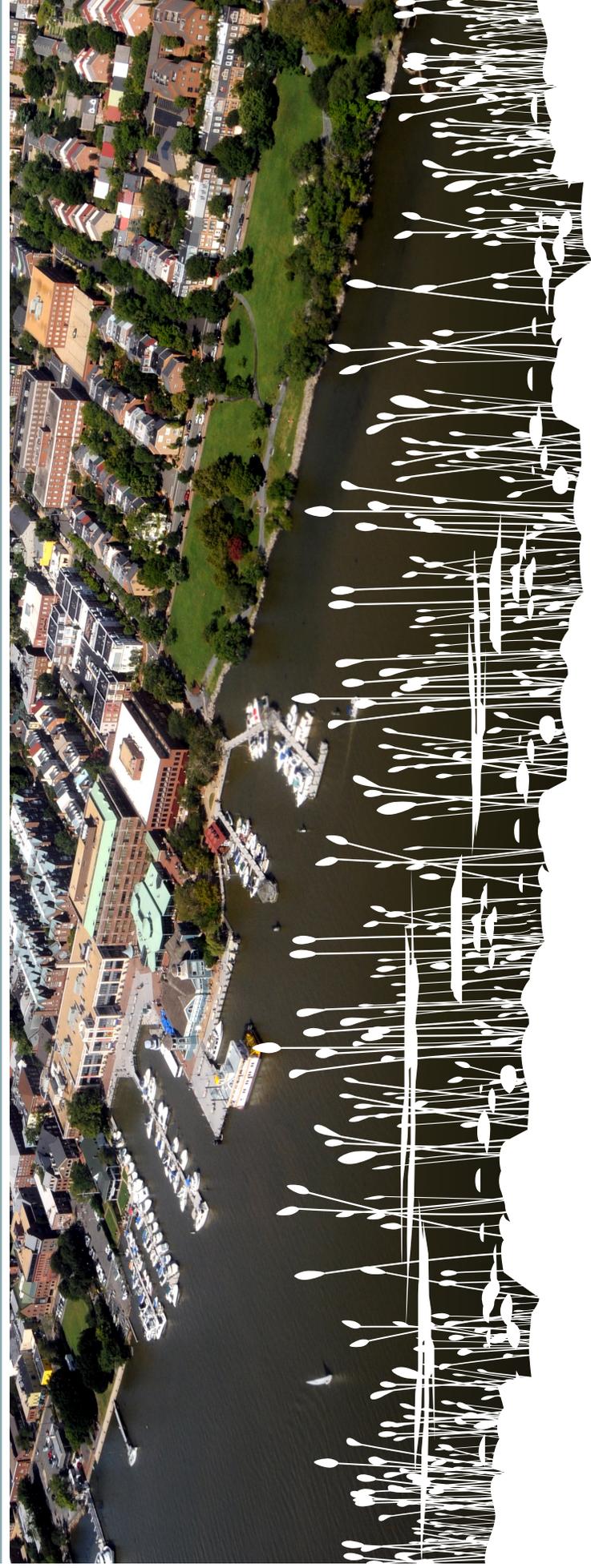


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1 EXECUTIVE SUMMARY

Many communities across the United States face the challenge of balancing water quality protection with the desire to accommodate new growth and development. These cities and counties are finding that a review of local ordinances beyond just stormwater regulations is necessary to remove barriers and ensure coordination across all development codes for better stormwater management and watershed protection. Local policies, such as landscaping and parking requirements or street design criteria, should complement strong stormwater standards and make it easier for developers to meet multiple requirements simultaneously.

EPA's Water Quality Scorecard was developed to help local governments identify opportunities to remove barriers, and revise and create codes, ordinances, and incentives for better water quality protection. It guides municipal staff through a review of relevant local codes and ordinances, across multiple municipal departments and at the three scales within the jurisdiction of a local government (municipality, neighborhood, and site),¹ to ensure that these codes work together to protect water quality goals. The two main goals of this tool are to: (1) help communities protect water quality by identifying ways to reduce the amount of stormwater flows in a community and (2) educate stakeholders on the wide range of policies and regulations that have water quality implications.

The scorecard is for municipalities of various sizes in rural, suburban, and urban settings, including those that have combined sewers, municipal separate storm sewers, and those with limited or no existing stormwater infrastructure. It can help municipal staff, stormwater managers, planners, and other stakeholders to understand better where a municipality's² land development regulations and other ordinances may present barriers or opportunities to implementing a comprehensive water quality protection approach. The scorecard provides policy options, resources, and case studies to help communities develop a comprehensive water quality program.

- ¹ While the watershed scale is the best scale at which to look regionally at water quality protection strategies, it can be difficult to align policies, incentives, and regulations across political boundaries. For purposes of implementation, the largest scale the scorecard uses is the municipality.
- ² The term "municipality" as used by the International City/County Management Association (ICMA) refers to local government at both the city and county levels.

2 BACKGROUND

Growth and development expand communities' opportunities by bringing in new residents, businesses, and investments. Growth can give a community the resources to revitalize a downtown, refurbish a main street, build new schools, and develop vibrant places to live, work, shop, and play. The environmental impacts of development, however, can make it more difficult for communities to protect their natural resources. The U.S. Census Bureau projects that the U.S. population will reach 400 million people by about 2040, which will add continued development pressure on local communities and the environment. Many communities are asking where and how they can accommodate this growth while maintaining and improving their water resources.

Land development directly affects watershed functions. When development occurs in previously undeveloped areas, the resulting alterations to the land can dramatically change the transportation and storage of water. Residential and commercial development creates impervious surfaces and compacted soils that filter less water, which increases surface runoff and decreases groundwater infiltration. These changes can increase the volume and velocity of runoff, the frequency and severity of flooding, and peak storm flows.



Mixed use developments, like main street in Cedar Falls, Iowa, allow for the co-locating of land uses, which decreases impervious surfaces and stormwater runoff problems.

Many communities are already struggling with degraded water bodies and failing infrastructure. For example, *EPA's National Water Quality Inventory: 1996 Report to Congress* indicated that 36 percent of total river miles assessed were impaired.³ In EPA's 2004 Report to Congress, that percentage increased to 44 percent.⁴ Further, a report by the National Academy of Sciences found urban stormwater is estimated to be the primary source of impairment for 13 percent of assessed rivers, 18 percent of lakes, and 32 percent of estuaries—significant numbers given that urban areas cover only 3 percent of the land mass of the United States.⁵

Urban runoff also affects existing wastewater and drinking water systems. EPA estimates that between 23,000 and 75,000 sanitary sewer overflows occur each year in the United States, releasing between 3 and 10 billion gallons of sewage annually.⁶ Many of these overflow problems stem from poor stormwater management. Many municipalities—both large and small—must address the impact of existing impervious areas, such as parking lots, buildings, and streets and roads, that have limited or no stormwater management while at the same time trying to find effective and appropriate solutions for new development.

These water quality impairments exist, in part, because historically stormwater management—and indeed stormwater regulation—has focused primarily at the site level. The reasoning was sound: manage stormwater well at the site, and water bodies in the community will be protected. However, as the findings of EPA's National Water Quality Inventory demonstrated, this strategy has not been effective for two main reasons.

First, the site-level approach does not take into account the amount of off-site impervious surfaces. During the development boom from 1995-2005, rain-absorbing landscapes, such as forests, wetlands, and meadows, were transformed into large areas of houses, roads, office buildings, and retail centers. This development created vast areas of impervious cover, which

generated significant increases in stormwater runoff. However, the amount of development in the watershed is not simply the sum of the sites within it. Rather, total impervious area in a watershed is the sum of sites developed plus the impervious surface of associated infrastructure supporting those sites, such as roads and parking lots.

Second, federal stormwater regulations focus on reducing pollutants in the runoff—the sediments from roads, fertilizers from lawns, etc.—and not on the amount of stormwater coming from a site. Nevertheless, the increased volume of runoff coming into a municipality's water bodies scours streams, dumps sediments, and pushes existing infrastructure past its capacity limits. Failure to consider the cumulative impact—this loss of natural land, increased imperviousness, and resulting stormwater runoff volumes—on regional water quality and watershed health has led communities to seek stormwater solutions that look beyond site-level approaches.

Communities are recognizing the importance of managing water quality impacts of development at a variety of scales, including the municipal, the neighborhood, and site levels. A range of planning and development strategies at the municipal and neighborhood scales is necessary to address stormwater management comprehensively and systematically. At the same time that stormwater management is moving beyond the site level, it is also evolving beyond hardscaped, engineered solutions, such as basins and curb-and-gutter conveyance, to an approach that manages stormwater through natural processes.

A green infrastructure approach provides a solution to thinking at all three scales as well as addresses the need to change the specific types of practices used on the site. Green infrastructure is a comprehensive approach to water quality protection defined by a range of natural and built systems that can occur at the regional, community, and site scales. At the larger regional or watershed scale, green infrastructure is the interconnected network of preserved or restored natural lands and waters that provide essential environmental functions. Large-scale green infrastructure may include habitat corridors and water resource protection. At the community and neighborhood scale, green infrastructure incorporates planning and design approaches such as compact, mixed-use development, parking reductions strategies and urban forestry that reduces impervious surfaces and creates walkable, attractive communities. At the site scale, green infrastructure mimics natural systems by absorbing stormwater back into the ground (infiltration), using trees and other natural vegetation to convert it to water vapor (evapotranspiration), and using rain barrels or cisterns to capture and reuse stormwater. These natural processes manage stormwater runoff in a way that maintains or restores the site's natural hydrology.

3 U.S. EPA National Water Quality Inventory: 1996 Report to Congress: <http://www.epa.gov/305b/96report/index.html>

4 U.S. EPA National Water Quality Inventory: 2004 Report to Congress: <http://www.epa.gov/owow/305b/2004report/>

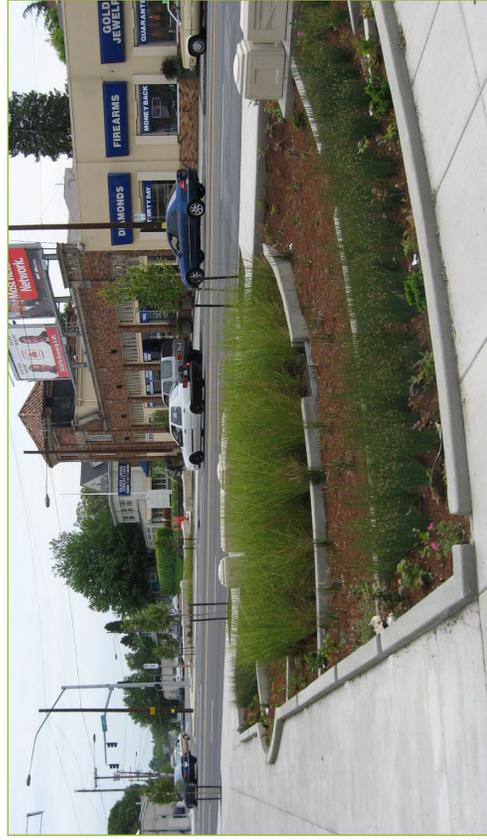
5 *Urban Stormwater Management in the United States*, National Research Council of the National Academy of Sciences, 2008: http://dels.nas.edu/dels/rpt_briefs/stormwater_discharge_final.pdf

6 U.S. EPA National Water Quality Inventory: 2004 Report to Congress: <http://www.epa.gov/owow/305b/2004report/>

At the municipal scale, decisions about where and how our towns, cities, and regions grow are the first, and perhaps most important, development decisions related to water quality. Preserving and restoring natural landscape features (such as forests, floodplains, and wetlands) are critical components of green infrastructure. By choosing not to develop on and thereby protecting these ecologically sensitive areas, communities can improve water quality while providing wildlife habitat and opportunities for outdoor recreation. In addition, using land more efficiently reduces and better manages stormwater runoff by reducing total impervious areas. Perhaps the single most effective strategy for efficient land use is redevelopment of already degraded sites, such as abandoned shopping centers or underused parking lots, rather than paving greenfield sites.

At the intermediate or neighborhood scale, green infrastructure includes planning and design approaches such as compact, mixed-use development, narrowing streets and roads, parking reduction strategies, and urban forestry that reduce impervious surfaces and better integrate the natural and the built environment.

At the site scale, green infrastructure practices include rain gardens, porous pavements, green roofs, infiltration planters, trees and tree boxes, and rainwater harvesting for non-potable uses such as toilet flushing and landscape irrigation.



Street retrofits can integrate green infrastructure, like this bioswale along Sandy Boulevard in Portland, Oregon, into standard roadway maintenance and upgrades.

These processes represent a new approach to stormwater management that is not only sustainable and environmentally friendly, but cost-effective as well.

Municipalities are realizing that green infrastructure can be a solution to the many and increasing water-related challenges facing municipalities, including flood control, combined sewer overflows, Clean Water Act requirements, and basic asset management of publicly owned treatment systems. Communities need new solutions and strategies to ensure that they can continue to grow while maintaining and improving their water resources. This Water Quality Scorecard seeks to provide the policy tools, resources, and case studies to both accommodate growth and protect water resources.

3 THE WATER QUALITY SCORECARD

EPA worked with numerous water quality experts, local government staff, developers, urban designers, and others working on land use and water quality issues to develop this Water Quality Scorecard. The purpose of the scorecard is to address water quality protection across multiple scales (municipality, neighborhood, and site) and across multiple municipal departments. This scorecard can help municipal staff, stormwater managers, planners, and other stakeholders to understand better where a municipality's land development regulations and other ordinances may present barriers or opportunities to implementing a comprehensive green infrastructure approach. The tool's two main goals are to: (1) help communities protect water quality by identifying ways to reduce the amount of stormwater flows in a community and (2) educate stakeholders on the wide range of policies and regulations that have water quality implications.

Communities throughout the U.S. are implementing stormwater regulations that require or encourage the use of green infrastructure for managing stormwater on site. These cities and counties are finding that, to better manage stormwater and protect watersheds, green infrastructure policies require a review of many other local ordinances to remove barriers and ensure coordination across all development codes. Local policies, such as landscaping and parking requirements or street design criteria, should complement strong stormwater standards and make it easier for developers to meet multiple requirements simultaneously. At the same time, if these policies support water quality goals, they can independently reduce and better manage stormwater runoff.

How to Use the Scorecard

This scorecard is a locally controlled self-assessment and guide for better incorporating green infrastructure practices at the municipal, neighborhood, and site scales. While one department or agency could complete the tool, the effectiveness of this tool will increase if an interagency process is established to review all local codes and policies that might affect water quality.

Completing the Water Quality Scorecard requires different documents, plans, codes, and guidance manuals. While the legal structure for stormwater management and land development regulation varies among municipalities, the following list contains the most common and relevant documents to complete this scorecard and describes how they can create impervious cover:

- *Zoning ordinances* specify the type and intensity of land uses allowed on a given parcel. A zoning ordinance can dictate single-use low-density zoning, which spreads development throughout the watershed, creating considerable excess impervious surface.
- *Subdivision codes* or ordinances specify development elements for a parcel: housing footprint minimums, distance from the house to the road, the width of the road, street configuration, open space requirements, and lot size—all of which can lead to excess impervious cover.
- *Street standards or road design guidelines* dictate the width of the road, turning radius, street connectivity, and intersection design requirements. Often in new subdivisions, roads tend to be too wide, which creates excess impervious cover.
- *Parking requirements* generally set the minimum, not the maximum, number of parking spaces required for retail and office parking. Setting minimums leads to parking lots designed for peak demand periods, such as the day after Thanksgiving, which can create acres of unused pavement during the rest of the year.
- *Setbacks* define the distance between a building and the right-of-way or lot line and can spread development out by leading to longer driveways and larger lots. Establishing maximum setback lines for residential and retail development will bring buildings closer to the street, reducing impervious cover associated with long driveways, walkways, and parking lots.

- *Height limitations* limit the number of floors in a building. Limiting height can spread development out if square footage is unmet by vertical density.
- *Open space or natural resource plans* detail land parcels that are or will be set aside for recreation, habitat corridors, or preservation. These plans help communities prioritize their conservation, parks, and recreation goals.
- *Comprehensive plans* may be required by state law, and many cities, towns, and counties prepare comprehensive plans to support zoning codes. Most comprehensive plans include elements addressing land use, open space, natural resource protection, transportation, economic development, and housing, all of which are important to watershed protection. Increasingly, local governments are defining existing green infrastructure and outlining opportunities to add new green infrastructure throughout the community.

An initial step in using this tool is to convene appropriate staff to review various sections of the tool and coordinate to both identify opportunities for change and address the potential inconsistencies between policies. The approaches described in this scorecard may be under the control of a number of different local government agencies, including:

- Parks and Recreation
- Public Works
- Planning
- Environmental Protection
- Utilities
- Transportation

The scorecard's review of land use and development policies provides guidance for implementing a range of regulatory and non-regulatory approaches, including land use planning elements, land acquisition efforts, and capital investment policies that can help various municipal agencies integrate green infrastructure into their programs. Internal agency policies and practices, such as maintenance protocols or plan review processes, may be potential barriers as well.

Each policy or approach is described in the context of its potential for providing water quality benefits, although most of the policies have many additional benefits for community livability, human health, air quality, energy use, wildlife habitat, and more. This tool does not provide model ordinance

language. It emphasizes best practices and helps municipalities understand the incremental steps for changing specific policies and internal agency practices. The scorecard divides the tools and policies into four categories:

1. Adopt plans/Educate
2. Remove barriers
3. Adopt incentives
4. Enact regulations

These four categories provide greater structure to the compiled tools by organizing the policies or approaches as incremental changes and updates. These categories may help municipal staff prioritize which tools to work on based on local factors like resources, time, and political support. For example, an appropriate first step in the process of updating local regulations may be to remove a barrier rather than enacting a new regulation. Most policy options avoid specific performance guidance so that the tool is useful to a range of municipalities in different contexts. However, the case studies and resources provide locally appropriate performance measures where possible.

To highlight the diverse nature of green infrastructure approaches, as well as the fact that oversight over these policies resides in various municipal agencies, the scorecard has five sections:

1. Protect Natural Resources (Including Trees) and Open Space
2. Promote Efficient, Compact Development Patterns and Infill
3. Design Complete, Smart Streets that Reduce Overall Imperviousness
4. Encourage Efficient Provision of Parking
5. Adopt Green Infrastructure Stormwater Management Provisions

The five sections organize green infrastructure approaches based on drivers of impervious cover at the municipal, neighborhood, and site scales. Yet all three scales may be in any single section. For example, the parking section will have questions that address the municipal, neighborhood and site level considerations.

The scorecard describes alternative policy or ordinance information that, when implemented, would support a comprehensive green infrastructure approach, and will allow the municipality to determine where, in the broad spectrum of policy implementation, their policies fall.

A Note about the Point System

The tool includes a point system to make it easier to evaluate and improve local programs. The municipality can decide whether to use the point system at all. If the point system is used, municipalities can set locally appropriate thresholds and goals.

Governments could choose to use the point system in many different ways, including:

- State governments could require municipalities to complete the Water Quality Scorecard and establish measures for improvement over different permit cycles. For example, a municipality might have to improve its score by some number of points before the next permit cycle.
- Local governments could determine a score based on existing programs and policies and then set goals from this baseline. Local targets may include incremental yearly improvements or achieving additional points in a particular section, such as “Encourage Efficient Parking Supply” or “Protect Natural Resources and Open Space.”
- Stakeholders such as watershed groups or environmental organizations could complete the scorecard and then provide feedback and information assistance to the local government about sections within the scorecard that received few points and might be an area for improvement.
- The total score or scores in certain sections could educate elected officials, decision makers, and others about the importance of these issues and the role of local policies in addressing them.
- A lack of points in one section may alert a municipality that a certain area, such as parking, lacks local ordinances that support green infrastructure and may be ripe for improvement.
- Variation in the number of points achieved across the five sections may help a municipality to better assess local sources of impervious cover and potential for the introduction of green infrastructure.

Because the scorecard is intended for use by a range of community types and sizes in locations throughout the U.S., please note that no single municipality will be able to receive every point. Some questions and points may only be

available to urban municipalities while others may only be available to those in a suburban or rural setting.

Tips for Building Relationships Between Stormwater Managers, Land Use Planners, and Other Local Officials

Effective stormwater management requires coordination and collaboration across many different municipal departments and processes. Below are some ideas for incorporating stormwater management in traditional planning processes and programs.

- Include both land use planners and stormwater managers in pre-concept and/or pre-application meetings for potential development projects.
- Use local government sites (e.g., schools, regional parks, office buildings, public works yards) as demonstration projects for innovative land use strategies and stormwater management. Form a team that includes land use planners, stormwater managers, parks and school officials, etc. to work out the details.
- Include stormwater managers in the comprehensive plan process to incorporate overall watershed and stormwater goals.
- Make sure that both land use planners and stormwater managers are involved in utility and transportation master planning.
- Allow stormwater managers to be involved in economic development planning, especially for enterprise zones, Main Street projects, and other projects that involve infill and redevelopment. Encourage stormwater managers to develop efficient watershed-based solutions for these plans.
- Develop cross training and joint activities that allow land use planners, stormwater managers, and transportation, utility, and capital projects planners to explore the improved integration of various land use and stormwater processes.
- Hold staff trainings with speakers that are knowledgeable about smart growth and stormwater management. Alternately, encourage land use planners, stormwater managers, and other local officials to attend trainings on this topic as a team.



A green roof located on the Friends Center in downtown Philadelphia, Pennsylvania provides stormwater management capacity and adds aesthetic value to this dense urban environment.

Table 1: Water Quality Scorecard Quick Reference Guide

Incorporating Green Infrastructure Practices at the Municipal, Neighborhood, and Site Scales (SUMMARY)

Policy Question	Goal
PROTECT NATURAL RESOURCES (INCLUDING TREES) AND OPEN SPACE	
1A. NATURAL RESOURCE PROTECTION	
Are development policies, regulations, and incentives in place to protect natural resource areas and critical habitat?	Protect natural resource areas (e.g., forests, prairies) and critical habitat (e.g., conservation corridors, buffer zones, wildlife preserves) from future development.
Are no-development buffer zones and other protective tools in place around wetlands, riparian areas, and floodplains to improve/protect water quality?	Protect critical areas such as wetlands, floodplains, lakes, rivers, and estuaries with a mandatory no-development buffer.
Does the community have protection measures for source water protection areas through land use controls and stewardship activities?	Protect source water areas from current or potential sources of contamination.
1B. OPEN SPACE PROTECTION	
Does the jurisdiction have adequate open space in both developed and greenfield areas of the community?	Create open networks throughout a community that serve a dual function of providing recreational areas and assisting in management of stormwater runoff.
1C. TREE PRESERVATION	
Does the local government have a comprehensive public urban forestry program?	Protect and maintain trees on public property and rights-of-way and plant additional trees to enhance the urban tree canopy.
Has the community taken steps to protect trees on private property?	Preserve trees on private property and require replacement when trees are removed or damaged during development.
Do local codes encourage or require street trees as part of road and public right-of-way capital improvement projects?	Leverage existing capital funds to plant more street trees and add multiple benefits to the public right-of-way.
PROMOTE EFFICIENT, COMPACT DEVELOPMENT PATTERNS AND INFILL	
2A. INFILL AND REDEVELOPMENT	
Are policy incentives in place to direct development to previously developed areas?	Municipalities implement a range of policies and tools to direct development to specific areas.
2B. DEVELOPMENT IN AREAS WITH EXISTING INFRASTRUCTURE	
Is the jurisdiction directing growth to areas with existing infrastructure, such as sewer, water, and roads?	Adopt policies, incentives, and regulations to direct new development to areas that have infrastructure, such as water and sewer.
2C. MIXED-USE DEVELOPMENT	
Are mixed-use and transit-oriented developments allowed or encouraged?	Revise codes and ordinances to allow for the “by right” building of mixed-use and transit-oriented developments.

Incorporating Green Infrastructure Practices at the Municipal, Neighborhood, and Site Scales (SUMMARY) continued

Policy Question	Goal
DESIGN COMPLETE, SMART STREETS THAT REDUCE OVERALL IMPERVIOUSNESS	
3A. STREET DESIGN	
Do local street design standards and engineering practices encourage streets to be no wider than is necessary to move traffic effectively? Do policies allow narrow neighborhood streets designed to slow traffic and create safer conditions for pedestrians and bicyclists?	Appropriate street widths allow narrower lanes for certain street types, thereby reducing overall imperviousness.
Are shared driveways, reduced driveway widths, two-track driveways, and rear garages and alleys encouraged for all single-family developments?	Encourage alternative forms and decreased dimensions of residential driveways and parking areas.
3B. GREEN INFRASTRUCTURE ELEMENTS AND STREET DESIGN	
Are major street projects required to integrate green infrastructure practices as a standard part of construction, maintenance, and improvement plans?	Formally integrate green infrastructure into standard roadway construction and retrofit practice.
Do regulations and policies promote use of pervious materials for all paving areas, including alleys, streets, sidewalks, crosswalks, driveways, and parking lots?	Build and retrofit these surfaces with pervious materials to reduce stormwater runoff and its negative impacts.
ENCOURAGE EFFICIENT PROVISION OF PARKING	
4A. REDUCED PARKING REQUIREMENTS	
Does your local government provide flexibility regarding alternative parking requirements (e.g., shared parking, off-site parking) and discourage over-parking of developments? Do parking requirements vary by zone to reflect places where more trips are on foot or by transit?	Match parking requirements to the level of demand and allow flexible arrangements to meet parking standards.
4B. TRANSPORTATION DEMAND MANAGEMENT ALTERNATIVES	
Does the municipality allow developers to use alternative measures such as transportation demand management or in-lieu payments to reduce required parking?	Provide flexibility to reduce parking in exchange for specific actions that reduce parking demands on site.
4C. MINIMIZING STORMWATER FROM PARKING LOTS	
Are there requirements for landscaping designed to minimize stormwater in parking lots?	Require substantial landscaping to help reduce runoff.
ADOPT GREEN INFRASTRUCTURE STORMWATER MANAGEMENT PROVISIONS	
5A. GREEN INFRASTRUCTURE PRACTICES	
Are green infrastructure practices encouraged as legal and preferred for managing stormwater runoff?	Make all types of green infrastructure allowed and legal and remove all impediments to using green infrastructure (including for stormwater requirements), such as limits on infiltration in rights-of-way, permit challenges for green roofs, safety issues with permeable pavements, restrictions on the use of cisterns and rain barrels, and other such unnecessary barriers.
Do stormwater management plan reviews take place early in the development review process?	Incorporate stormwater plan comments and review into the early stages of development review/site plan review and approval, preferably at pre-application meetings with developers.

Incorporating Green Infrastructure Practices at the Municipal, Neighborhood, and Site Scales (SUMMARY) continued

Policy Question	Goal
Do local building and plumbing codes allow harvested rainwater use for exterior uses such as irrigation and non-potable interior uses such as toilet flushing?	Ensure that the municipality allows and encourages stormwater reuse for non-potable uses.
Are provisions available to meet stormwater requirements in other ways, such as off-site management within the same watershed or “payment in lieu” of programs, to the extent that on-site alternatives are not technically feasible?	Allow off-site management of runoff while still holding developers responsible for meeting stormwater management goals.
5B. MAINTENANCE/ENFORCEMENT	
Does your stormwater ordinance include monitoring, tracking, and maintenance requirements for stormwater management practices?	Incorporate monitoring, tracking, and maintenance requirements for stormwater management practices into your municipal stormwater ordinance.

GETTING STARTED



Below are suggested steps to help complete the Water Quality Scorecard:

Step 1. Review the scorecard to identify which agencies, departments, or personnel will be required to complete each section.

Step 2. Convene appropriate staff to review various sections of the tool, and work together to ensure that updates and changes to codes, policies, and internal processes align well with other agency changes.

Step 3. Collect existing ordinances and policies that will be necessary references to complete the scorecard.

Step 4. Coordinate between appropriate agencies or departments to complete the scorecard.

Please indicate by your signature that you have reviewed the tool with all co-signees of this document (name, department, and date):

Step 5: Identify sections of the scorecard and/or specific policy questions that should be prioritized for immediate revision or update.

Step 6: Identify short-, medium-, and long-term goals and strategies for revising local policies to better support green infrastructure.

1 PROTECT NATURAL RESOURCES (INCLUDING TREES) AND OPEN SPACE

Sensitive Natural Lands/Critical Area Protection

QUESTION: Are development policies, regulations, and incentives in place to protect natural resource areas and critical habitat?

GOAL: Protect natural resource areas (e.g., forests, prairies) and critical habitat (e.g., conservation corridors, buffer zones, wildlife preserves) from future development.

WHY: Protection of significant tracts of critical lands and wildlife habitat will aid in protecting and improving water quality by increasing infiltration and groundwater recharge, preventing erosion and contamination of ground water and surface water resources, and protecting sources of drinking water.

Implementation Tools and Policies		Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:				
Identify and map critical natural resource areas (e.g., steep slopes, wildlife habitat, forests, drinking water source areas).	1			
The local comprehensive plan contains a natural resource protection element with goals calling for preservation of identified critical natural resource areas.	1			
Identify key natural resource areas for protection in jurisdiction's parks and open space plan.	1			
Assist landowners in identifying sensitive natural areas and laying out developments to avoid such areas.	1			
Local plans establish and enforce areas which are available for development and which lands are a priority for preservation.	1			
REMOVE BARRIERS:				
Protection of sensitive natural areas and wildlife habitat qualifies for credit towards local open space dedication and set-aside requirements.	1			
ADOPT INCENTIVES:				
Provide financial support to or collaborate with land trusts to acquire critical natural areas.	1			
Establish a dedicated source of funding for open space acquisition and management (e.g., bond proceeds, sales tax).	2			
Adopt a transferable developments rights program to provide an incentive for landowners to preserve sensitive natural lands and wildlife habitat.	1			
PAGE TOTAL				

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Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
Land use regulations provide for the creation of cluster and conservation subdivision on the periphery of urban growth areas to encourage preservation of intact blocks of sensitive natural areas.	1		
ENACT REGULATIONS:			
Adopt regulations to protect steep slope, hillsides, and other sensitive natural lands (e.g., by limiting development on slopes > 30% or requiring larger lot sizes in sensitive areas).	2		
Adopt wildlife habitat protection regulations aimed at preserving large contiguous blocks of habitat areas.	2		
Create agriculture/natural resource zoning districts (e.g., minimum lot size of 80 acres and larger) to preserve agricultural areas and forests.	2		
PAGE TOTAL			SUBTOTAL FROM PREVIOUS PAGE ▼ CARRY THIS SUBTOTAL TO NEXT PAGE _____ + _____ = _____

1.A.2a Protection Of Water Bodies/Aquifers

QUESTION: Are no-development buffer zones and other protective tools in place around wetlands, riparian areas, and floodplains that improve/protect water quality?

GOAL: Protect critical areas such as wetlands, floodplains, lakes, rivers, and estuaries with a mandatory no-development buffer.

WHY: The use of these practices will reduce pollutant loads and hydrologic alterations to water bodies.

Implementation Tools and Policies		Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:				
Identify and map critical water resource areas.		1		
The local comprehensive plan contains a water quality protection element with goals calling for protection of identified water bodies and other water resource areas such as wetlands.		1		
Identify key critical water resource areas for protection in jurisdiction's parks and open space plan.		1		
Cooperate in developing regional approaches to watershed protection and stormwater management.		1		
REMOVE BARRIERS:				
Wetlands and other water bodies and buffer areas qualify for credit against local open space dedication/set-aside regulations.		1		
ADOPT INCENTIVES:				
Protected water bodies and buffer areas qualify for twice the credit (or more) against open space requirements set by the municipality.		1		
Restoration of degraded riparian/wetland areas qualifies for additional open space credit within the local municipal system.		1		
Transfer of density from protected riparian areas/buffers to upland portions of development sites.		1		
ENACT REGULATIONS:				
Riparian and wetland buffer areas required by local land use regulations		1 to 3		
· Buffer is at least 50 feet (as measured from the top of bank) = 1 point				
· Buffer is at least 100 feet (as measured from the top of bank) = 2 points				
· Buffer is greater than 100 feet (as measured from the top of bank) = 3 points				
Critical water resource areas cannot be counted in calculating allowable density on a site (e.g., on a 200-acre site with 50 acres of wetlands, only 150 acres can be used to calculate density under zone district regulations, and only those 150 acres may be developed).		1		
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Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
Development in floodplains is prohibited or must demonstrate no adverse impacts upstream and downstream (See resources below for details on "no adverse impact" approach to floodplain management).	2		
Stormwater quality and quantity performance standards exist for development sites (e.g., restrictions on sedimentation levels, pre/post development flows).	1		
Local regulations require restoration of degraded riparian/wetland areas on a development site.	1		
Compensation for damage to riparian/wetland areas must be on a minimum 2:1 basis on- or off-site.	1		
Performance standards exist and are well enforced for stormwater discharges to wetlands that protect the hydrologic regimes and limit pollutant loads.	1		
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1.A.2b Protection Of Water Bodies/Aquifers

QUESTION: Does the community have protection measures for source water protection areas through land use controls and stewardship activities?

GOAL: Protect source water areas from current or potential sources of contamination.

WHY: These practices will help safeguard community health, reduce the risk of water supply contamination, and potentially reduce water treatment costs.

Implementation Tools and Policies

Pts. Avail. Rec. or N/A

Notes and Local References

ADOPT PLANS/EDUCATE:

Local land use plans identify aquifer recharge/source water areas and recommend protective measures.	1	
Require that all stormwater inlets carry a notice regarding discharge to receiving waters.	1	
Map and publish wellhead and aquifer recharge areas to alert developers to potential restrictions.	1	

ADOPT INCENTIVES:

Identification of drinking water source protection and aquifer recharge areas with a dedicated funding source in place to purchase and protect such areas.	1	
Protection of critical water source areas qualifies for additional credit towards local open space requirements.	1	

ENACT REGULATIONS:

Adopt well-head protection regulations/zones to prevent incompatible development and uses.	1	
Adopt aquifer protection regulations/zones to prevent incompatible development and uses.	2	

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1.B OPEN SPACE PROTECTION

1.B.1

QUESTION: Does the jurisdiction have adequate open space in both developed and greenfield areas of the community?

GOAL: Create open space networks throughout a community that serve a dual function of providing recreational areas and assisting in the management of stormwater runoff.

WHY: In addition to providing open space throughout a community as an amenity, such a network can provide large areas that contribute little to stormwater loads and can provide large areas for the infiltration and purification of stormwater.

Implementation Tools and Policies		Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:				
Adopt a community-wide open space and parks plan.	1			
The local comprehensive plan contains an open space/parks element that recognizes the role of open space in sustainable stormwater management.	1			
REMOVE BARRIERS:				
Green infrastructure practices count towards local open space set aside requirements up to 50% of total.	1			
Allow and encourage retrofits of abandoned or underutilized public lands to serve as permanent or temporary open space and green infrastructure sites.	1			
ADOPT INCENTIVES:				
Additional open space credits are eligible for green stormwater management facilities improved/designed for public recreational purposes.	1			
Provide credit against open space impact fees for green roofs.	1			
ENACT REGULATIONS:				
Adopt neighborhood policies and ordinances that work to create neighborhood—not development site—open space amenities that are within ¼ to ½ mile walking distance from every residence.	1			
Adopt an open space impact fee to purchase passive open space that can assist in stormwater management.	1			
Adopt open space dedication and/or set aside requirements based on the demand generated by the development. As a baseline, use the average open space requirements adopted by the National Recreation and Park Assn. (e.g., 10 acres of community and neighborhood parks for every 1,000 persons in a development or fraction thereof).	1			
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1.C TREE PROTECTION

1.C.1

QUESTION: Does the local government have a comprehensive public urban forestry program?

GOAL: Protect and maintain trees on public property and rights-of-way and plant additional trees to enhance the urban tree canopy.

WHY: Mature trees provide multiple community benefits, reduce overall stormwater runoff, and improve stormwater quality.

Implementation Tools and Policies		Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:				
Survey and inventory existing trees on public lands and street rights-of-way. Document the characteristics and location of street trees and urban tree canopy to inform public tree planting, adoption, and maintenance programs.	1			
Select tree species based on known performance for managing stormwater runoff. Publish list and make widely available for homeowners/others that plant street trees.	1			
Conduct education and outreach about tree protection, proper maintenance, and replanting opportunities through printed materials, workshops, events, and signage.	1			
Adopt a policy to protect existing trees on local government development sites (e.g., municipal parking lots, municipal buildings).	1			
Maintain an active tree maintenance program for public trees, including pest control, pruning, watering, and similar measures.	1			
REMOVE BARRIERS:				
Acknowledge trees as part of community infrastructure and develop a coordinated design for locating public utilities to provide enough space for mature tree canopy and root development.	1			
ADOPT INCENTIVES:				
Provide free or reduced-price trees to homeowners to be used as street trees.	1			
ENACT REGULATIONS:				
Require any public trees removed or damaged during construction associated with private development to be replaced on- or off-site with an equivalent amount of tree caliper (e.g., remove a 24-inch diameter tree/replace with 6 four-inch diameter trees).	1			
Adopt construction protection rules for all public trees (e.g., fencing, no storage of hazardous materials, avoid cutting into root zones).	1			
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QUESTION:	Has the community taken steps to protect trees on private property?		
GOAL:	Preserve trees on private property and require replacement when trees are removed or damaged during development.		
WHY:	Mature trees provide multiple environmental, economic, and community benefits, including improved water and air quality, reduced heat island effects, lowered energy costs, and improved community aesthetics.		

Implementation Tools and Policies		Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:				
Community plans specifically include tree preservation and replacement as community goals.		1		
Conduct educational sessions for builders and developers regarding appropriate tree protection techniques and/or publish a technical tree protection manual.		1		
Follow maintenance and inspection timelines and meet canopy goals and milestones by ensuring old trees survive, replacing dead or diseased trees, and planting new trees.		1		
REMOVE BARRIERS:				
Set up maintenance and inspection agreements for private properties meeting stormwater requirements or receiving stormwater fee credit for trees.		1		
Set up long-term maintenance and inspection schedules for trees on public lands.		1		
ADOPT INCENTIVES:				
Support local non-profits that plant trees and provide educational services.		1		
Provide financial incentives for tree purchases and planting.		1		
A tree fund has been established to receive in-lieu payments when trees must be removed from a development site to accommodate permitted projects.		1		
Trees of a specified minimum size count towards a percentage of stormwater management requirements (e.g., partial credit given for each mature tree exceeding a specified height or canopy size).		1		
Trees over a specified minimum size (e.g., 3-inch caliper) protected during development are credited towards landscaping requirements. <ul style="list-style-type: none"> · meeting the established landscape requirement = 1 point · exceeding the established landscape requirement = 2 points 		1 to 2		

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Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ENACT REGULATIONS:			
Require permits before removing trees on proposed development or redevelopment sites. Provide fines and/or stop-work authority for permit violations.	1		
Set minimum tree preservation standards for new development sites.	1		
Require site plans or stormwater plans to include tree preservation.	1		
Require/allow tree replacement off-site for infill sites.	1		

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1.C.3

QUESTION: Are street trees encouraged or required as part of road and public right-of-way capital improvement projects?

GOAL: Leverage existing capital funds to plant more street trees and add multiple benefits to the public right-of-way.

WHY: Street trees can help manage and reduce stormwater runoff while providing multiple public and environmental benefits.

Implementation Tools and Policies		Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:				
Local comprehensive and transportation plans support the planting of street trees by all private and public development projects.	1			
Capital improvement plans include tree planning as part of project budgets.	1			
ADOPT INCENTIVES:				
Offer incentives, such as reduced setbacks or increased building densities, in exchange for additional tree preservation beyond ordinance requirements.	1			
ENACT REGULATIONS:				
All private and public developments are required to plant street trees in accordance with size, spacing, and other local government requirements.	1			
New street designs and redesigns of existing streets take into account space for tree development and require necessary surface area and volume of soil dependent on type of tree species selected (this includes lateral root growth as well as direct downward growth to accommodate mature tree canopy and roots without adversely affecting other utilities).	1			
Street specifications require permeable paving for sidewalks and other surfaces to reduce stormwater runoff and allow street trees to benefit from the available water.	1			

▼ Total score for SECTION 1: PROTECT NATURAL RESOURCES (INCLUDING TREES) AND OPEN SPACE

SUBTOTAL FROM PREVIOUS PAGE + PAGE TOTAL = (TOTAL POINTS AVAILABLE: 82)

This section has been reviewed and scored by _____

Department name _____

Signee _____

Resources

- Planner's Guide to Wetland Buffers for Local Governments, Environmental Law Institute: http://www.elistore.org/reports_detail.asp?ID=11272
- Mertes, James D. and James R. Hall. Park, Recreation, Open Space and Greenway Guidelines. National Recreation and Park Association, 1996.
- Center for Watershed Protection guidance on aquatic buffers: http://www.cwp.org/Resource_Library/Restoration_and_Watershed_Stewardship/perviousarea.htm
- "Protecting Stream and River Corridors: Creating Effective Local Riparian Buffer Ordinances," Carl Vinson Institute of Government, The University of Georgia: http://www.rivercenter.uga.edu/publications/pdf/riparian_buffer_guidebook.pdf
- No Adverse Impact Floodplain Management, Association of State Floodplain Managers: <http://www.floods.org/index.asp?menuID=349&firslevelmenuID=187&siteID=1>
- Riparian Toolbox: Model Regulations and Legal Issues, Long Island Sound Study: <http://www.longislandsoundstudy.net/riparian/legal.htm>
- Model Ordinances to Protect Local Resources: Aquatic Buffers, U.S. EPA: <http://www.epa.gov/owow/nps/ordinance/osm1.htm>
- Duerksen, Christopher and Cara Snyder. Nature-Friendly Communities: Habitat Protection and Land Use Planning. Island Press, 2005.
- City Trees: Sustainability Guidelines and Best Practices: <http://www.treetrust.org/pdf/community-forestry-city-trees-bonestroo.pdf>
- Guide to Setting Urban Tree Canopy Goals, American Forests: <http://www.americanforests.org/resources/urbanforests/treedeficit.php>
- Urban Forestry Manual, Center for Watershed Protection: <http://www.cwp.org/forestry/part3forestrymanual.pdf> (pg. 69)
- Duerksen, Christopher and Suzanne Richman, "Tree Conservation Ordinances." American Planning Association. 1993: Planning Advisory Service Report No. 446.
- Duerksen, Christopher , Mowery, M. and McGlynn M. "Tree Preservation." Zoning Practice. July 2006: American Planning Association, Volume 23 Number 7.
- "Trees for green streets: An illustrated guide," Portland Metro: <http://www.metro-region.org/index.cfm/go/by.web/id=26337>

- *Tree Preservation Information Guide, Portland, Oregon:* <http://www.sustainableportland.org/shared/cfm/image.cfm?id=72545>
- Storm Water Pollution Prevention Plan (SWPPP) Guide, U.S. EPA: <http://cfpub.epa.gov/npdes/stormwater/swppp.cfm>
- Center for Urban Forest Research, U.S. Forest Service: <http://www.fs.fed.us/psw/programs/cuf/>
- Urban Forest Policy and Management, U.S. Forest Service: <http://www.fs.fed.us/psw/programs/cuf/research/studies.php?TopicID=1>
- Plants for Stormwater Design Volume II, Great River Greening: <http://www.greatrivergreening.org/downloads/PSD%20II%20Sample.PDF>

Case Studies

- Alachua County, Florida's land conservation and acquisition program, *Alachua County Forever*; has conserved over 17,000 acres of environmentally sensitive land: <http://www.alachuacounty.us/government/depts/epd/land/files/forms.aspx>
- Baltimore County, Maryland's Master Plan 2010 designates land management areas that include agricultural preservation areas and resource preservation areas: <http://www.baltimorecountymd.gov/Agencies/planning/masterplanning/smartgrowth.html>
- King County, Washington's Greenprint Project is an open space and resource conservation strategy that focuses on land acquisition, restoration projects, regulatory changes and protection within the urban growth boundary: <http://dnr.metrokc.gov/wlr/greenprint/about.htm>
- The Pennsylvania Horticultural Society's *Philadelphia Green* program revitalizes and maintains abandoned land and public spaces by partnering with government, businesses and the community: <http://www.pennsylvaniahorticulturalsociety.org/phlgreen/about.html>
- Chicago, Illinois's Open Space Impact Fee Ordinance charges a fee associated with residential development building permits and spends the funds on acquisition of neighborhood open space in the same area where development occurs: http://egov.cityofchicago.org/city/webportal/portalContentItemAction.do?blockName=Buildings&topChannelName=ainCategoryOID=-536901233&entityName=Buildings&contentChannelName=Dept&contentOID=536988877&contentType=COC_EDITORIAL
- Lenexa, Kansas's Watershed Management Plan includes erosion and sediment control, stream buffers, subwatershed protection and

- improvement, and design standards for the city's uniform development code: <https://www.ci.lenexa.ks.us/Planning/complan/Overview/>
- The Maryland Cooperative Extension Service provides a fact sheet on how to design, plant and maintain a riparian forest buffer: <http://www.riparianbuffers.umd.edu/fact/FS725.html>
 - Vermont's Department of Environmental Conservation offers grants to conservation organizations to purchase or receive donated river corridor easements on private property within priority stretches of river: http://www.anr.state.vt.us/dec/waterq/rivers/docs/rv_RiverCorridorEasementGuide.pdf
 - The U.S. Department of Agriculture's Natural Resources Conservation Service provides guidance on riparian buffers through the Ohio Lake Erie Buffer Program: http://www.oh.nrcs.usda.gov/programs/Lake_Erie_Buffer/riparian.html
 - Davidson, North Carolina requires a public park within a five minute walk of all housing units, providing multifunctional neighborhood open space: <http://www.ci.davidson.nc.us/index.aspx?NID=576>
 - San Jose, California gives post-construction stormwater treatment credit for new and existing trees in close proximity to impervious areas: http://www.sanjoseca.gov/planning/stormwater/Policy_6-29_Memo_Revisions.pdf
 - Portland, Oregon gives a stormwater fee discount for trees over 15 feet tall: <http://www.portlandonline.com/bes/index.cfm?c=43444&#types>
 - Portland, Oregon also gives a tree credit for meeting local stormwater requirements: <http://www.portlandonline.com/shared/cfm/image.cfm?id=93075>
 - Portland, Oregon Parks and Recreation and Bureau of Development Services regulate tree cutting on private property and public property: <http://www.portlandonline.com/parks/index.cfm?c=39712>
 - New York City requires street tree planting for a range of developments and zoning increases: http://www.nyc.gov/html/dcp/html/street_tree_planting/index.shtml
 - Charlottesville, North Carolina has set goals for achieving a 40% minimum urban tree canopy: <http://www.charlottesville.org/Index.aspx?page=1745> (Chapter 8, pgs. 184-187)

2 PROMOTE EFFICIENT, COMPACT DEVELOPMENT PATTERNS AND INFILL

2.A SUPPORT INFILL AND REDEVELOPMENT

2.A.1	<p>QUESTION: Are policy incentives in place to direct development to previously developed areas?</p> <p>GOAL: Municipalities implement a range of policies and tools to direct development to specific areas.</p> <p>WHY: Municipalities can realize a significant reduction in regional runoff if they take advantage of underused properties, such as infill, brownfield, or greyfield sites. Redeveloping already degraded sites such as abandoned shopping centers or underutilized parking lots rather than paving greenfield sites for new development can dramatically reduce total impervious area while allowing communities to experience the benefits and opportunities associated with growth.</p>	
<p style="text-align: center;">Implementation Tools and Policies</p> <p style="text-align: center;">Pts. Avail. Pts. Rec. or N/A Notes and Local References</p>		
<p>ADOPT PLANS/EDUCATE:</p>		
	Local plans identify potential brownfield and greyfield sites, and support their redevelopment.	1
	Capital improvement plans include infrastructure improvements (water, sewer, road, sidewalk, etc. upgrades) for identified brownfield and greyfield sites.	1
	Educate lending and financial institutions about benefits and local priorities of directing development to existing areas.	1
	Conduct outreach to the community to ensure support for local forms and patterns of development.	1
<p>REMOVE BARRIERS:</p>		
	Establish a brownfields program to remove uncertainty regarding cleanup and liability issues.	1
<p>ADOPT INCENTIVES:</p>		
	Provide incentives such as density bonuses and accelerated permitting for brownfield and greyfield sites.	1
	Adopt funding mechanisms for remediating/redeveloping brownfield and greyfield sites.	1
	Streamline permitting procedures to facilitate infill and brownfield redevelopment plan review.	1
	Establish tax increment financing (TIF) districts to encourage redevelopment.	1
<p>ENACT REGULATIONS:</p>		
	In local codes, ordinances, and policies, the municipality differentiates between greenfield and infill development.	1
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2.B.1

QUESTION: Does the municipality direct growth to areas with existing infrastructure, such as sewer, water, and roads?

GOAL: Adopt policies, incentives, and regulations to direct new development to areas that have infrastructure, such as water and sewer. However, in situations where development is in areas with no sewer infrastructure, permitting alternative treatment options that can allow for higher density development or clustering of houses will reduce the overall water quality impact.

WHY: Sewer and water authorities can play a major role in directing a region's growth by determining when and where new infrastructure investment will occur. Well-drafted facility planning areas can direct growth by providing sewer service in areas least likely to impact water resources.

ADOPT PLANS/EDUCATE:		Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
Local plans recommend/establish urban growth areas and urban growth boundaries. Development is encouraged within urban growth boundaries and discouraged outside of them.	1			
Analyze which areas within the jurisdiction are appropriate for higher density development based on existing infrastructure capacity, cost of providing new services, and access.	2			
Capital improvement plans for public infrastructure (roads, water, sewer, etc.) target funding inside urban growth boundary.	2			
Local sewer/water authority capital improvement plans follow development policies established in local comprehensive plans and target areas with existing development/infrastructure.	1			
REMOVE BARRIERS:				
Development standards addressing landscaping, buffering, parking, and open space are tailored for infill areas to avoid creating unnecessary hurdles to development (e.g., imposing suburban parking requirements in high-density infill areas).	2			
Remove prohibitions on accessory dwelling units in infill areas to increase density of development.	2			
Off-site, regional water retention/detention encouraged/allowed to avoid costly on-site retention in densely developed infill areas and to provide benefit to priority retrofit sites, such as schools.	2			
Package plants and other wastewater treatment trains are encouraged for development in limited circumstance areas where growth is appropriate but sewers/treatment capacity does not exist.	1			
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Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
Technical information and analysis on the effectiveness of various treatment systems are readily available to developers. Local governments have determined which systems work best for their soil conditions and topography and have made this information available to the development community.	1		
Allow a wide variety of housing types and sizes within infill areas and reduced minimum lot sizes.	1		
ADOPT INCENTIVES:			
Increase development densities and allowable height in infill areas.	1		
Reduce impact fees for infill development based on less demand for new infrastructure.	1		
Create development incentives for green roofs (e.g., increased floor area ratio [FAR] bonus, additional building height).	1		
Include provision in stormwater management requirement that reduces on-site management requirements for projects that decrease total imperviousness on previously developed sites.	1		
ENACT REGULATIONS:			
Zoning and land development regulations implement urban service areas/urban growth boundary policies by restricting development in outlying areas.	1		
Adopt adequate public facility and concurrency ordinances that require adequate public infrastructure to be available when development comes on line (e.g., water, sewer, roads).	1		
Adopt large-lot/agricultural zoning (e.g., 1 unit/160 acres) on fringe of city to restrict inappropriate greenfield development.	1		
Enact transitional compatibility standards to ensure that new denser infill development is compatible with existing neighborhoods/adjacent development.	1		

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2.C ENCOURAGE MIXED-USE DEVELOPMENTS

2.C.1

QUESTION: Are mixed-use and transit-oriented developments allowed or encouraged?

GOAL: Revise codes and ordinances to allow for the “by right” building of mixed-use and transit-oriented developments.

WHY: Mixed-use developments allow for the co-locating of land uses, which decreases impervious surfaces associated with parking and decreases vehicle miles traveled—resulting in a reduction of hydrocarbons left on roadways and reduced air deposition.

Transit-oriented development (TOD) produces water quality benefits by reducing: (1) land consumption due to smaller site footprints; (2) parking spaces and the impervious cover associated with them; and (3) average vehicle miles traveled, which, in turn, reduces deposition of air pollution into water bodies.

Implementation Tools and Policies		Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:				
Comprehensive plans identify appropriate areas for higher-density mixed-use developments (e.g., at transit stops) and recommend policies to encourage their development.	1			
Local capital improvement plans and funding are targeted to areas appropriate for mixed-use development.	2			
REMOVE BARRIERS:				
Zoning ordinances can create by-right mixed-use and transit-oriented development districts or overlays through amendments.	1			
Initiate map amendments to designate mixed-use and transit-oriented development areas, eliminating the need for developers to secure zoning amendments.	1			
ADOPT INCENTIVES:				
Parking requirements are reduced to reflect decreased automobile use.	1			
Credit given for adjacent on-street parking, which can count for local parking requirements.	1			
Shared parking and alternative parking arrangements encouraged.	1			
Mixed-use districts/areas feature increased densities and height.	1			
Accessory parking structures are not counted against maximum floor area ratio (FAR) on a site.	1			
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ENACT REGULATIONS:

Zoning code requires a minimum mix of uses and minimum density in designated mixed-use and transit-oriented development areas.	1	
Auto-oriented uses and drive-throughs are restricted or prohibited in mixed-use and transit-oriented development areas.	1	

▼ **Total score for SECTION 2: PROMOTE EFFICIENT, COMPACT DEVELOPMENT PATTERNS AND INFILL**

SUBTOTAL FROM PREVIOUS PAGE = (TOTAL POINTS AVAILABLE: 45)

PAGE TOTAL

This section has been reviewed and scored by _____

Department name _____ Signee _____

Resources

- “Protecting Water Resources with Higher-Density Development,” U.S. EPA Development, Community and Environment Division: http://www.epa.gov/dced/water_density.htm
- “Infill Development: Completing the Community Fabric,” Municipal Research and Services Center of Washington: <http://www.mrsc.org/Subjects/Planning/infilldev.aspx>
- Smart Growth Priority Funding Areas Act of 1997, Maryland Department of Planning: <http://www.mdp.state.md.us/fundingact.htm>
- Metro Regional Government Urban Growth Boundary, Portland Metro: <http://www.metro-region.org/index.cfm/go/by/web/id/277>
- Smart Growth Toolkit, Smart Growth Leadership Institute: <http://www.smartgrowthtoolkit.net/main-content/the-smart-growth-implementation-tools.html>
- “Water and Growth: Toward a Stronger Connection Between Water Supply and Land Use in Southeastern Pennsylvania,” 10,000 Friends of Pennsylvania: <http://10000friends.org/water-and-growth>
- “Connecting Smart Growth and Brownfields Redevelopment,” Center for Environmental Policy and Management, University of Louisville: http://cepm.louisville.edu/publications/PDF_docs/smart%20growth%20and%20brownfields%20for%20website.pdf
- “Strategies for Successful Infill Development,” Northeast Midwest Institute: <http://www.nemw.org/infillbook.htm>
- “Smart Infill,” Greenbelt Alliance: <http://www.greenbelt.org/resources/reports/smartinfill/index.html>
- Infill Incentives, Policy Link: <http://www.ci.phoenix.az.us/BUSINESS/infillpgm.html>

Case Studies

- Wisconsin Department of Natural Resources is responsible for helping municipalities establish Sewer Service Area Planning to protect water quality and guide growth within public sewer systems: <http://dnr.wi.gov/org/water/wm/GLWSP/SSAPlan/>
- Dane County, Wisconsin’s BUILD program offers incentives for infill development and removes barriers to redevelopment in order to preserve farmland and prevent greenfield development: <http://www.countyofdane.com/plandev/Community/build/about.asp>
- U.S. EPA and Land-of-Sky Regional Council in Asheville, North Carolina developed a report outlining market, policy, and regulatory changes that can help overcome the barriers to infill and brownfield redevelopment: http://www.epa.gov/dced/pdf/losrc_brownfields.pdf
- The Oregon Transportation and Growth Management Program prepared a Model Infill Ordinance to clarify legal and policy-related questions about local infill incentives: http://www.dca.state.ga.us/intra_nonpub/Toolkit/ModelOrdinances/ModOrdInfl.pdf
- The City of Sacramento, California’s Infill Strategies includes a Water Development Fee Waiver, Reduced Entitlement Fees, and Sewer Facility Fee Reductions: <http://www.cityofsacramento.org/planning/infill/>
- Phoenix, Arizona’s Infill Housing Program provides incentives to encourage single-family housing on vacant and underutilized land and offers high density development standards: <http://www.ci.phoenix.az.us/BUSINESS/infillpgm.html>
- Portland, Oregon’s Infill Design website provides design strategies for integrating infill development into medium-density neighborhoods: <http://www.portlandonline.com/bps/index.cfm?c=34024>
- Portland, Oregon’s Ecoroof Floor Area Ratio (FAR) Bonus allows developers to increase a building’s footprint or floor area by adding an ecoroof: <http://www.portlandonline.com/bes/index.cfm?a=236916&c=48725>
- The Georgia Quality Growth Partnership’s Infill Development Program outlines a comprehensive infill strategy that includes incentives, improvements to public facilities, streamlined regulations, and guidelines for the design, density, and location of infill projects: <http://www.georgiaqualitygrowth.com/ToolDetail.asp?GetTool=32>
- Santa Cruz, California’s Accessory Dwelling Unit Development Program encourages well-designed rental housing in the developed core of the City while being careful to discourage poorly-constructed illegal residential additions: <http://www.ci.santa-cruz.ca.us/pl/hcd/ADU/adu.html>
- Clark County, Washington’s Infill Development Incentives include a waiver of all stormwater requirements for infill projects that create less than 5,000 square feet of new impervious surface: <http://www.clark.wa.gov/commdev/documents/devservices/handouts/46-infill.pdf>
- San Diego, California offers expedited permitting for eligible affordable/infill housing projects: <http://www.sandiego.gov/development-services/industry/pdf/infobulletin/ib538.pdf>

3 DESIGN COMPLETE, SMART STREETS THAT REDUCE OVERALL IMPERVIOUSNESS

3.A STREET DESIGN

3.A.1

QUESTION: Do local street design standards and engineering practices encourage streets to be no wider than necessary to move traffic effectively?

Do street designs vary according to:

- **street type** (arterial streets, collector streets, neighborhood streets) and
- **urban context** (urban core, transit station area, suburban center, general suburban, rural)?

Do policies allow narrow neighborhood streets designed to slow traffic and create safer conditions for pedestrians and bicyclists?

GOAL: Appropriate street widths allow narrower lanes for certain street types, thereby reducing overall imperviousness.

WHY: The width of travel lanes, parking lanes and sidewalks should be tailored to the urban setting. Where appropriate, narrowing travel lane width to 10-11 feet, rather than the standard 12-13 feet, can significantly reduce the total amount of impervious surfaces. Such streets can also substantially improve conditions for walking, biking, and using transit, which reduces automobile use and overall demand for parking spaces.

Implementation Tools and Policies		Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:				
Comprehensive plan/transportation plan emphasizes alternative modes of transportation (walking, biking, and transit) to reduce vehicle miles traveled and width and prominence of roads/streets.	1			
Comprehensive/transportation plan calls for distributing traffic across several parallel streets, reducing the need for high capacity streets with wide rights-of-way.	1			
Comprehensive/transportation planning process brings emergency response and other local government departments (e.g., public works, utilities) to the table early in the process to discuss street design.	1			
Adopt formal bicycle/pedestrian master plan.	1			
Create "safe routes to school" programs or other pedestrian/bike safety initiatives.	1			
Make consistent improvements to walking/biking conditions or develop a formal bicycle/pedestrian master plan.	1			
REMOVE BARRIERS:				
Comprehensive plan endorses context-sensitive street design with narrower streets in appropriate locations.	1			
Improve pedestrian crossing at intersections to encourage walking.	1			
Consolidate utilities in street right-of-way to improve sidewalk design and function.	1			
		PAGE TOTAL		

◀ CARRY THIS SUBTOTAL TO NEXT PAGE = _____

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
Negotiate with state department of transportation or county transportation department to allow different design standards for regional roads passing through downtowns or other key areas.	1		
Promote street standards for fire safety that include attributes of narrow streets (20 feet widths) while identifying factors relevant to local government departments involved with streets such as public works, engineering, and utilities.	2		
Take formal control of state or county roads within city boundaries to ensure power over design and operations.	2		
ADOPT INCENTIVES:			
Developments that provide comprehensive pedestrian/bicycle circulation systems allowed reducing number of vehicle parking spaces. (See parking section below for greater detail.)	1		
Developments with approved comprehensive mobility/transportation plans allowed building narrower, less costly streets and alleys.	1		
ENACT REGULATIONS:			
Revamp local government technical street specifications to allow context-sensitive, innovative street design with narrower travel lanes, without curb and gutter, etc., in appropriate circumstances (See Institute of Transportation Engineers Recommended Practice document below).	2		
Emergency response professionals and other local government departments involved with streets (e.g. public works, engineering, utilities) have endorsed or adopted design standards for narrower neighborhood streets.	1		
Development review process involves emergency response early on to reach consensus on appropriate project street design and access.	1		
Development review process requires submittal of project pedestrian/bicycle circulation plans with safe street routes and other pedestrian/bicycle-friendly features in addition to traffic circulation plans for larger developments.	1		
Apply formal connectivity index ⁷ or other measures to ensure adequate internal street and pedestrian/bicycle connections.	2		
Zoning/subdivision regulations require minimum number of connections between new project and surrounding developments and neighborhoods.	2		
	PAGE TOTAL	+	▼ CARRY THIS SUBTOTAL TO NEXT PAGE
		=	SUBTOTAL FROM PREVIOUS PAGE

⁷ Connectivity index refers to the directness of links and the density of connections in path or road network. A well-connected road or path network has many short links, numerous intersections, and minimal dead-ends (cul-de-sacs). As connectivity increases, travel distances decrease and route options increase, allowing more direct travel between destinations, and creating a more **Accessible** and **Resilient** system. Source: Online Travel Demand Management Encyclopedia. <http://www.vtpi.org/tadm/tadm116.htm>

3.A.2

QUESTION: Are shared driveways, reduced driveway widths, two-track driveways, and rear garages and alleys encouraged for all single-family developments?

GOAL: Encourage alternative forms and decreased dimensions of residential driveways and parking areas.

WHY: Off-street parking and driveways contribute significantly to the impervious areas on a residential lot. Reducing such dimensions can minimize the amount of stormwater runoff from a site.

REMOVE BARRIERS:		
Allow developments that utilize shared driveways and rear-loaded garages to permit overnight parking in driveways and on-street.	1	
Development code prohibits homeowner covenants forbidding overnight parking in driveways, on-street overnight parking, and shared driveways.	1	
ADOPT INCENTIVES:		
Allow developments with narrow driveways and rear-loaded garages to reduce number of parking spaces for guests.	1	
Zoning/subdivision regulations require minimum number of connections between new project and surrounding developments and neighborhoods.	1	
ENACT REGULATIONS:		
Shared driveways are permitted or required for single-family residential developments.	1	
Minimum widths for single-family driveways reduced to 9 feet.	1	
Two-track driveways are allowed by technical street/subdivision specifications.	1	
Single-family residential developments encouraged/required to be designed with minimum percentage of alley-accessible, rear-loading garages. · Alleys/garages encouraged = 1 points · Alleys/garages required = 2 points	1 to 2	

SUBTOTAL FROM PREVIOUS PAGE _____ + PAGE TOTAL _____ = _____

▼ CARRY THIS SUBTOTAL TO NEXT PAGE

GREEN INFRASTRUCTURE ELEMENTS AND STREET DESIGN

QUESTION: Are major street projects required to integrate green infrastructure practices as a standard part of construction, maintenance, and improvement plans?
GOAL: Formally integrate green infrastructure into standard roadway construction and retrofit practice.
WHY: Consistent projects to improve or repair streets provide opportunities to include green infrastructure retrofits as part of larger project budget, design, and construction.

Implementation Tools and Policies		Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:				
Comprehensive/transportation plans promote green infrastructure practices in street design.	1			
Street project cost estimates include green infrastructure designs and assess cost savings from reduced hard infrastructure.	1			
REMOVE BARRIERS:				
Technical street specifications allow/require integration of green infrastructure elements into street project construction.	1			
Allow street-side swales to replace conventional curb and gutter for managing stormwater and for separating sidewalks from street traffic in appropriate circumstances.	1			
ADOPT INCENTIVES:				
Undertake consistent effort to secure state and federal funds (e.g., transportation enhancements) to pay for green infrastructure elements.	1			
Streets with green infrastructure count towards stormwater requirements.	1			
ENACT REGULATIONS:				
Adopt green infrastructure retrofit standards for major street projects.	1			
Adopt technical specifications and design templates for green infrastructure in private and public rights-of-way.	1			
All local road projects required to allocate a minimum amount of the total project cost to green infrastructure elements.	1			
PAGE TOTAL		+	SUBTOTAL FROM PREVIOUS PAGE	
		=	▼ CARRY THIS SUBTOTAL TO NEXT PAGE	

QUESTION: Do regulations and policies promote use of pervious materials for all paving areas, including alleys, streets, sidewalks, crosswalks, driveways, and parking lots?

GOAL: Build and retrofit these surfaces with pervious materials to reduce stormwater runoff and its negative impacts.

NOTE: While eliminating sidewalks or placing sidewalks on only one side of the road can reduce impervious cover, this strategy is typically most appropriate for rural areas. However, other effective strategies can achieve the same runoff reductions that will not limit residents' options for recreation and transportation.

WHY: Streets, sidewalks, and other hard surfaces contribute a large portion to a municipality's total imperviousness. Making these impervious surfaces more permeable protects water quality, reduces flooding, and can recharge groundwater.

Implementation Tools and Policies		Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:				
Sponsor/approve pilot programs to determine appropriate pervious materials for different paving areas (e.g., permeable concrete for sidewalks, permeable pavers for driveways), as well as process for installation and maintenance.	1			
Pilot project results incorporated into standard practice for all new paved areas and retrofits of existing paved surfaces.	1			
Adopt policy to replace impervious materials with pervious materials where practical.	1			
REMOVE BARRIERS:				
Technical street specifications allow pervious paving materials in appropriate circumstances (e.g., not allowed over aquifer recharge areas).	1			
ADOPT INCENTIVES:				
Create formal program offering incentives (e.g., cost sharing, reduction in street widths/parking requirements, assistance with maintenance) to property owners who utilize pervious pavement elements.	1			
ENACT REGULATIONS:				
Adopt requirement that some percentage of parking lots, alleys, or roads in a development utilize pervious materials.	1			
Development approvals that allow/require use of pervious materials include requirements for continuing maintenance/cleaning of pervious surfaces.	1			
		PAGE TOTAL	+	Subtotal from previous page
		▼ Total score for SECTION 3: DESIGN COMPLETE, SMART STREETS THAT REDUCE OVERALL IMPERVIOUSNESS = _____ (TOTAL POINTS AVAILABLE: 50)		

This section has been reviewed and scored by _____

Department name _____

Signee _____

Resources

- Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities, Institute of Transportation Engineers: <http://www.ite.org/css/> (Ch. 6, pages. 65-87)
- “Neighborhood Street Design Guidelines: An Oregon Guide for Reducing Street Widths,” Oregon Department of Transportation and Department of Land Conservation and Development: <http://www.oregon.gov/LCD/docs/publications/neighborstreet.pdf>
- University of California, Davis Sustainable Transportation Center Sustainable Streets Project: <http://stc.ucdavis.edu/outreach/ssp.php>
- New York High Performance Infrastructure Guidelines: http://www.designtrust.org/pubs/05_HPIG.pdf
- Stormwater Guidelines for Green, Dense Redevelopment: Stormwater Quality Solutions for the City of Emeryville: http://www.ci.emeryville.ca.us/planning/pdf/stormwater_guidelines.pdf
- “Sustainable Green Streets and Parking Lots Design Guidebook,” San Mateo County, California Water Pollution Prevention Program: http://www.flowstobay.org/ms_sustainable_streets.php
- Green Streets: Innovative Solutions for Stormwater and Stream Crossings, Portland Metro: <http://www.oregonmetro.gov/index.cfm/go/by.web/id=26335>
- Green Highways Partnership between U.S. EPA, U.S. Federal Highway Administration and Maryland State Highway Administration: <http://www.greenhighways.org/>
- Protecting Water Quality with Smart Growth Strategies and Natural Stormwater Management in Sussex County, Delaware: http://www.epa.gov/smartgrowth/pdf/2009_0106_sussex_county.pdf
- Promoting Sustainable Transportation Through Site Design: An Institute of Transportation Engineers Proposed Recommended Practice: http://www.cite7.org/Technical_Projects/Final%20Proposed%20Recommended%20Practice%20RP-035.pdf
- Transportation is about Places, Project for Public Spaces: <http://www.pps.org/transportation/>

Case Studies

- The Road Ecology Center at the University of California, Davis conducts research and develops policies to design transportation systems that minimize the impacts of roads on landscapes and communities: <http://roadecology.ucdavis.edu/>
- Houston, Texas’s Urban Corridor Planning changes development regulations and infrastructure standards to support transit ridership and walkability in key corridors: http://www.houstontx.gov/planning/Urban/urban_cor.html
- San Francisco, California’s Better Streets Plan created a common set of standards and guidelines for designing, building and maintaining more pedestrian friendly sidewalks, crosswalks, and roadways, including extensive greening: <http://www.sfbetterstreets.org>
- Portland, Oregon’s Green Streets Program includes design specifications for swales, planters and curb extensions, creative funding for projects that treat runoff from public rights-of-way, case studies, tours, and videos of public and private green street projects: <http://www.portlandonline.com/BES/index.cfm?c=4440>
- Seattle, Washington’s Right-of-Way Improvements Manual outlines the requirements and permitting process for right-of-way improvements, as well as provides specific design criteria and model templates for submitting street design concepts: <http://www.seattle.gov/transportation/rowmanual/>
- Florida Department of Transportation developed Model Regulations and Plan Amendments for Multimodal Transportation Districts, including regulation changes related to traffic calming, parking, sidewalks and pedestrian and bicycle facilities, and incentives for developments located in multimodal transportation districts: <http://www.dot.state.fl.us/planning/systems/sm/los/pdfs/MMTDregs.pdf>
- New York Department of Transportation’s Sustainable Streets Strategic Plan includes an initiative to retrofit underused roads into public plazas, streamlining design review for capital projects, and goals to connect tree pits for better surface drainage, among other stormwater management improvements: <http://www.nyc.gov/html/dot/html/about/stratplan.shtml>
- Chicago, Illinois’s Green Alley Program retrofits existing alleys with permeable pavement for better stormwater management, localized flood mitigation, heat reduction, material recycling, and energy conservation: http://egov.cityofchicago.org/webportal/COCWebPortal/COC_EDITORIAL/GreenAlleyHandbook.pdf

- North Carolina Department of Environment and Natural Resources offers guidance to developers on eliminating curbs and gutters, including siting and design considerations, maintenance concerns, effectiveness and cost considerations: <http://www.p2pays.org/ref/41/40403.pdf>
- New York City requires street trees for every 25 feet of street frontage of a zoning lot: http://www.nyc.gov/html/dcp/pdf/street_tree_planting/tree_adopted_cc_043008.pdf, page 8.
- Seattle Public Utilities' Natural Drainage System projects redesign residential streets to include vegetated drainage systems that use swales, wetlands, trees and other natural features to treat pollutants and minimize the speed and volume of road runoff: http://www.seattle.gov/util/About_SPU/Drainage_&_Sewer_System/Natural_Drainage_Systems/

4 ENCOURAGE EFFICIENT PARKING

4.A REDUCED PARKING REQUIREMENTS

4.A.1	QUESTION: Does your local government provide flexibility regarding alternative parking requirements (e.g., shared parking, off-site parking) and discourage over-parking of developments? Do parking requirements vary by zone to reflect places where more trips are on foot or by transit?	GOAL: Match parking requirements to the level of demand and allow flexible arrangements to meet parking standards.	WHY: Inflexible parking requirements that do not allow for alternative approaches, as well as standards that require too much parking for specific uses increase the amount of impervious surface in a development. Over-parking a development also encourages greater vehicle use and detracts from the overall pedestrian environment.	Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:							
	The comprehensive plan recognizes the advantages to reduced parking requirements generally and specifically for mixed-use and transit-oriented developments.		1		1		
	The comprehensive plan recommends alternative, flexible approaches to meeting parking demands (e.g., shared parking, counting on-street spaces towards site parking requirements).		1		1		
	Comprehensive/bicycle plans recommend provision of bicycle parking spaces/storage lockers and concomitant reduction in vehicle parking space requirements.		1		1		
REMOVE BARRIERS:							
	Allow flexibility in meeting parking space requirements through shared parking, off-site parking, and similar approaches.		1		1		
	Permit businesses with different peak demand periods to share their required parking spaces.		1		1		
ADOPT INCENTIVES:							
	Permit reduction in vehicle parking spaces through the provision of a minimum number of bicycle parking spaces.		1		1		
	Allow by-right reduction in required parking spaces (e.g., 25%) in mixed-use and transit-oriented developments and districts.		1		1		
	Permit developers to undertake parking studies to establish that specific developments (e.g., senior housing, affordable housing) require fewer parking spaces than typical projects.		1		1		
							PAGE TOTAL

◀ CARRY THIS SUBTOTAL TO NEXT PAGE = _____

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
Create parking districts to finance/construct centralized parking lots/structures as shared parking facilities to reduce on-site parking.	1		
ENACT REGULATIONS:			
Revise parking regulations to reduce minimums below standard ITE (Institute of Transportation Engineers) requirements based on analysis of local developments and actual parking demand/experience.	2		
Charge developers for every space beyond parking minimums to offset environmental impacts.	1		
Enact parking standards that allow credit for adjacent on-street parking.	1		
Create zones with reduced parking requirements (e.g., transit overlay districts, mixed-use activity centers, multi-modal districts).	1		
Waive all parking minimums in downtown and other locations that are pedestrian-oriented and/or have good transit access.	1		
Adopt parking standards that reduce requirements based on sliding scale tied to degree of walkability/transit access locations (20% reduction in areas well served by bus, 30% reduction in areas served by rail stations).	1		
Require shared parking agreements where appropriate complementary uses exist.	1		
Adopt maximum parking caps (e.g., 125% above minimum) for multi-family and commercial developments.	2		
Reduce minimum parking space size based on analysis of average vehicle size in jurisdiction.	1		
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		=	▼ CARRY THIS SUBTOTAL TO NEXT PAGE

4.B TRANSPORTATION DEMAND MANAGEMENT ALTERNATIVES

4.B.1

QUESTION: Can developers use alternative measures such as transportation demand management or in-lieu payments to reduce required parking?

GOAL: Provide flexibility to reduce parking in exchange for specific actions that reduce parking demands on site.

WHY: Incentives such as transit passes, vanpool arrangements, flexible work schedules, market-priced facilities, and separate leasing for spaces in apartments and condominiums have quantifiable impacts on parking demand. Incorporating them into parking requirements creates the opportunity to meet demand with less impervious cover.

Implementation Tools and Policies		Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:				
Comprehensive/transportation plans recognize transportation demand management as an approach to reducing vehicle miles traveled and parking requirements.	1			
REMOVE BARRIERS:				
Rather than include parking spaces with an apartment lease, allow tenants to opt-out by treating parking as a separate optional lease agreement.	1			
ADOPT INCENTIVES:				
Allow businesses that offer employee transit passes, provide vans for employee commuting, allow flexible working arrangements, or charge market rates for parking to 1) provide fewer parking spaces or 2) pay less into a parking district fund for required parking spaces.	2			
Allow developers to make in-lieu fee payments for parking. Fees utilized by local government/parking authority to provide off-site parking lots/structures.	1			
Provide mechanisms for car sharing in transit-oriented development. Where done, area parking requirements are reduced.	1			
ENACT REGULATIONS:				
Create a parking district and allow/require businesses to support public garages rather than provide their own on-site parking.	1			
Require large developments to adopt transportation demand management techniques to lower vehicle use and parking demand.	1			
PAGE TOTAL		+		
SUBTOTAL FROM PREVIOUS PAGE		=		

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4.C MINIMIZE STORMWATER FROM PARKING LOTS

4.C.1

QUESTION: Are there requirements for landscaping designed to minimize stormwater in parking lots?

GOAL: Require substantial landscaping to help reduce runoff.

WHY: Parking lots generate a large amount of impervious cover. Requiring landscaping reduces the environmental impact of parking and can provide additional community benefits by providing shade and, if appropriately placed, creating natural barriers between pedestrians and cars.

Implementation Tools and Policies		Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:				
Comprehensive plan calls for landscaping in parking lots to help reduce stormwater runoff.		1		
REMOVE BARRIERS:				
Allow alternative or innovative landscaping solutions that provide stormwater management functions to count towards perimeter or other landscaping requirements.		1		
ADOPT INCENTIVES:				
Parking lot landscaping and green roofs on parking structures credited towards meeting local stormwater management requirements.		1		
Give additional landscaping credit for preservation of large, mature trees within parking lots.		1		
Do not count parking structures with green roofs against the allowable floor area ratio of a site.		1		
ENACT REGULATIONS:				
Adopt parking lot landscape regulations that require provision of trees, minimum percent of parking lot interior area to be landscaped (e.g., 10%), and minimum sized landscaping areas (e.g., minimum of 25 square feet for island planting areas).		1		
In parking lot landscaping regulations, specify the types and sizes of shrubs and trees most appropriate for controlling/reducing stormwater runoff.		1		
Adopt standards requiring a minimum area of the parking lot to drain into landscaped areas.		1		
Require the management of runoff from parking lots through green infrastructure practices, including trees, vegetated islands, swales, rain gardens, or other approaches.		1		
PAGE TOTAL				

SUBTOTAL FROM PREVIOUS PAGE

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=

▼ CARRY THIS SUBTOTAL TO NEXT PAGE

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
Enact specific alternative landscaping and parking regulations to support infill development (parking requirements, parking lot landscaping options that focus on perimeter landscaping to encourage smaller lots, etc.).	2		
Require parking structures to incorporate green roofs to reduce stormwater runoff.	1		
Reduce drive aisle widths in parking lots to decrease the amount of pervious surface. For multi-family developments, drive aisles can be shared. In commercial developments, typical drive aisles can be reduced 5–10%.	1		

▼ Total score for SECTION 4: ENCOURAGE EFFICIENT PARKING

PAGE TOTAL **+** SUBTOTAL FROM PREVIOUS PAGE **=** (TOTAL POINTS AVAILABLE: 41)

This section has been reviewed and scored by _____
 Department name _____ Signee _____

Resources

- “Parking Spaces/Community Places: Finding the Balance through Smart Growth Solutions” (pg. 14, 18-19, 21), U.S. EPA Development, Community and Environment Division: <http://www.epa.gov/piedpage/pdf/EPAParkingSpaces06.pdf>
- “Shared Parking, Second Edition,” Urban Land Institute: www.uli.org/bookstore/
- “Developing Parking Policies to Support Smart Growth in Local Jurisdictions: Best Practices,” Metropolitan Transportation Commission: http://www.mtc.ca.gov/planning/smart_growth/parking_study/April07/bestpractice_042307.pdf
- “Driving Urban Environments: Smart Growth Parking Best Practices,” Maryland Governor’s Office of Smart Growth: <http://www.smartgrowth.state.md.us/pdf/Final%20Parking%20Paper.pdf>
- “Design Principles for Parking Lots,” Tennessee Valley Authority Economic Development: <http://www.tvaed.com/sustainable/parking.htm>
- Efficient Parking Strategies, Centralina Council of Governments and Catawba Regional Council of Governments: http://www.epa.gov/region4/airqualitytoolkit9_CaseStudies/SEQL%20-%20Efficient%20Parking%20Strategies.pdf
- “Parking Management: Strategies, Evaluation and Planning,” Victoria Transport Policy Institute: http://www.vtpi.org/park_man.pdf
- “Smart Growth Alternatives to Minimum Parking Requirements,” *Proceedings from the 2nd Urban Street Symposium*, July 28-30, 2003: http://transtoolkit.mapc.org/Parking/Referenced_pdfs/Forinash_SmartGrowthParkingAlternatives.pdf
- “Flexible Parking Standards,” Georgia Quality Growth Partnership: <http://www.dca.state.ga.us/toolkit/ToolDetail.asp?GetTool=17>
- “Multifunctional Landscaping: Putting Your Parking Lot Design Requirements to Work for Water Quality,” University of Illinois Extension: <http://urbanext.illinois.edu/lcr/LGIEN2002-0017.html>
- “Low-Impact Parking Lot Design Reduces Runoff and Pollutant Loads,” *Journal of Water Resources Planning and Management*, 2001: <http://cedb.asce.org/cgi/WWWDisplay.cgi?0101775>
- “Managing Stormwater for Urban Sustainability Using Trees and Structural Soils,” Virginia Polytechnic Institute and State University:

<http://www.cnr.vt.edu/urbanforestry/stormwater/Resources/TreesAndStructuralSoilsManual.pdf>

Case Studies

- San Mateo County, California’s “Sustainable Green Streets and Parking Lots Design Guidebook” provides policy guidance and design and construction details, including site layout strategies, green infrastructure design guidelines and case studies for both streets and parking lots: http://www.flowstobay.org/ms_sustainable_streets.php
- Minneapolis, Minnesota’s zoning code includes regulations to support pedestrian-oriented off-street parking, including parking maximums, shared parking allowances, pedestrian-overlay districts with reduced parking requirements, replacing off-street parking spaces with bicycle racks, and more: <http://www.ci.minneapolis.mn.us/rtrezoning/tod-haiwatha-09.asp>
- Boston Metropolitan Area Planning Council gives detailed guidance for reducing parking demand and developing parking requirements based on local factors such as access to transit, expected demographics, auto ownership rates and access to destinations and transit service: <http://transtoolkit.mapc.org/Parking/Strategies/flexiblerequirements.htm>
- San Diego, California’s Community Parking District Program helps older commercial districts collect revenue and implement parking plans to construct public parking facilities, make public transit enhancements, and maximize off-street parking inventory: <http://www.sandiego.gov/economic-development/business-assistance/small-business/pmd.shtml>
- Placer County, California enacted an In-Lieu Parking Fee that allows developments within specific parking districts to pay a fee in lieu of complying with off-street parking standards. The collected fees are then used to construct new public parking spaces within the same parking district: <http://www.placer.ca.gov/Departments/Works/TahPkgStudy/DraftParkingFeeOrdinance.aspx>
- Minnesota’s Urban Small Sites Best Management Practice Manual provides drawings, design guidelines and plant lists for impervious surface reduction in parking lot design: http://km.fao.org/uploads/media/Impervious_surface_reduction_parking_lot_desing.pdf
- The retrofit of Our Lady Gate of Heaven Parish parking lot in Chicago, Illinois included a large swale that absorbs 100,000 gallons of runoff per year, reducing flooding in the parking lot and in nearby streets and properties. This U.S. EPA-funded project continues to be monitored for

performance data: <http://www.cnt.org/natural-resources/demonstration-projects/olgh-case-study>

- The Florida Aquarium Parking Lot and Queuing Garden in Tampa, Florida maximizes existing site vegetation for stormwater management and provides education to Aquarium visitors. This website includes construction cost information, lessons learned, monitoring results and maintenance protocols: <http://www.sustainableites.org/cases/show.php?id=16>
- Several parking lot demonstration sites in Blacksburg, VA, Ithaca, NY and Davis, CA provide details about newly constructed parking lots and retrofitted lots that include trees, structural soils and pervious pavements for managing stormwater: <http://www.cnr.vt.edu/urbanforestry/stormwater/DemonstrationSites.html>

5 ADOPT GREEN INFRASTRUCTURE STORMWATER MANAGEMENT PROVISIONS

5.A GREEN INFRASTRUCTURE PRACTICES

5.A.1	<p>QUESTION: Are green infrastructure practices encouraged as legal and preferred for managing stormwater runoff?</p> <p>GOAL: Make all types of green infrastructure allowed and legal and remove all impediments to using green infrastructure (including for stormwater requirements), such as limits on infiltration in rights-of-way, permit challenges for green roofs, safety issues with permeable pavements, restrictions on the use of cisterns and rain barrels, and other such unnecessary barriers.</p> <p>WHY: Green infrastructure approaches are more effective and cost efficient than conventional stormwater management practices in many instances, and provide other substantial community benefits.</p>				
ADOPT PLANS/EDUCATE:					
	Inform the public, through education and outreach programs, that green infrastructure practices can manage stormwater runoff on their property.	1			
	Create a green infrastructure workshop or training program for internal and external reviewers to ensure that the stakeholders who use this tool will have the ability to understand and use it effectively.	1			
REMOVE BARRIERS:					
	Development and other codes encourage and allow property owners to adopt home-based green infrastructure practices, such as rain gardens, rain barrels, and other rainwater harvesting practices.	1			
	Review and change, where necessary, building codes or other local regulations to ensure that all local government departments/agencies have coordinated with one another to ensure that green infrastructure implementation is legal, e.g. remove restrictions on downspout disconnection.	1			
ADOPT INCENTIVES:					
	Credit green infrastructure practices towards required controls for stormwater runoff.	1			
	Establish a "Green Tape" expedited review program for applications that include green infrastructure practices.	1			
	Reduce stormwater utility rates based on the use of green infrastructure practices.	1			
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Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
<p>ENACT REGULATIONS:</p> <p>Zoning and subdivision regulations specifically permit green infrastructure facilities, including but not limited to: (1 point for each technique to a maximum of 4 points)</p> <ul style="list-style-type: none"> · Green roofs; · Infiltration approaches, such as rain gardens, curb extensions, planter gardens, permeable and porous pavements, and other designs where the intent is to capture and manage stormwater using soils and plants; · Water harvesting devices, such as rain barrels and cisterns; and · Downspout disconnection. 	1 to 4		
<p>Developers are required to meet stormwater requirements using green infrastructure practices where site conditions allow. Developers must provide documentation for sites that do not allow on-site infiltration, reuse, or evapotranspiration to meet locally determined performance stormwater management standards.</p>	1 to 2		

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5.A.2

QUESTION: Do stormwater management plan reviews take place early in the development review process?

GOAL: Incorporate stormwater plan comments and review into the early stages of development review/site plan review and approval, preferably at pre-application meetings with developers.

WHY: Pre-site plan review is an effective tool for discussing with developers alternative approaches for meeting stormwater requirements. This will incorporate green infrastructure techniques into new projects at early design stages, well before construction begins.

Implementation Tools and Policies		Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:				
Encourage/require a pre-site plan meeting with developers to discuss stormwater management and green infrastructure approaches.	1 to 2			
· Voluntary = 1 point				
· Mandatory = 2 points				
Include landscape architects in design and review of stormwater management plans.	1			
ADOPT INCENTIVES:				
Provide accelerated review of projects where developer attended a pre-application meeting.	1			
ENACT REGULATIONS:				
Preliminary stormwater plan review occurs contemporaneously with preliminary site plan review and before any development approvals.	1			
Development applications must include preliminary/conceptual stormwater management plans that incorporate green infrastructure elements and describe how stormwater management standards will be met.	1			
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QUESTION: Do local building and plumbing codes allow harvested rainwater for exterior uses, such as irrigation, and non-potable interior uses, such as toilet flushing?

GOAL: Ensure that the municipality allows and encourages stormwater reuse for non-potable uses.

WHY: Stormwater reuse is important for dense, urban areas with limited spaces for vegetated green infrastructure practices.

Implementation Tools and Policies		Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:				
Local government provides information brochures/manual for homeowners describing acceptable rainwater harvesting techniques.	1			
REMOVE BARRIERS:				
Local development, building, and plumbing codes updated to allow reuse of stormwater for non-potable purposes.	1			
ADOPT INCENTIVES:				
Reduce stormwater management facility requirements for developments employing comprehensive rainwater harvesting.	1			
Reduce stormwater utility rates based on the use of harvest and reuse techniques.	1			
ENACT REGULATIONS:				
Require developments to adopt rainwater harvesting techniques as elements of stormwater management plans.	1			

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5.A.4

QUESTION: Are provisions available to meet stormwater requirements in other ways, such as off-site management within the same sewershed or “payment in lieu” of programs, to the extent that on-site alternatives are not technically feasible?

GOAL: Allow off-site management of runoff while still holding developers responsible for meeting stormwater management goals.

WHY: In some cases, it is impracticable or infeasible to treat all or even some of the stormwater runoff on site. In such instances, alternative means should be provided through contribution to off-site mitigation projects or off-site stormwater management facilities (preferably green infrastructure facilities).

Pts. Avail. Pts. Rec. or N/A

Implementation Tools and Policies

For infill and redevelopment areas, off-site green stormwater management plans should be developed in cooperation between local government and landowners/developers. Allowing off-site management of stormwater runoff requires sewershed designation within the local government to ensure that true mitigation is possible and realize the equal stormwater management and water quality benefits through off-site management.	2	
Retrofit projects that will utilize green infrastructure stormwater management techniques should be identified and prioritized within the sewershed.	1	
Amend stormwater management regulations and development codes as necessary to allow off-site stormwater management, especially for infill and redevelopment areas.	1	
Establish system that allows/requires payment-in-lieu fees for off-site stormwater management facilities. Fees should be set sufficiently high as to cover the true cost of off-site management. Consider limitations on amount of off-site management allowed (more for infill areas, less for greenfield sites).	1	

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5.B.1

QUESTION: Does your stormwater ordinance include monitoring, tracking, and maintenance requirements for stormwater management practices?

GOAL: Incorporate monitoring, tracking, and maintenance requirements for stormwater management practices into your municipal stormwater ordinance.

WHY: These measures will help ensure that the successful tracking and monitoring of green infrastructure practices remain in proper working condition to provide the performance required by the stormwater ordinance.

Implementation Tools and Policies		Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:				
Develop a system to monitor and track stormwater management practices deployed at greenfield and redevelopment sites. Tracking of management practices should begin during the plan review and approval process with a database or geographic information system (GIS). The database should include both public and private projects.	1			
Provide model checklist for maintenance protocols for ease of inspection, tracking, and enforcement.	1			
Sponsor demonstration projects for green infrastructure management best practices.	1			
REMOVE BARRIERS:				
Ensure that proper local agencies have authority to enforce maintenance requirements.	1			
ADOPT INCENTIVES:				
Create self-inspection maintenance certification program that allows developers/landowners to train/retain private inspectors to certify compliance with stormwater management plans and long-term maintenance.	1			
ENACT REGULATIONS:				
Require long-term maintenance agreements that allow for public inspections of the management practices and account for transfer of responsibility in leases and/or deed transfers.	1			
Conduct inspections every 3 to 5 years, prioritizing properties that pose the highest risk to water quality, inspecting at least 20% of approved facilities annually.	1			
Develop a plan approval and post-construction verification process to ensure compliance with stormwater standards, including enforceable procedures for bringing noncompliant projects into compliance.	1			
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Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
Inspections of construction sites occur at for at least 25% of permitted projects to ensure proper installation of approved practices.	1		
Require conservation/green infrastructure bond/escrow in zoning/subdivision ordinances to ensure installation/maintenance of green infrastructure storm water management facilities.	1		
<p style="text-align: right;">SUBTOTAL FROM PREVIOUS PAGE</p> <p style="text-align: right;">PAGE TOTAL</p>		<p style="text-align: center;">+</p>	<p style="text-align: center;">=</p> <p style="text-align: right;">(TOTAL POINTS AVAILABLE: 39)</p>

▼ **Total score for SECTION 5: GREEN INFRASTRUCTURE STORMWATER MANAGEMENT PROVISIONS**

This section has been reviewed and scored by _____

Department name _____ Signee _____

Resources

- Green Infrastructure Municipal Handbook, U.S. EPA Green Infrastructure website: <http://cfpub.epa.gov/npdes/greeninfrastructure/munichandbook.cfm>
- *A Catalyst for Community Land Use Change*, National NEMO Network 2008 Progress Report with local regulations for water quality protection: http://nemonet.uconn.edu/about_network/publications/2008_report.htm
- Public Entity Environmental Management System Resource Center: <http://peercenter.net/>
- Environmental Management System, U.S. EPA: <http://epa.gov/ems/>
- “The Economics of Low-Impact Development: A Literature Review,” EcoNorthwest: http://www.econw.com/reports/ECONorthwest_Low-Impact-Development-Economics-Literature-Review.pdf
- “Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices,” U.S. EPA Office of Water: <http://www.epa.gov/owow/nps/lid/costs07/>
- New York City’s PlaNYC for Water: <http://www.nyc.gov/html/planyc2030/html/plan/water.shtml>
- Puget Sound Partnership Low Impact Development Local Regulation Assistance Project: http://www.psparchives.com/our_work/stormwater/lid/lid_regs.htm
- Massachusetts Low Impact Development Toolkit: http://www.mapc.org/regional_planning/LID/PDFs/LID%20Local%20Codes%20Checklist.pdf
- Plan Review checklist and flow chart, Office of Watersheds, Philadelphia Water Department: http://www.phillyriverinfo.org/WICLibrary/DevelopmentProcess_Final.pdf
- General Factors that Influence the Selection of Stormwater Management Facilities, Portland Bureau of Environmental Services: <http://www.portlandonline.com/shared/cfm/image.cfm?id=129055>
- Operations and Maintenance of Treatment Best Management Practices, Santa Clara Valley Urban Pollution Prevention Program: http://www.sevurppp-w2k.com/om_workproduct_links.htm
- Stormwater Center Maintenance Agreements Guidance and Case Studies: http://www.stormwatercenter.net/Manual_Builder/Maintenance_Manual/4Maintenance_Agreements/Maintenance%20Agreements%20Introduction.htm

Case Studies

- Alachua County, Florida’s stormwater regulation requires that developers reduce impervious surfaces via vertical construction and alternative parking surfaces and use site contours and minimize disturbance to existing natural features: http://growth-management.alachua.fl.us/complanning/amended_docs/ORDstormCPA-06-06-01final.pdf
- Philadelphia, Pennsylvania’s stormwater regulation requires that projects infiltrate/manage the first 1” of rainfall from all directly connected impervious surfaces and exempts redevelopment projects from flood control and channel protection requirements: <http://www.phillyriverinfo.org/Programs/SubprogramMain.aspx?Id=Regulations>
- Portland, Oregon’s stormwater requirement uses a mandatory hierarchy that requires on-site infiltration with surface vegetation above all other practices <http://www.portlandonline.com/bes/index.cfm?c=35122> (Chapter 1, page 1-18)
- Emeryville, California’s stormwater guidelines for dense green redevelopment provide guidance on using green infrastructure in high density, infill sites: <http://ca-emeryville.civicplus.com/DocumentView.aspx?DID=144>
- Portland, Oregon’s Ecoroof Floor Area Ratio (FAR) Bonus allows developers to increase a building’s footprint or floor area for projects that include an ecoroof: <http://www.portlandonline.com/bes/index.cfm?a=236916&c=48725>
- Chicago Department of Construction and Permits has a Green Permit Program that offers expedited permits and waived permit review fees for projects that meet a series of green building requirements, including exceptional water management and green roof criteria: http://egov.cityofchicago.org/webportal/COCWebPortal/COC_EDITORIAL/GreenPermitBrochure1.pdf
- Tucson, Arizona’s Water Harvesting Guidance Manual describes how the City’s code requirements for water harvesting help to meet several other local codes, such as for landscaping, floodplain and erosion hazard management, and stormwater management: <http://dot.tucsonaz.gov/stormwater/education/waterharvest.php> (page 26)
- San Francisco, California’s Public Utilities, Department of Building Inspection and Department of Public Health partnered to allow the use of rainwater for irrigation and toilet flushing without requiring treatment to potable standards: http://sfwater.org/mto_main.cfm/MC_ID/14/MSC_ID/361/MTO_ID/559

- Seattle, Washington's Green Factor is an amended landscape requirement that property owners meet via a scoring system that encourages green features such as large plants, permeable pavement, green roofs, vegetated walls and tree preservation: <http://www.seattle.gov/dpd/permits/greenfactor/Overview/>
- San Jose, California's stormwater regulation requires that projects with 10,000 square feet or more of impervious surface area use landscape-based treatment and trees to meet quantity and quality standards: http://www.sanjoseca.gov/planning/stormwater/Policy_6-29_Memo_Revisions.pdf
- Santa Monica, California's stormwater code requires that new development projects maximize permeable areas, maximize runoff to permeable areas, reuse stormwater, and reduce parking lot pollution: http://www.smgov.net/uploadedFiles/Departments/OSE/Categories/Urban_Runoff/UR_Brochure.pdf
- Chicago, Illinois's stormwater regulation requires that new developments manage 0.5" runoff from all impervious surfaces or reduce imperviousness by 15%: http://egov.cityofchicago.org/webportal/COCWebPortal/COC_EDITORIAL/Stormwater.ManagementOrdinance1206.pdf
- Lenexa, Kansas's stormwater regulation requires new developments to manage 1.37" for water quality using a natural system treatment train approach and also charges a fee for water quantity management which pays for watershed-scale public projects managed by the City: <http://www.ci.lenexa.ks.us/LenexaCode/viewXRef.asp?Index=2927>
- Fauquier County, Virginia's stormwater maintenance agreements state that if maintenance is neglected the County has the authority to perform the work and recover costs from the property owner: <http://www.fauquiercounty.gov/documents/departments/commdev/pdf/SWMOrdinance.pdf> (pages 12-13)
- Philadelphia, Pennsylvania's Stormwater Management Guidance Manual provides maintenance guidelines and schedules for a range of green infrastructure practices, from green roofs to pervious pavements and subsurface infiltration: <http://www.phillyriverinfo.org/Programs/SubprogramMain.aspx?Id=StormwaterManual>

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Appendix F: Potential Partner Matrix

Potential Implementation Partners

PARTNERSHIP	CONTACT	DESCRIPTION
Western Pennsylvania Conservancy	800 Waterfront Drive Pittsburgh, PA 15222 Phone: 412-288-2777 Toll-Free: 1-866-564-6972 Fax: 412-231-1414 www.paconserve.org	Partners with more than 10,000 volunteers and dozens of community organizations and businesses each year to plant and maintain more than 140 gardens and greening projects in 20 Western Pennsylvania counties. Inch by inch, yard by yard and acre by acre, our volunteers are helping to make Pennsylvania a more beautiful place to live and to visit.
2009 Rain Garden Alliance	For more information, e-mail: info@raingardenalliance.org	I. Education and outreach. Partners will collaborate on educational and promotional materials including: website, brochures, displays, posters, workshops, presentations, etc II. Installation of gardens. Partners may facilitate the installation of gardens or provide technical assistance during installation. Partners or members will register these gardens on the Rain Garden Alliance website III. Promotion of the Alliance
3 Rivers Wet Weather Demonstration Program	3901 Penn Avenue Bldg. #3 Pittsburgh, PA 15224 Phone: 412-578-8375 Fax: 412-578-8065 www.3riverswetweather.org	Committed to improving the quality of Allegheny County's water resources by helping communities address the issue of untreated sewage and storm water overflowing into the region's waterways. To promote the most cost-effective, long-term, sustainable solutions, the nonprofit organization benchmarks sewer technology, provides financial grants, educates the public and advocates inter-municipal partnerships.
Allegheny Land Trust (ALT)	409 Broad Street Suite 206A Sewickley, PA 15143 Phone: 412-741-2750 www.alleghenylantrust.org	ALT works to protect local open space that provides the most benefit to communities. Examples: partnering with a municipal government to create a park, protecting floodplains and wetlands that help to retain storm and floodwaters; steep wooded slopes that are vulnerable to landslides if disturbed; and scenic vistas that create our region's

Potential Implementation Partners

		unique natural character.
Audubon Society of Western Pa	614 Dorseyville Road Pittsburgh, PA 15238 Phone: 412-963-6100 Fax: 412-963-6761 www.aswp.org	Offers a variety of programs for people of all ages to inspire and educate the people of southwestern Pennsylvania to be respectful and responsible stewards of the natural world. Programs focus on education and awareness.
Allegheny County Conservation District	400 North Lexington Street Suite 102 Pittsburgh, PA 15208 Phone: 412-241-7645 Fax: 412-242-6165 www.accd.pghfree.net	I. Provides assistance to community groups wishing to establish watershed associations, which work to improve the overall environment within the drainage area the watershed encompasses. Our Watershed Specialist works with these groups to assist in start-up activities, provide limited administrative support, and secure funding for watershed improvement projects. II. Assists land trusts, municipal tree commissions, municipalities, boy and girl scout troops and other groups by providing written materials for public education purposes and through an equipment-lending program through which groups can borrow digital cameras, gps units and other equipment required for watershed assessment and documentation programs.
DCNR	Rachel Carson State Office Building PO Box 8767 400 Market Street Harrisburg, PA 17105-8767 Phone: 1-888 PA-PARKS (1-888-727-2757) www.dcnr.state.pa.us	Pennsylvania Department of Conservation and Natural Resources is charged with maintaining and preserving the 117 state parks; managing the 2.1 million acres of state forest land; providing information on the state's ecological and geologic resources; and establishing community conservation partnerships with grants and technical assistance to benefit rivers, trails, greenways, local parks and recreation, regional heritage parks, open space and natural areas. Primary assistance is provided municipalities and non-profit organizations through the award and distribution of various C2P2 grants.

Potential Implementation Partners

<p>Sewickley Creek Watershed Association</p>	<p>P.O. Box 323 Youngwood, PA 15697-0323</p> <p>Phone: 724-925-3621</p> <p>www.sewickleycreek.com</p>	<p>I. The Association seeks out and cooperates with government agencies, interested organizations, businesses and individuals in implementing programs that improve water quality and encourage proper land use.</p> <p>II. The Association uses its resources to educate the citizens of the watershed as to sound environmental practices.</p> <p>III. This Association is a non-profit 501(c) organization. Contributions to this organization are tax deductible.</p>
<p>North Area Environmental Council</p>	<p>P.O. Box 71 Ingomar, PA 15127</p> <p>Phone: 412-364-7006</p> <p>naecwpa.org</p>	<p>A non-profit citizens' conservation group in northern Allegheny County, whose programs focus on resource assessment, remediation and conservation within the watersheds of northern Allegheny County.</p>
<p>Penn State University, Cooperative Extension, Allegheny County</p>	<p>400 North Lexington Street Pittsburgh, PA 15208-2521</p> <p>Phone: 412-473-2540 Fax: 412-473-2768</p> <p>allegheny.extension.psu.edu</p>	<p>Penn State Cooperative Extension in Allegheny County gives local residents easy access to the resources and expertise of the Pennsylvania State University. Through educational programs, publications, and events, cooperative extension agents deliver unbiased, research-based information to Allegheny County citizens. Educational program topics include natural resources, agriculture, horticulture, community development, etc.</p>
<p>Pennsylvania Environmental Council</p>	<p>22 Terminal Way Pittsburgh, PA 15219</p> <p>Phone: 412-481-9400 Fax: 412-481-9401</p> <p>www.pecpa.org</p>	<p>Works with communities, landowners and land trusts to conserve properties along the thousands of miles of shoreline in Western Pennsylvania to protect water quality and maintain both natural and working landscapes.</p>
<p>Pennsylvania Organization of Watersheds and Rivers (POWR)</p>	<p>130 Locust Street Suite 200 Harrisburg, PA 17101</p> <p>Phone: 717-230-8044 Fax: 717-230-8045</p>	<p>The Pennsylvania Organization for Watersheds & Rivers (POWR) advocates for the protection, restoration and enjoyment of our common wealth of water resources, and conducts programs that foster stewardship, communication,</p>

Potential Implementation Partners

	<p>pawatersheds.org</p>	<p>leadership and action.</p> <p>POWR’s primary projects focus on three areas: capacity building for local conservation, recreation and experience-based conservation activities, and public support for watershed protection. Specifically, our projects include:</p> <ul style="list-style-type: none"> • Watershed association capacity building & technical assistance • Statewide coordination of the nationally unique Pennsylvania Sojourns (multi-day paddling and educational events), selection of the River of the Year, and development of the River of the Year Poster • Support for and evaluation of river conservation planning • State-level advocacy on water conservation issues • Communications and watershed awareness through diverse outlets such as the website, blog, e-newsletter, events listing, action alerts, etc. • General liability insurance program for members • Coordination of the Keystone Monitoring Network, a web-based source and repository for local watershed monitoring data
<p>Sewickley Garden Club</p>	<p>PO Box 103 Sewickley, PA 15143</p> <p>www.sewickleygardens.org/vgc/index.php</p>	<p>I. Encourages members to be pro-active in their homes and their community as well as getting involved on the national level.</p> <p>II. Partners for Plants: a joint initiative of the GCA Horticulture and Conservation Committees. It pairs local GCA clubs with state and federal land managers to monitor rare, endangered, medicinal or invasive plants on state and federal</p>

Potential Implementation Partners

		lands.
Sewickley Civic Garden Council	PO Box 103 Sewickley, PA 15143 www.sewickleygardens.org/index.php	Strives to stimulate interest and influence action toward improving and preserving the appearance of the Sewickley public spaces in relation to architecture, landscape design, and regional planning, to engage in the planting and maintenance of plant materials, and to encourage interest and appreciation of nature through education programs.
Sewickley Valley Community Fund	Phone: 412-741-6661 www.sewickleylibrary.org/svcf.html	The purpose of the Fund, which originated in 2001, is to support, financially, cooperation and collaboration between the 11 municipalities in the Quaker Valley area. In addition, community projects with a regional focus are considered for support through matching grants.
The Hollow Oak Land Trust	Robin Hill Park - Main House 949 Thorn Run Road Moon Township, PA Phone: 412-264-5354 www.hollowoak.org	I. Works to acquire land for conservation through acquisition and conservation easements. II. Promotes the education of the public and municipal officials on conservation issues. Conservation efforts within and along the airport corridor serve to balance the pressures of commercial and residential development of the area. III. Partners with area organizations to implement projects which will establish a greenway in the Montour Valley.
Wildlife Habitat Council	8737 Colesville Road Suite 800 Silver Spring, MD 20910 Phone: 301-588-8994 Fax: 301-588-4629 www.wildlifehc.org/	I. Works with various outside organizations and local, state and federal agencies. Some of the partner programs are listed below and are available for members to incorporate into their habitat programs. These resources can help provide technical assistance and sometimes funding through grants. II. An added bonus is the opportunity to

Potential Implementation Partners

		<p>gain broader recognition for positive contributions to biodiversity conservation efforts. Through partnerships, corporations can become leaders in planning for sustainability and meeting environmental needs of the present and for future generations.</p> <p>III. WHC's <i>Corporate Wildlife Habitat Certification/International Accreditation Program</i> recognizes commendable wildlife habitat management and environmental education programs at individual sites. WHC certification adds value to programs by providing third-party credibility and an objective evaluation of projects.</p>
Three Rivers Habitat Partnership (TRHP)	<p>Bayer Corporation 100 Bayer Road Pittsburgh, PA 15205</p> <p>Phone: 412-777-2464</p> <p>www.wildlifehc.org/threerivers</p>	<p>The Three Rivers Habitat Partnership (TRHP), a regional project of the Wildlife Habitat Council, assists corporations, communities, and organizations to enhance wildlife habitat in the Pittsburgh region.</p>
Trout Unlimited (TU) Trout Unlimited - National Office	<p>1300 N. 17th Street Suite 500 Arlington, VA 22209-2404</p> <p>Toll Free: 1-800-834-2419 National Office: 703-522-0200 Fax: 703-284-9400 www.tu.org</p>	<p>Embrace-A-Stream (EAS) Overseen by a committee of TU volunteers and administered by its national office, Trout Unlimited annually raises money from TU members, corporate and agency partners, and foundations to distribute as small grants to local TU projects</p>

Potential Implementation Partners

<p>The Foundation for Pennsylvania Watersheds</p>	<p>9697 Loop Road Alexandria, PA 16611</p> <p>Phone: 814-669-4244 Fax: 814-669-1323</p> <p>www.pennsylvaniawatersheds.org</p>	<p>I. The Foundation for Pennsylvania Watersheds, formerly known as the Western Pennsylvania Watershed Program, is a grant-making foundation that invests in local efforts to protect healthy, natural streams, to clean up pollution and to restore degraded wildlife habitat.</p> <p>II. We are a source of matching funds for local, state and federal grants.</p> <p>III. We provide matching grant funds to both small and large groups and organizations throughout most of the Commonwealth (we currently do not service areas east of the Susquehanna River).</p>
<p>Water Resources Education Network (WREN) Project</p>	<p>wren.palwv.org</p>	<p>I. (WREN) is a project of the Citizen Education Fund of the League of Women Voters of Pennsylvania (LWVPA-CEF). WREN is a nonpartisan informal collaboration among organizations and public officials working for the protection and management of Pennsylvania's water resources, both surface and ground water, through grass-roots education and informed policy-making.</p> <p>II. Provides training and grants for local coalition building to promote community awareness and development of public policies necessary to protect Pennsylvania water resources.</p> <p>III. Program focuses on two initiatives: Watershed Education to prevent nonpoint source pollution, and Source Water Protection Promotion to raise awareness about the importance of protecting public drinking water sources.</p>
<p>Fern Hollow Nature Center</p>	<p>1901 Glen Mitchell Road P.O. Box 8 Sewickley, PA 15143</p> <p>Phone: 412-741-6136 Fax: 412-741-7536</p>	<p>The Fern Hollow Nature Center is a place where individuals, groups and families can come to enjoy the outdoors. It is also the gateway to the area park system. Educational programs are both organized and spontaneous and are aimed at helping children and</p>

Potential Implementation Partners

	fhnc.org	adults understand and appreciate the environment.
Garden Club of Allegheny County	www.gcacpgh.org	The objective of The Garden Club of Allegheny County shall be to promote greater knowledge of horticulture, stimulate interest in conservation and historic preservation, encourage community and environmental education, and participate in civic planning and planting programs.
Pittsburgh Parks Conservancy	2000 Technology Drive Suite 300 Pittsburgh, PA 15219 Phone: 412-682-7275 www.pittsburghparks.org	Parks Conservancy signed an official public-private partnership agreement with the City of Pittsburgh to work together for the restoration of the city's four regional parks - Frick, Highland, Riverview, and Schenley. Since then, the Parks Conservancy has raised \$45 million toward park improvements, and has recently expanded into other city parks as time and resources permit.