

I.
INTRODUCTION
&
BACKGROUND



I. INTRODUCTION AND BACKGROUND

A. The River Conservation Plan Framework

The Darby Creek Valley Association (“*DCVA*”) and its technical consultants, Cahill Associates, have prepared this 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.

Generally, River Conservation Plans are intended to inventory significant river resources, identify potential threats to these resources, and recommend restoration, maintenance, or enhancement options in the form of a set of management strategies, all based on a vision of the watershed's future. To the extent possible, River Conservation Plans also are encouraged to identify *specific projects* that will be eligible for funding from other grant programs.

PADCNR has established a four-step planning process to guide this planning, which is being followed for this Darby Creek Watershed planning, which includes:

- Step 1 Determine public interest
- Step 2 Collect and analyze resource data
- Step 3 Prepare draft plan
- Step 4 Prepare final plan

In order to accomplish these program goals in general - and especially in the case for the highly diverse Darby Creek Watershed, public participation and involvement is critical. Because there



are so many different municipalities in this Watershed (31) and because these municipalities play such an important role in so many elements of watershed life and decision-making, municipal involvement and cooperation early on has been recognized as essential to the success of this Plan. First, the Plan consultants needed input from the municipalities to identify the key natural, historic, and recreational features and facilities within each municipality, as well as to provide land use and land use management information. Identification of Watershed issues and problems has relied heavily on municipal input, as has the process of establishing Watershed goals and undertaking the visioning that is so important for this Plan. Ultimately, identification of general types of restoration and conservation projects, as well as specific project listings, is also very much influenced by municipal participation, though not exclusively.

The public participation process developed for this Plan has included a series of public meetings, held in the evening, strategically located throughout the Watershed, as well as municipal meetings typically held during daytime hours for municipal staff and officials. Special Watershed posters have been prepared and distributed for display in each municipal building to help engender Plan interest and momentum. Building on the resources (and relationships) of an already well-established Watershed organization, DCVA's quarterly newsletter and other regularly scheduled events also have been used to promote the planning process. In some cases, special individual municipal meetings have also been arranged. A Watershed Study Advisory Committee (Municipal and Non-municipal) has been formed, including municipal representatives as well as a special list of priority Watershed professionals, and has been especially instrumental in the difficult work of defining Watershed projects and prioritization of Watershed projects.

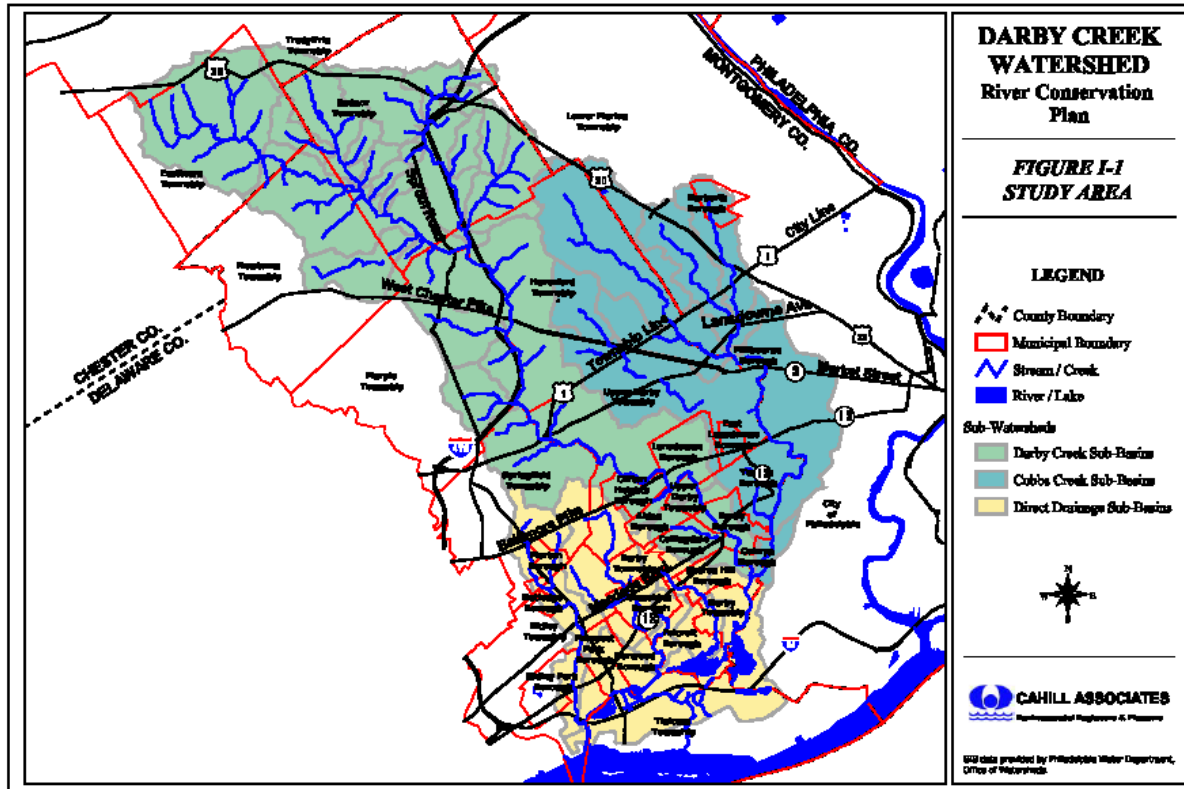
All of these efforts notwithstanding, all participants fully acknowledge that so much remains to be done. The hope is that this Plan, reinforced by continuing efforts of the DCVA as well as the Darby-Cobbs Partnership (see below), will serve as the impetus for truly meaningful Watershed conservation.

B. The Darby Creek Watershed Study Area

The Darby Creek Watershed Plan is an especially ambitious watershed plan, given the Watershed's complexity and high degree of urbanization. Darby Creek is located within southeastern Pennsylvania and flows into the Delaware River, south of the Schuylkill River and the City of Philadelphia (Figure 1-1). The Watershed straddles the Fall Line, the imaginary physiographic line separating the Coastal Plain, vividly exemplified by the John Heinz National Wildlife Refuge at Tinicum, from the rolling hills of the Piedmont. The Darby Creek Watershed includes more than 77 square miles and includes portions of Chester, Delaware, Montgomery, and Philadelphia Counties, with all or parts of 31 municipalities. Most of the Watershed is located within Delaware County. Major tributaries of the Darby Creek include Cobbs Creek, Naylor's Run, Indian Creek, Langford Run, Little Darby Creek, Julip Run, Ithan Creek, Meadowbrook Run, Wigwam Run, Foxes Run, Muckinipattis Creek, Hermesprota Run, Stony Creek, and Whetstone Run, all of which combine to flow into the tidal Darby at the John Heinz



National Wildlife Refuge at the Darby's juncture with the Delaware River, south of Little Tincum Island. The Refuge is the largest remaining freshwater tidal wetland in Pennsylvania. Tidal influence exists throughout this lower portion of the Darby and its tributaries, extending varying distances upstream on tributaries like the Muckinipattis, Stony, and Hermesprota Creeks, and also to old impoundment areas such as on the main Darby stem and Cobbs Creek.



Historically, the Watershed has developed from the lower downstream portions in Delaware County, which were some of the earliest settlements in the nation, as well as outward from the City of Philadelphia. This older development tends to be very dense; most of it pre-dates any significant stormwater management and other site development regulations. At the other extreme are the upper portions of the Darby Creek Watershed in Chester County, where development is much more recent and where development continues to compete for a rapidly dwindling supply of developable land, though this newer development tends to benefit from somewhat improved stormwater management and other site development regulations. Although an exact count has not yet been done, the Watershed, though not large by watershed standards, is home to a population that approaches 500,000 people (484,000 estimated by the Darby-Cobbs Watershed Partnership), for an average density of nearly 10 persons per acre. Its many businesses and economic enterprises provide many thousands of jobs, ranging from the robust high tech office parks at the top of the Watershed (e.g., the Radnor Corporate Park including the



former Wyeth-Ayers complex) to the many aged and declining heavier industries in the lower part of the Watershed (e.g., Folcroft Industrial Park).

Urbanization of this Watershed with the resulting changes to the natural landscape has taken its toll, especially upon water resources. These changes have often substantially altered the natural characteristics and flow patterns of streams. Both direct human intervention, as well as natural forces associated with surging flows from increased stormwater runoff, have straightened once slowly meandering streams, scouring streambeds, and eroding stream banks, making it difficult for aquatic life to continue, let alone thrive. With so much encroachment onto the natural floodplain by development, flooding has worsened, extending to adjacent homes and properties not previously subject to flooding. In multiple cases, Watershed development, particularly in the floodplains, has exposed homes and businesses to more frequent flooding. (Darby-Cobbs Partnership Status Report 2001).

The human relationship with watersheds has not always been a healthy one. Land development has often been done in a manner that has unnecessarily filled in wetlands. This has been detrimental to the Watershed because wetlands act as natural filters, cleaning stormwater runoff and protecting streams; they also mitigate flooding. The streams' natural floodplains, the land adjoining the streams, were paved in many places, destroying their natural buffers. Factories and homes were built, and sewers were constructed in the stream corridors to drain away wastewater.

Until recently, the impact of these changes to the land and streams—to watersheds--has not been fully understood or given much attention. The landfills, tank farms, and industrial facilities which once operated along the 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 now appear to be leaking. 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 sometimes even after the storm surge has passed, if the combined sewer overflow regulators malfunction). Sediment from land disturbed by development upstream has been transported by stormwater runoff into the stream system. Urbanization increases the volume and velocity of stormwater runoff, so that contaminants deposited in the streets and on paved areas, such as oil, gasoline, metals, and other substances are washed away and then deposited in the stream system. We are only beginning to address the problems caused by shortsighted land use and development practices that too often were used in the development of the areas surrounding the Darby Creek Watershed.

In fact, as much as this is a watershed of commonalities, this is a watershed of contrasts. It is a watershed of many personalities, often divergent in nature. It contains areas of considerable wealth, as well as areas that are economically challenged. In short, watershed planning becomes an even more challenging task, when the goals and priorities of the stakeholders in one portion of the Watershed can be substantially different from those of stakeholders in another part. This Plan strives to respect the many differences found throughout the Watershed, while emphasizing certain common goals and important linkages among the many communities within the Watershed. Therefore, although the Plan would be too cumbersome to discuss data from each of



the thirty-one municipalities on an individual basis, from time to time groupings have been developed which highlight these important Watershed distinctions.

C. The Darby Creek Valley Association (“DCVA”) and the Study Advisory Committee

DCVA is a nonprofit watershed organization dedicated to the protection and enhancement of the Darby Creek Watershed and its resources, including water, wildlife, historical sites, floodplains, wetlands, and riparian zones. A major goal of DCVA is the immediate prevention of all forms of pollution in the Darby Creek and its tributaries, including a prohibition against all forms of dumping and construction within floodplain zones and maintenance of a debris-free stream through clean-ups and expanded public education programs. DCVA has worked energetically to support the protection of historic properties, such as the Swedish Cabin and Blue Bell Inn, and has as its ultimate goal the development of a 30-mile greenway system to serve this Watershed’s many highly urbanized communities. DCVA, with assistance from the U.S. Environmental Protection Agency (“USEPA”), also supports a volunteer water quality monitoring program. DCVA continues to 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, the Philadelphia Water Department (“PWD”), and Aqua Pennsylvania (formerly known as Philadelphia Suburban Water Company).

In preparing this Plan, DCVA has strived to develop a vision for the restoration and protection of the Darby Creek Watershed that considers all residents and interest groups, all neighborhoods, and all municipalities. The goals of this Plan will only be realized through the cooperative efforts of the many diverse stakeholders in this Darby Creek Watershed.

D. Other Important Planning in the Watershed

In addition to this Plan, several other very important planning and management processes are ongoing in the Darby Creek Watershed. Given the seriousness of the Watershed challenges, it is of paramount importance that these major efforts be coordinated effectively and they work together successfully. The good news is that solving this Watershed’s special problems can benefit greatly from these united efforts. The downside risk is that keeping all of these efforts straight is far from simple and at times can be frustrating.

The Darby-Cobbs Watershed Partnership

Partnerships are essential. Several years ago, PWD, realizing its critical role in the Cobbs Creek and other portions of the Darby system, 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. PADEP generally encourages the development of watershed partnerships as a mechanism to improve water quality and meet



federal and state requirements. The Darby-Cobbs is one of several watersheds in the Southeast (others include the Wissahickon and the Tacony.) where partnerships are being established with PADEP assistance. The mission of the Partnership is “to improve the environmental health and safe enjoyment of the Darby-Cobbs Watershed by sharing resources through cooperation of the residents and other stakeholders in the Watershed. The goals of the initiative are to protect, enhance, and restore the beneficial uses of the Darby-Cobbs waterways and riparian areas. Watershed management seeks to mitigate the adverse physical, biological, and chemical impacts of land uses as surface and groundwater are transported throughout the watershed to waterways.”

The Partnership is currently developing a Watershed Management Plan which will assist Watershed stakeholders in simultaneously meeting State and Federal Clean Water Act-linked regulatory requirements while defining and tackling local priorities for restoration and protection of waterways. 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. Ideally, this Plan will also allow the Partnership stakeholders to apply for available funding for operation and maintenance of the Partnership as a consortium represented by the Watershed's stewards. The Watershed Management Plan is intended to include components that enable stakeholders to meet State required technical and public involvement requirements while at the same time, enable stakeholders to jointly develop goals and objectives for the Watershed. This will include the prioritization of problems and the evaluation of alternatives, followed by the publication of an overall Plan with recommendations targeted on a sub-watershed level. Partnership stakeholders will reevaluate the success of this Plan on a periodic basis to measure performance and to assess the need for Plan modifications.

A series of interrelated activities makes the Darby an especially good candidate for productive partnering. These activities include:

- **State List of Impaired Streams, 303d List, TMDLs:** Many sections of the Darby have been listed on the State’s list of “impaired streams,” as a result of PADEP’s statewide assessment of streams (PADEP has conducted and continues to conduct an assessment of all waterbodies in the State as required by the Clean Water Act); “impairment” means that the waterway is not achieving its State-designated stream standards. One portion of the Darby Creek, the Hermesprota Creek, has been further listed on the State’s 303(d) List. The Clean Water Act (“*CWA*”) requires the development of TMDLs for both point (wastewater treatment plants) and nonpoint pollutant sources for these impaired waters which are listed on this “303d List.” PADEP may decide in the future to list additional portions of the Darby system on the “303d List.” Because all of the Cobbs Creek as well as several other sections of the lower Darby Creek and a few sections in the upper portion of the Watershed have been designated as “impaired” by the State, clearly water quality problems exist. Future designations and actions notwithstanding, the City of Philadelphia has already proactively embarked on a water quality improvement program; although the primary focus of these efforts have been on Philadelphia’s portion of the Watershed, City efforts such as the water quality sampling discussed in Section IV involve the entire



Watershed. Also, given the fact that the Darby Watershed has no significant point sources of pollution (e.g., wastewater treatment plants) as such, water quality improvement efforts are likely to focus primarily on nonpoint sources and their equitable allocation in order to meet CWA water quality standards in the Watershed.

- **PWDs Combined Sewer Abatement Program:** The PWD has undertaken a major pollution abatement program to reduce the impacts of combined sewer overflows (“*CSOs*”) on the Cobbs Creek. Combined sewers are often found in older cities where one pipe is used to convey both sanitary sewage and stormwater runoff. During wet weather, flows of stormwater and wastewater which exceed the wastewater treatment plant capacity are conveyed untreated to local waterbodies. In response to national policy addressing this issue and as part of a PADEP-approved plan, PWD is implementing a series of capital programs to increase the amount of combined flow that receives treatment. In addition, and in recognition that total CSO removal will still not allow the stream to attain water quality standards, PWD is developing a watershed-based control plan that will recommend controls for CSO discharges along with other point and nonpoint source pollution reductions necessary for the stream to attain beneficial use standards. Benefits of this work are substantial and an ambitious water quality sampling program has been undertaken by the City, extending beyond the Cobbs Creek portion of the Watershed. This data will be used to further confirm the nature and extent of the water quality impacts in the Watershed and will be used to begin the development of water quality solutions for the Watershed. This water quality effort is discussed further in Section IV.
- **NPDES Phase II:** All of the municipalities in the Watershed will be affected by the National Pollution Discharge Elimination System (“*NPDES*”) Phase II stormwater plan and permit requirements for Municipal Separate Storm Sewer Systems or “MS4” communities (all municipalities over a certain population and/or with a certain threshold population density must be permitted under the requirements of this new program; in order to obtain these permits, detailed Phase II permit programs had to be prepared and submitted by each affected municipality by Spring 2003). These permit requirements are being phased in the future under the administration of both PADEP and the US Environmental Protection Agency. 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 MS4 municipalities (note that these NPDES Phase II ordinance requirements will have to be incorporated into the Act 167 Storm Water 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.

Given the variety and level of existing activities, the development of a partnership on the Darby-Cobbs makes sense. In addition to the PWD, the Darby-Cobbs Watershed Partnership includes a consortium of environmental groups, community groups, government agencies, residents, and



other Watershed stakeholders. Specifically, the Partnership coordinates all of the various study and planning efforts ongoing and being planned for the future to maximize their positive effect on the Watershed. The Pennsylvania Environmental Council acts as the coordinator for the Partnership. In addition to the PWD, partners at the present time include: DCVA, the Cobbs Creek Community Environmental Education Center, DCPD, the Montgomery County Planning Commission (MCPC), the John Heinz National Wildlife Refuge at Tinicum, the City of Philadelphia Fairmount Park Commission, USEPA, US Fish and Wildlife Service, Delaware River Basin Commission (“**DRBC**”), PADEP, PEC, Drexel University, and the Sunoco Corporation, and the list is growing. The Partnership is supported by the PWD and by various grants and will continue to function in important ways in future months.

Act 167 Stormwater Management Plan

The Delaware County Planning Department (“**DCPD**”), in cooperation with adjoining Watershed counties (Chester, Montgomery, and Philadelphia), is preparing an Act 167 Stormwater Management Plan for Darby Creek, funded in part through a PADEP grant. Preparation of this watershed-level study involves a complex planning process, with detailed inventorying and complex hydrologic modeling. The 167 Plan will identify stormwater problems and include development of new regulatory requirements which Watershed municipalities will be required to adopt. It should be noted that Act 167 plans are designed to address future stormwater impacts from new development, not correct problems resulting from existing development. Therefore, given the mostly developed status of the Darby Creek watershed, effectiveness of the plan will be limited to its ability to control runoff from future development. Although Act 167 plans have historically focused only on water quantity issues, recent re-interpretation of the Act now requires water quality considerations to be taken into account when managing future runoff. Because the 167 Plan is not on the same schedule as this Plan, various 167 outputs such as the model stormwater management ordinance cannot be provided as this document goes to press.

It should be noted here that Watershed issues for many Watershed stakeholders have been heavily targeted on a history of severe flooding which has occurred in selected portions of the Watershed, particularly in the lower portions of the Watershed (e.g., Upper Darby Township, Darby Borough and Township). For those residents and stakeholders directly impacted by this flooding as well as for those municipal officials most severely impacted by this flooding, the expectation has been that the Act 167 Stormwater Management Plan, and even the Plan, would solve these problems. Explaining how and why this is not the case has been challenging.

Act 537 Sewage Facilities Plan Update for Eastern Delaware County

Act 537 is a State-mandated program which requires individual municipalities to undertake sewage facilities planning to establish existing and future needs. In this case, Delaware County (specifically the DCPD) has volunteered to prepare a 537 plan update for the many different municipalities within the Darby Creek Watershed (eastern Delaware County), virtually all of which (excepting Newtown Township) also rely on the County’s 1971 Sewage Facilities Plan. This planning is being undertaken with the Delaware County Regional Water Quality Control Authority (“**DELCORA**”), the regional authority created by the County to implement the 1971 Plan. With the exception of Tinicum Township which has its own municipal treatment plant, all



of the Watershed wastewater is treated through the elaborate system of interceptor collection sewers plus large pump stations and force mains developed as part of this system; wastewater is ultimately treated at the City of Philadelphia Southwest Water Pollution Control Plant. The system is complicated by the existence of a variety of smaller authorities which own and operate localized collection facilities, including the Radnor-Haverford-Marple Authority, the Darby Creek Joint Authority, the Central Delaware County Authority, and the Muckinipattis Sewer Authority, in addition to individual municipal authorities. In terms of remedying existing and future problems and planning for future needs, this 537 Plan is critical. The 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 variety of specific projects are being undertaken by Watershed municipalities (see Section VII). Perhaps the most significant individual project is the ongoing analysis of the proposed development of the former Haverford State Hospital site in the central portion of the Watershed. Although a portion of the large wooded tract was previously developed for mental hospital facilities, the bulk of this keystone Watershed site remains undeveloped and offers a tremendous conservation and recreation opportunity in this heavily developed Watershed. It is a wonderful opportunity for furthering the goals 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.

E. A Brief History of Watershed Problems and Issues

As a substantially developed watershed where development has often occurred at high densities predating even the most basic stormwater management regulations, the Darby Creek Watershed suffers from a variety of water resource, general environmental, and other Watershed problems. The significant change in the natural landscape with the tremendous addition of impervious cover undoubtedly 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, because stormwater runoff has increased, serious flooding occurs in many different parts of the Watershed. This increased runoff also means that far less water filters naturally back into the ground to replenish the groundwater, resulting in significant declines in stream baseflow. Stream flow quickly “flashes” into out of bank flooding during rains and then quickly sinks to a trickle after the rain stops. The flash flood flows 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. Flooding problems were demonstrated vividly in Springfield Township, Drexel Hill, Upper Darby (Naylor’s Run), Colwyn, Eastwick, Darby Borough, and other Watershed communities during Hurricane Floyd. Flooding remains a serious issue in this Watershed.



On the water quality side, 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 thread up and down Watershed stream valleys for many miles, as well as pollutant inputs from CSOs in the Cobbs Creek. Nonpoint loadings combine with various other hazardous waste site discharges, private wastewater treatment plant discharges, and miscellaneous sources, such as a proliferating Canadian geese population, to make overall water quality significantly degraded.

One of the most serious problems in the Watershed has been the direct impact of development on the stream system itself, from extensive re-channeling and relocation of the stream to outright total piping, enclosure, and burial. Burial of the stream may solve one problem (though even this is questionable), but creates many more problems. Indeed, as the result of this environmentally shortsighted and practically ineffective practice, many flooding problems have been exacerbated (the burial of Naylor's Run is a good example of this practice and its problems). Water quality problems have worsened as well.

To make matters worse, land uses historically have encroached into the floodplain. Many current uses were built before the existence of floodplain regulations. Still, floodplain encroachment continues today as developers search out vacant parcels, even those with serious environmental constraints. Many municipalities maintain only minimum floodplain regulations, which allow substantial disturbance of sensitive floodplain zones, if the new uses are flood-proofed. Frequent bridge abutments and old dam structures interfere with the free flow of the stream. Dumping has occurred and continues in many locations. Riparian buffers have been removed and stream banks are often heavily eroded which causes serious problems in the aquatic habitat. In short, the stream has been substantially impacted by a broad array of human activities.

The issues certainly transcend water resources. Most of the older development in the lower portions of the Watershed was constructed well before current environmental regulations and community service standards were put in place. These communities, so many built in the 19th century and early part of the 20th century, lack the recreational facilities, active and passive, which we now define as appropriate and desirable for healthy communities. Housing stock has aged and, as employment opportunities have radiated ever outward (and upward in terms of the Darby Creek Watershed), people have followed jobs. Certain areas in the lower communities in the Watershed have experienced decline. Once prosperous neighborhoods have fallen into serious decline and suffer increasingly from the host of human-scale problems which are so often associated with this cycle of decline. Older neighborhoods are disposed of and cast aside by all those households or businesses having the economic mobility to keep moving. Meanwhile, infill development rapidly consumes what little vacant land remains in the Watershed, even as other properties go abandoned. In addition, upstream development in the Watershed often has a detrimental impact on those downstream, in terms of runoff contamination, silting, debris and flooding.

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. The purpose of this Plan is to describe existing problems, to set forth goals for improving the quality of the Watershed and to recommend feasible steps to achieve those goals.