

ACKNOWLEDGMENTS

The Darby Creek Valley Association ("DCVA") has prepared this Watershed Plan with the assistance of Cahill Associates, West Chester, PA 19382 for the Darby Creek Watershed under a grant provided by the Pennsylvania Department of Conservation of Natural Resources (Key-RCP-97-04) and additional funding support from the Delaware County Council through the Community Development Block Grant Program, which is administered by the Delaware County Office of Housing and Community Development (HUD-CDBG-98-#24-93A).

The work on this Plan was spearheaded by Anne Ackerman and guided by a Steering Committee comprised of Fritz Thornton, Anne Ackerman, John Furth, Dave Cannan, Bill Frasch, Clyde Hunt and Dan Simcox. In addition, the DCVA is indebted to the many other members of the DCVA and the municipal officials who provided assistance throughout the planning and drafting of this document.

The address of the Darby Creek Valley Association is P.O. Box 732, Drexel Hill, PA, 19026. A copy of the entire Watershed Conservation Plan will be available in the Delaware County Library System. Compact discs containing a complete copy of this Plan will be available from DCVA by contacting us. This Plan will also be available at DCVA's website, which is www.dcva.org.

EXECUTIVE SUMMARY

A. Background and the Pennsylvania Rivers Conservation Program

The Darby Creek Valley Association (“*DCVA*”) and its technical consultants, Cahill Associates, have prepared a Watershed Conservation Plan (this “*Plan*”) for Darby Creek under a grant provided by the Pennsylvania Department of Conservation and Natural Resources (“*PADCNR*”). The Delaware County Council has provided additional funding support directly through the Community Development Block Grant Program (“*CDBG*”), which has been administered by the Delaware County Office of Housing and Community Development (“*DCOHCD*”). Additional, matching in-kind labor and services have been provided by the members of DCVA and various municipalities throughout the Darby Creek Watershed (the “*Watershed*”).

DCNR’s stated purposes for encouraging the preparation of rivers conservation plans are:

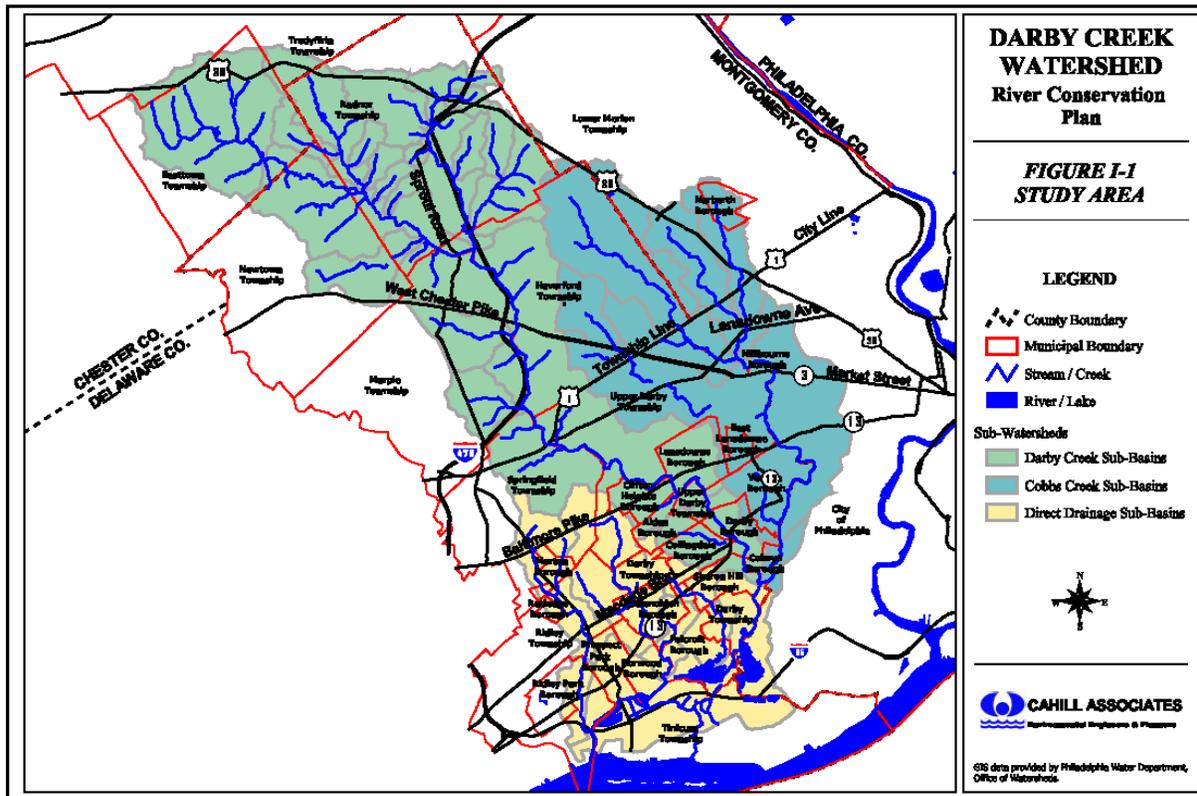
- to foster development of locally initiated river conservation plans, which will restore, maintain or enhance the river resources throughout the Commonwealth;
- to provide financial and technical assistance for local river conservation planning activities;
- to establish a Pennsylvania Rivers Conservation Registry, which recognizes rivers or river segments that have an approved river conservation plan; and
- to encourage state and local organizations to take actions that are consistent with local river conservation plans.

In order to accomplish these goals, public participation and involvement is critical. The public participation process developed for this Plan has included a series of public meetings held in the evening at locations strategically located throughout the Watershed, as well as municipal meetings, which were typically held during business hours for municipal officials.

B. The Darby Creek Watershed Study Area

The Darby Creek Watershed is located in southeastern Pennsylvania and drains into the Delaware River, south of the Schuylkill River and the City of Philadelphia (See Figure 1-1 below). Most of the 77 square miles of the Watershed are located in Delaware County. However, the Watershed also includes portions of Chester, Delaware, Montgomery, and Philadelphia Counties. Overall, the Watershed encompasses all or parts of 31 municipalities. The main stem of Darby Creek originates in Easttown Township, Chester County and is joined by a number of tributaries as it flows downstream. Cobbs Creek, the major tributary of the Darby, converges with it in Colwyn Borough. The Darby is then joined by the Hermesprota, Muckinapattis and Stony Creeks, which flow into a tidal portion of Darby Creek at the John Heinz National Wildlife Refuge (the “*Refuge*”), where Darby Creek meets the Delaware River, south of Little Tinicum Island. The Refuge is the largest remaining freshwater tidal wetland in Pennsylvania. Tidal influence exists throughout this lower portion of Darby Creek and its

tributaries up to the “Fall Line”, an imaginary physiographic line separating the Coastal Plain from the rolling hills of the Piedmont. The Watershed straddles this Line.



Though not large in area compared to other watersheds, the Darby Creek Watershed is home to a population of approximately 500,000 people, with an average density of nearly 10 persons per acre. Historically, population growth and land development in the Watershed originated in the lower downstream portions of Delaware County, which includes some of the earliest settlements in the nation, and spread outwardly from the City of Philadelphia. This older development tends to be very dense; most of it pre-dates current stormwater management practices and governmental land use and site development regulations. At the other extreme are the upper portions of the Watershed in Chester County, where development has been more recent. Though this newer, upstream development tends to benefit from somewhat improved stormwater management practices and other site development regulations, the pace and intensity of development in the upstream region has resulted in continuing loss of wetlands and increased severity of floods in the downstream portions of the Watershed.

Both the historic and recent urbanization of the Watershed have substantially altered its natural characteristics and flow patterns. Direct human intervention as well as natural forces associated with surging flows from increased stormwater runoff have straightened once slowly meandering streams, scoured streambeds, and eroded stream banks, making it difficult for aquatic life to continue, much less thrive. With continued encroachment onto the natural floodplain by development, flooding has worsened, extending to adjacent homes and properties not previously subject to flooding and occurring with greater frequency. Land development without adequate regard for good stormwater management has often resulted in significant impairment of the wetlands throughout the Watershed.

Wetlands act as natural filters, cleaning stormwater runoff, protecting our streams, and mitigating against flooding. Natural floodplains (i.e., the land adjoining the streams) have too often been paved over in many places, destroying their ability to serve as natural buffers. Through years of development in the Watershed, buildings and other improvements were too often constructed in a manner that was unnecessarily damaging to these natural buffers. As a result, sediment from disturbed areas upstream has been transported downstream by increased stormwater runoff. The overall urbanization of the Watershed, and perhaps more importantly, the specific nature of development on particular sites, has increased the volume and velocity of runoff. Contaminants deposited on streets and paved areas, such as oil, gasoline, metals, and other substances are often washed away to be deposited in the stream system.



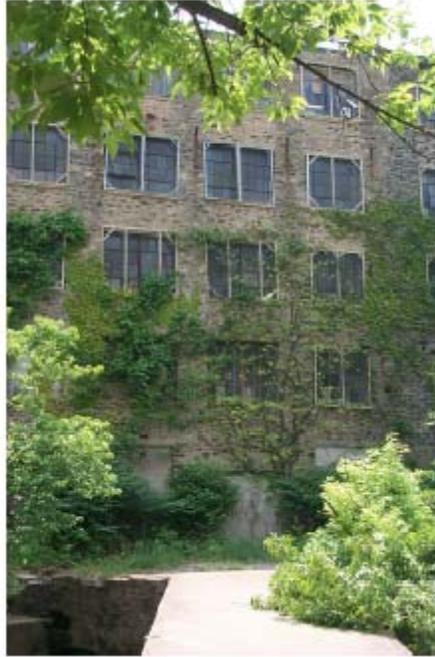
The "Impoundment" at the John Heinz National Wildlife Refuge at Tinicum

Other significant problems have arisen near industrial uses and aging infrastructure in the Watershed. Some of the landfills, tank farms, and industrial facilities, which once operated along portions of Darby and Cobbs Creeks, have leached chemicals into the streams over the years. Aging interceptor sewer lines paralleling the streams have heaved and cracked over the years and frequently leak. Portions of the Watershed built with combined sewers, where storm sewers are connected to sanitary sewers, invariably discharge untreated wastewater into streams during storm flows (and occasionally even after the storm surge has passed, when combined sewer overflow regulators malfunction).

C. The Darby Creek Valley Association and Several Existing Watershed Programs

DCVA is a nonprofit watershed organization dedicated to the protection and enhancement of the Watershed and its resources, including water, wildlife, historical sites, floodplains, wetlands, and riparian zones. DCVA's major goals include: promoting the improvement and development of the Watershed as a natural, educational, recreational and historic resource for future generations, as well as preventing all forms of pollution and dumping in the Darby Creek and encouraging development that respects the resources of the Watershed, opposing construction within floodplain zones, as well as other unnecessary damage to the Watershed, and maintaining a clean Watershed through annual clean-ups and public education programs. DCVA has worked energetically to support protection of historic properties, such as the Swedish Cabin and Blue Bell Inn. DCVA's ultimate goal is the development of a 30-mile greenway system linking the entire Watershed as it flows through its many constituent communities. DCVA, with assistance from the U.S. Environmental Protection Agency ("*USEPA*"), also supports a volunteer water quality-monitoring program. Members of the organization also work energetically with public and private schools, the Delaware County library system, the Delaware County Environmental Network, the Philadelphia Water Department and the Darby-Cobbs Partnership, the Partnership for the Delaware Estuary (formerly Delaware Estuary Program), the Delaware County Historical Society, the Stroud Water Research Center and Aqua Pennsylvania (formerly known as Philadelphia Suburban Water Company) and many other governmental agencies, school districts, non-profit groups and other organizations interested in the Watershed.

Through this Plan, DCVA wishes to set forth a vision for the restoration and protection of the Darby Creek Watershed. It is our hope that this Plan will be of interest and value to residents, neighborhoods, civic associations and other groups, as well as all of the municipalities in the Watershed. This Plan will only be put into action through the ongoing, cooperative efforts of the many diverse stakeholders in this Darby Creek Watershed.



Historic Kent Mill Structure in the Proposed Upper Darby Area Greenway

There are many existing programs of governmental and quasi-governmental agencies designed to improve the quality of the Watershed. Many of these programs are focused on specific aspects of the Watershed. No one agency or authority has jurisdiction over all Watershed matters. The following paragraphs briefly outline a number of these ongoing programs:

- Certain planning efforts in the Watershed relate to combined sanitary-storm sewers and stormwater management. To help address the issues raised by these older combined systems, the Philadelphia Water Department (“**PWD**”) initiated the Darby-Cobbs Partnership, with the support and endorsement of the State. PWD continues to financially support this important effort to unite Watershed stakeholders in a variety of ways.
- The Pennsylvania Department of Environmental Protection (“**PADEP**”) has encouraged the development of watershed partnerships as a mechanism to improve water quality and meet federal and state requirements. The Watershed Management Plan, which is subsidized by the PADEP in an effort to implement emerging requirements of the Total Maximum Daily Loads (“**TMDL**”) program, focuses on the Cobbs Creek portion of the Watershed at the present time.
- The City of Philadelphia has also proactively embarked on a water quality improvement program. Although the primary focus of these efforts are on Philadelphia’s portion of the Watershed, certain City efforts such as the water quality sampling involve the entire Watershed.

- In addition, the USEPA National Pollutant Discharge Elimination System ("*NPDES*") Phase II permit program requirements have been drafted by PADEP and are currently in various stages of final review.
- PADEP has drafted a model stormwater ordinance, which is to be incorporated by Municipal Separate Storm Sewer Systems, or "*MS4*", municipalities (note that these *NPDES* Phase II ordinance requirements will have to be incorporated into the Act 167 Stormwater Management Plan and the model ordinance, as discussed below). Because the *NPDES* Phase II permit program has so many facets, a detailed description has not been provided in this Plan.
- The Delaware County Planning Department ("*DCPD*") is currently developing a Stormwater Management Plan as stipulated by Act 167. The plan is being developed in cooperation with adjoining Watershed counties (Chester, Montgomery, and Philadelphia) and is funded in part through a PADEP grant. The Plan will identify stormwater problems and include development of new regulatory requirements that Watershed municipalities will be required to adopt. Act 167 plans are designed to address future stormwater impacts from new development and will not correct problems resulting from existing development. Although Act 167 plans have historically focused only on water quantity issues, recent re-interpretation of Act 167 now requires water quality considerations to be taken into account when managing future runoff. The model stormwater management ordinance should require that any redevelopment of property larger than one acre should be subject to the provisions of the ordinance.
- Another State-mandated program, Act 537, requires individual municipalities to undertake sewage facilities planning, establishing existing and future needs. The Act 537 Plan Update has been completed, reviewed, and adopted by resolution by all participating municipalities and thereby becomes the official "537 Plan" of each municipality.
- Many other individual projects, public and private, are occurring throughout the Watershed. A more complete description of these projects appears in Section VII of this Plan.

In sum, each of these different projects and planning processes involves a series of actions, which DCVA is striving to coordinate with this Plan.

D. A Brief History of Watershed Problems and Issues

The Darby Creek Watershed suffers from a variety of water resource, general environmental, and other problems in part because of its historic development. It is an urbanized watershed where development has often occurred at high densities pre-dating even the most rudimentary stormwater management regulations.



Flooding in the Lower Watershed

The significant change in the natural landscape with the tremendous addition of impervious cover has produced dramatic changes in the overall hydrology of the Watershed, if patterns existing in pre-colonial times were to be compared with the current day. First, stormwater runoff has increased such that serious flooding occurs in many different parts of the Watershed. This increased runoff means that far less water infiltrates naturally into the ground to replenish the groundwater, resulting in significant declines in stream baseflow. Stream flow quickly “flashes” into flooding over the Creek’s banks during rains and then quickly sinks to a trickle after the rain stops. The flash floods erode stream banks, scour away the natural pools and riffles so critical to the aquatic biota, and ultimately change the whole nature of the stream -- its “geomorphology” in today’s terms. Substantial nonpoint source pollutant loads, including sediment, are washed into the streams during and after rain events; this pollution combines with virtually constant (dry weather and wet weather) leakage from aging sanitary sewer interceptors which run up and down Watershed stream valleys for many miles, as well as pollutant inputs from combined sewer overflows (“*CSOs*”) in the Cobbs Creek. Nonpoint source pollution combines with various other hazardous waste site discharges, private wastewater treatment plant discharges, and miscellaneous sources, such as a proliferating Canadian geese population, to significantly degrade overall water quality. In addition, there has been extensive channelizing and relocation of the stream by engineering projects in various locations -- these include total piping, enclosure, and burial of the stream. These environmentally shortsighted practices have also contributed to increased flooding and decreased water quality.

Floodplain encroachment continues as developers search out vacant parcels in parts of the Watershed. Frequent bridge abutments and old dam structures interfere with the free flow of the stream. Dumping has occurred at many locations along the Creek and continues to be a problem.

The issues transcend water resources, extending into the overall quality of the built environment in the Watershed. Most of the older development in the lower portions of the Watershed occurred well before current environmental regulations and land-use regulations were enacted. These communities, many of which were built in the 19th Century and early part of the 20th Century, lack the recreational facilities, active and passive, which are now regarded as appropriate for healthy communities. Housing stock has aged and, as employment opportunities have radiated ever outward (and upstream in terms of the Darby Creek Watershed), people and financial resources (in the aggregate) have followed the jobs. The communities further downstream have experienced declines in employment and housing quality.



*WRAP Grant Project Area in Darby Borough
(Houses Removed)*

E. Recommendations

In many ways, the challenges facing the people of the Darby Creek Watershed track those facing people residing in other older, urbanized neighborhoods throughout the Commonwealth, or more generally, throughout the United States. The resulting decay of older communities and rapacious development of more affluent regions within the Watershed has adverse effects generally for land use, economic development and quality of life for the Watershed as a whole. In order to reverse some of these trends and improve the quality of the Watershed, we would like to make the following recommendations:

1. ***Establish a Darby Creek Watershed Greenway.*** Every effort should be made to create a Darby Creek Watershed Greenway, extending from the headwaters of Darby and Cobbs Creeks, continuing downstream to the confluence of Darby Creek with the Delaware River. Ideally, this Greenway would form a Darby Creek Park, similar to Fairmount Park in Philadelphia. Darby Creek Park would encompass existing County parks such as Kent Park in Upper Darby Township and Shrigley Park in Lansdowne Borough, as well as municipal parks such as the Willows in Radnor Township and Penn Pines in Upper Darby Township. Responsibility for maintaining this Park would rest primarily with the County but could be funded in part by the municipalities. Undeveloped tracts (or portions of them) such as the Haverford State Hospital site in Haverford Township and the Thompson and Whalen Tracts in Upper Darby Township might also be included. A greenway along portions of Naylor's Run should also be considered. Ideally, a series of trails would connect the larger park areas. Townships and boroughs may consider amending their zoning ordinances to preserve buffers along the creek.



Waterfall in Proposed Upper Darby Area Greenway

2. ***Monitor Stormwater Management Plan.*** As planning for the Greenway proceeds, all persons, groups and municipalities involved should stay apprised of developments regarding the Stormwater Management Plan being developed by the Delaware County Planning Department. Although the Stormwater Management Plan will be a more technical document than this Plan, it will have very significant ramifications on the Watershed.
3. ***Establish a Watershed Conservation District.*** One organization -- a Watershed Conservation District or other inter-governmental authority -- should be established and empowered to coordinate Watershed conservation matters. The work of this entity would include seeking grants and coordinating other available funds to bring the Park and Greenway to fruition. The organization will need sufficient financial resources and staffing to be effective. Its staff will be accountable to a board of directors which will include representation of the various municipal stakeholders (i.e, the County and the various townships and boroughs).
4. ***Identify Critical Parcels for Acquisition.*** The County and municipal planning departments should make it a top priority to identify open space within the proposed Greenway for potential acquisition. This planning will put specific properties on the radar screen of County and municipal councils. When an opportunity to purchase any of these properties arises, these governmental bodies would be aware of them and may have looked into the feasibility of such acquisitions as well as potential funding sources.
5. ***Consider Referenda to Create Funding Sources for Watershed Conservation.*** Referenda should be considered in each municipality, and at the County level, to establish a fund or floating bonds to raise money to acquire these open spaces.
6. ***Promote Efforts to Establish, Improve and Enforce Existing Land Use and Development Ordinances that Protect Floodplains and Promote Watershed***

- Conservation.** County and municipal planning departments should review existing subdivision and land development ordinances to assess their effectiveness in promoting good site planning and development with respect to Watershed issues.
7. ***Explore Innovative Development Techniques to Promote Conservation.*** County and municipal planning departments, as well as nonprofit groups like DCVA, should examine innovative development programs, such as transfer of development rights (TDRs) and conservation easement programs, to encourage the conservation of key Watershed properties and features.
 8. ***Promote Watershed Projects in Schools.*** This Plan should be distributed to all school districts within the Watershed and the districts should be encouraged to incorporate Watershed improvement projects and an introduction to the Darby Creek Watershed into the existing curriculum. This proposal does not suggest developing a whole course on the Watershed, but merely looking at the existing curriculum to consider how a project to improve a neighborhood park, or to establish a local water quality monitoring program, could be incorporated. If only one teacher develops a program or replicates an existing program that is a success in the Watershed, the ripple effect could be substantial.
 9. ***Convene Regular Watershed Conferences.*** DCVA and other groups should convene quarterly or annual conferences to encourage ongoing discussion of the goals of this Plan. Conferences provide an opportunity to bring many different stakeholders together to discuss progress, programs and opportunities.
 10. ***Additional Recommendations.*** Additional, specific projects are discussed more fully in the body of this Plan. A map of the "mainstream" projects with high priority items is appended to this summary.

**MISSION STATEMENT OF
THE DARBY CREEK VALLEY ASSOCIATION**

The Darby Creek Valley Association ("DCVA") is dedicated to the protection and enhancement of all of the watershed's resources, including water, wildlife, historical sites and the flood plain. The organization's immediate goals are to prevent all forms of pollution in the Darby Creek and its tributaries, to prohibit dumping and construction on the floodplain, and to expand our educational programs for all residents within the watershed. The DCVA also seeks to improve water quality and maintain a debris-free stream through cleanups and public education.

To join, contact the DCVA at P.O. Box 732, Drexel Hill, PA 19026.



*Historic Swedish Cabin Along Darby Creek
(Upper Darby Township)*

