

Increasing development pressures in many parts of the Lehigh Valley have resulted in increased awareness and interest in preserving open space. A range of techniques can be used to conserve open space from absolute to minimal protection. Since it is neither practical nor desirable for local government to regulate everything, a combination of landowner stewardship and public sector regulation is fundamental to the preservation of natural resources as conservation is most effective when various techniques are applied together. The options available to local governments include regulatory, non-regulatory and administrative measures. Any of the available measures described below should be carefully evaluated and implemented to meet the environmental and political needs of each municipality.

Land Conservation Techniques

Permanently protecting environmentally sensitive, historically important and/or culturally significant lands from undesirable development can be a challenging and time-consuming task. Choosing the appropriate method of preservation involves evaluating the landscape to identify the features needing protection, assigning priority to the land to assure the most sensitive and at-risk features are protected, and selecting suitable methods and entities to accomplish the conservation objectives.

Many valuable resources would have been developed from their natural undisturbed state had it not been for the hard work and collaboration of local governments and nonprofit organizations that aim to acquire and protect land identified by the Lehigh Valley Planning Commission (LVPC) as high priority resource lands. Land trusts that are actively protecting lands in the Lehigh Valley include:

Wildlands Conservancy

Emmaus, PA

Since 1973, Wildlands Conservancy has been working to protect and enhance the quality of place that we all enjoy here in the Lehigh River watershed, as well as elsewhere in eastern Pennsylvania. As a non-profit, member-supported organization, we work on ways to protect water quality throughout the watershed, and we assist efforts to create, enhance, maintain, and promote parks and trails. We have protected more than 40,000 acres of critical farmland and wildlands in eastern Pennsylvania. We also foster responsible stewardship of our resources through education of our youth and by raising the environmental awareness of the general public.

Natural Lands Trust

Media, PA

Natural Lands Trust is a non-profit land conservation organization protecting land in communities throughout the greater Philadelphia region. We envision and work to build an interrelated system of permanently protected open space comprised of the regions most important natural areas, cultural landscapes, and sustainable agricultural lands. Within this open space network, Natural Lands Trust: - Creates, owns and manages signature preserves; - Protects and monitors lands under conservation easement; - Helps conservation-minded partners and clients conserve land; - Actively manages thousands of preserved acres and teaches others best practices in land stewardship.

Heritage Conservancy**Doylestown, PA**

Heritage Conservancy preserves the open spaces and historic places that are so essential to our region's quality of life by working with citizens, community groups, private landowners, municipalities, and state and federal agencies to promote and implement open space and natural resource protection, green urban planning, agricultural land protection, innovative sustainable land use practices, preservation and/or adaptive re-use of historic structures, wildlife habitat restoration and best land management practices.

Appalachian Trail Conservancy**Boiling Springs, PA**

The Appalachian Trail Conservancy is a volunteer-based, private non-profit organization dedicated to the conservation of the 2,175-mile Appalachian National Scenic Trail, a 250,000-acre greenway extending from Maine to Georgia. Our mission is to ensure that future generations will enjoy the clean air and water, scenic vistas, wildlife and opportunities for simple recreation and renewal along the entire Trail corridor.

The most commonly used land conservation techniques are: fee simple acquisition, conservation easements and land management/stewardship.

Fee Simple Acquisition

Fee simple acquisition is the most straightforward method of preservation. A fee simple acquisition provides the greatest level of protection as a landowner sells their rights, title and interest in the property to the buyer, who then owns and maintains the land. Either by purchase or donation (tax benefits may apply to the donor), the receiving entity will hold the deed and be responsible for the insurance, taxes, liabilities and long term management of the property.

Through the Community Conservation Partnership Program (C2P2), DCNR provides technical assistance and grant funding to counties, municipalities, land trusts and preservation organizations for acquisition projects that preserve natural, cultural and recreational areas. The state and federal funds are available to encourage the preservation of publicly available open space and natural areas either through fee simple acquisition or acquisition of conservation easements.

Conservation Easement

A conservation easement is a method of protecting the significant resources of a property with deed restrictions that targets only those rights necessary to protect the land's conservation value. Through a conservation easement a landowner voluntarily assigns restrictions on the future use of the land; therefore, protecting sensitive environmental features, riparian buffers, greenways, historic resources, scenic vistas, and agricultural lands in perpetuity. Once again through purchase or donation a landowner conveys their development rights to the receiving entity yet retains ownership of the property, including the ability to sell or pass it on to heirs. Future owners of the land will also be bound by the conservation easement terms.

Conservation easements are a popular option amongst landowners as the responsibilities and rewards of ownership continue, thus the landowner retains full control over public access just as he did before granting the easement. However, in most instances when public dollars are used, this method of land preservation may require monitored public access when it is compatible to the conservation objectives. Also attractive to local governments, easement acquisition provides valuable open space to communities at a lesser cost to taxpayers than fee simple acquisition. This results in the generation of a significant public benefit through the permanent protection of more land using fewer funds.

Land Management/Stewardship

The least expensive land preservation technique is land stewardship through the careful management of land alteration to ensure that the natural (and cultural resources) are maintained and/or enhanced. This method of protection involves the thorough understanding of the value and roles of the resources present and incorporating this understanding into the development and maintenance of both privately and publicly owned land.

Conservation based development is one method of stewardship guided by the preservation of the conservation value of the property as well as the achievement of the economic goals of the landowner. Careful planning and design that incorporates open areas into a development site ensures that the highest priority natural areas are preserved. These areas can be used for recreation or preserved as open space. This method may use a combination of many land preservation techniques and is an alternative to traditional development.

Regulatory Measures

The *Pennsylvania Municipalities Planning Code (MPC)*, in effect since 1969, and updated several times since, provides the enabling legislation to municipalities for the creation of comprehensive plans, and the establishment and use of regulatory land use ordinances. The general intent of the MPC is to give municipalities the police power to guide coordinated development; guide uses of land, structures, streets, and public facilities; and to promote preservation of natural and historic resources. Comprehensive Plans and regulatory ordinances are often the primary means a municipality uses to both guide potential open space acquisitions and enforce the protection of natural features from the development or use of a property.

Comprehensive Plan

The municipal Comprehensive Plan is a legal document that serves as a decision-making guide for both officials and citizens. It is intended to assist the municipality in making decisions about future growth and development. The process of developing the plan is perhaps as important as the final document. The process examines existing conditions and issues unique to the municipality and establishes goals and policies that support the municipality's desired future character and form. Relative to open space and environmental feature protection, the Comprehensive Plan can include objectives, strategies and recommended actions designed to ensure the provision of open space in the municipality. Further, it can include observations on general open space deficiencies and potential acquisition sites that would serve as the foundation for a municipal open space plan. Essentially a roadmap for the future, the goals and policies of the Comprehensive Plan serve as the document which the Official Map and/or municipal ordinances are based upon.

Official Map

Article IV of the *Pennsylvania Municipalities Planning Code* (MPC) enables municipalities to prepare an official map and take proactive measures in shaping important components of their future development, in contrast to simply reacting to developers' proposals. Adopted by ordinance, it serves as a visionary document that specifies properties the municipality wants to acquire for public improvements.

The official map is a seldom used land use management tool that can help municipalities plan the location and layout of future roads and public areas and preserve rights-of-way. By doing so, it reserves this land for future public use. When consistent with a municipal subdivision and land development ordinance (SALDO), zoning ordinance, and comprehensive plan, it can give strength and validity to a municipality's wants and needs for future growth. Further, it is an excellent supporting document for grant applications involving land or easements intended for open space or park facilities. For example, mapping future parks and recreation areas demonstrates that the municipality has proactively planned for these improvements, instead of reacting to unanticipated needs.

A wide variety of elements can be shown on the map as long as they are consistent with the MPC. The official map can include features such as:

- Existing and proposed public streets, watercourses, and public grounds, including widening, extensions, openings or closings
- Bikeway routes (both separate trails and those proposed along existing roads)
- Existing and proposed public parks, playgrounds, and open space reservations
- Pedestrian ways and easements
- Railroad and transit rights-of-way and easements (including those that may be vacated or abandoned and have potential use as trails)
- Stream valley corridors and other environmentally critical areas such as unique and scenic areas, or habitats of endangered species
- Flood control basins, floodways, and floodplain, stormwater management areas, and drainage easements
- Potential public well sites or groundwater resources areas
- Historical and archaeologically significant areas

The official map is not a taking of private land. If by virtue of the official map a landowner is denied reasonable use of his property, he or she can apply for a special encroachment permit that would allow them to build on the site. If a landowner notifies the municipality of their intention to develop a site identified on the map, the municipality has one year to acquire the site or the reservation of that land becomes invalid. The landowner is free to use any unmapped portions of the land in accordance with the municipality's zoning and subdivision regulations.

The official map need not be surveyed. A metes and bounds survey is not required until an actual purchase of land or easement is proposed by the municipality. It does not obligate the municipality to open, maintain or improve mapped roads or build the improvements cited on the map. It does not serve as the municipality's zoning map or comprehensive plan as it is a document of limited purpose and its legal impact is quite specific. The creation

of the official map is not necessarily an expensive undertaking. It can be simple or complex, with varying levels of detail. The level of complexity largely depends on the vision and the role of the map in helping elected officials make land use decisions.

In the Lehigh Valley, Lehigh County and the following municipalities have adopted official maps:

Allen Township (May 2000)
Bushkill Township (April 2005)
Hanover Township (Northampton County) (November 1996)
Moore Township (March 2003)
Whitehall Township (November 1998)

Municipal Ordinances

In addition to comprehensive planning, a municipality can enact regulatory measures to protect vulnerable natural resources through the following methods:

Subdivision and Land Development Ordinances (SALDO)

When a piece of land is divided into two or more lots, the land is considered to have been subdivided. Subdivision ordinances specify certain minimum requirements and standards that all land divisions must include. The municipality's SALDO can include a number of regulations that can preserve open space and protect environmental features.

Mandatory Dedication/Fee in lieu

The MPC provides for the mandatory public dedication of lands suitable for recreation purposes or the payment of fees in lieu of such lands. Municipal SALDOs can require fees paid by the developer to be deposited into a fund specifically for the construction of recreational facilities, reservation of land for parks or open space or a combination thereof. The MPC requires the formal adoption of a recreation plan as a prerequisite to implementation of these provisions. The fee in lieu of option ensures that all subdivisions provide for a proportionate share of the open space needs of the municipality. Both lands and fees obtained must be used to provide park or recreation facilities accessible to future residents of the development from which they were obtained.

Stormwater Management Best Management Practices (BMPs)

Preserving open space in a natural and undeveloped condition is an excellent best management practice (BMP) for groundwater protection, both for surface and groundwater supplies by filtering runoff and pollutants from impervious areas. It also provides additional area for other BMPs. They capture, treat and infiltrate stormwater on-site, helping to maintain the natural hydrology as development occurs. The LVPC recently developed a BMP manual as part of the *Global Act 167 Stormwater Management Plan Water Quality Update*. The Global Update was adopted by both counties and approved by the Pennsylvania Department of Environmental Protection in 2006.

The following table shows that a number of Lehigh Valley municipalities regulate, to some degree, the protection and preservation of natural features through municipal ordinances.

MUNICIPAL NATURAL RESOURCE PROTECTION ORDINANCES *										
Municipality	Rivers & Streams (Riparian Buffers)		Floodplains	Wetlands	Steep Slopes		Woodlands		Important Natural Areas ¹	
	Major Streams	Minor Streams			15 - 25%	25% +	Forestry	Preservation	Present	Provisions
LEHIGH COUNTY										
Alburtis Borough	No	No	Yes	No	Yes	Yes	No	Yes	No	No
Allentown City	No	No	Yes	Yes	No	No	Yes	Yes	No	No
Bethlehem City	No	No	Yes	No	Yes	Yes	No	No	No	No
Catasauqua Borough	No	No	Yes	Yes	No	No	No	No	No	No
Coopersburg Borough	No	No	Yes	Yes	Yes	Yes	No	Yes	No	No
Coplay Borough	No	No	Yes	No	No	No	No	No	No	No
Emmaus Borough	No	Yes	Yes	Yes	Yes	Yes	No	No	No	No
Fountain Hill Borough	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
Hanover Township	No	No	Yes	No	No	No	No	No	No	No
Heidelberg Township	No	No	Yes	Yes	Yes	Yes	No	Yes	Yes	No
Lower Macungie Township	No	No	Yes	Yes	Yes	Yes	No	Yes	Yes	No
Lower Milford Township	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Lowhill Township	No	No	Yes	No	Yes	Yes	No	No	Yes	No
Lynn Township	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Macungie Borough	No	No	Yes	No	No	No	No	No	No	No
North Whitehall Township	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Salisbury Township	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Slatington Borough	No	No	Yes	Yes	Yes	Yes	No	Yes	Yes	No
South Whitehall Township	No	No	Yes	No	No	No	No	No	Yes	No
Upper Macungie Township	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Upper Milford Township	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Upper Saucon Township	No	No	Yes	No	Yes	No	Yes	Yes	Yes	No
Washington Township	No	No	Yes	No	Yes	Yes	No	Yes	Yes	No
Weisenberg Township	No	No	Yes	Yes	Yes	Yes	No	Yes	No	No
Whitehall Township	No	No	Yes	No	No	No	No	No	Yes	No

MUNICIPAL NATURAL RESOURCE PROTECTION ORDINANCES *

(cont'd.)

Municipality	Rivers & Streams (Riparian Buffers)		Floodplains	Wetlands	Steep Slopes		Woodlands		Important Natural Areas ¹	
	Major Streams	Minor Streams			15 - 25%	25% +	Forestry	Preservation	Present	Provisions
NORTHAMPTON COUNTY										
Allen Township	No	No	Yes	Yes	Yes	Yes	Yes	No	No	No
Bangor Borough	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Bath Borough	No	No	Yes	No	Yes	Yes	No	No	No	No
Bethlehem City	No	No	Yes	No	Yes	Yes	No	No	No	No
Bethlehem Township	Yes	Yes	Yes	No	Yes	Yes	No	No	Yes	No
Bushkill Township	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No
Chapman Borough	No	No	Yes	Yes	No	No	No	Yes	No	No
East Allen Township	Yes	Yes	Yes	No	Yes	No	No	No	No	No
East Bangor Borough	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
Easton City	No	No	Yes	No	Yes	Yes	No	Yes	No	No
Forks Township	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Freemansburg Borough	No	No	Yes	Yes	Yes	Yes	No	Yes	No	No
Glendon Borough	No	No	Yes	Yes	Yes	Yes	No	Yes	No	No
Hanover Township	No	No	Yes	No	No	No	No	No	No	No
Hellertown Borough	No	No	Yes	No	No	No	No	No	No	No
Lehigh Township	No	No	Yes	No	Yes	Yes	Yes	No	Yes	No
Lower Mt. Bethel Township	No	No	Yes	No	Yes	No	Yes	No	Yes	No
Lower Nazareth Township	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No	No
Lower Saucon Township	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Moore Township	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes	No
Nazareth Borough	No	No	Yes	No	No	No	No	No	No	No
North Catasauqua Borough	No	No	Yes	No	No	No	No	No	No	No
Northampton Borough	No	No	Yes	No	No	No	No	No	No	No
Palmer Township	Yes	Yes	Yes	Yes	No	No	Yes	Yes	No	No
Pen Argyl Borough	No	No	Yes	Yes	Yes	Yes	No	Yes	No	No
Plainfield Township	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Portland Borough	No	No	Yes	No	No	No	No	No	No	No
Roseto Borough	No	No	Yes	No	Yes	No	No	No	No	No
Stockertown Borough	Yes	No	Yes	Yes	No	No	No	Yes	No	No
Tatamy Borough	Yes	No	Yes	Yes	No	No	Yes	No	No	No
Upper Mt. Bethel Township	No	No	Yes	Yes	Yes	Yes	No	No	Yes	No
Upper Nazareth Township	Yes	Yes	Yes	No	No	No	No	No	No	No
Walnutport Borough	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Washington Township	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No
West Easton Borough	No	No	Yes	No	No	No	No	No	No	No
Williams Township	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Wilson Borough	No	No	Yes	No	No	No	No	No	No	No
Wind Gap Borough	No	No	Yes	No	No	No	No	No	Yes	Yes

*It is possible that the table and the ordinances might not reflect more recent amendments. As such, the accuracy of the information displayed cannot be guaranteed.

¹Important Natural Areas include those areas identified in *A Natural Areas Inventory of Lehigh and Northampton Counties, Pennsylvania*, 2005. The Pennsylvania Science Office of the Nature Conservancy.

The following is a list of outstanding sample natural resource protection ordinances chosen from among municipalities on the list above. The full text of the ordinances can be found at the LVPC offices and is available upon request.

1. Comprehensive Natural Features Protection Ordinance

As a regulatory method to protect a variety of natural features, this approach is the most comprehensive and easiest to administer. Instead of several stand alone ordinances, it is a concise set of regulations, packaged as a section in a zoning ordinance, or as one stand alone ordinance. The examples listed below protect a host of the natural features highlighted previously in this chapter.

Lower Saucon Township, Northampton County
Heidelberg Township, Lehigh County
Upper Mount Bethel Township, Northampton County

Specialized environmental features ordinances that are not generally covered in a natural features omnibus ordinance include:

2. Sinkhole Prevention

Lehigh Valley Planning Commission (LVPC) Model Regulations
Williams Township, Northampton County

3. Forestry

Lower Saucon Township, Northampton County
Upper Macungie Township, Lehigh County
Upper Milford Township, Lehigh County
Penn State University Cooperative Extension Model Ordinance

4. Wellhead Protection

LVPC Model Wellhead Protection Ordinance

Zoning Techniques

The *Pennsylvania Municipalities Planning Code* (MPC) designates zoning as a tool for regulating land uses, including open space and recreational facilities. The primary function of zoning should be to implement the municipality's comprehensive plan. It regulates the use of private property in the public interest and may be used to protect natural resources.

Overlay districts

An overlay district directs development away from sensitive or environmentally important lands. It is a set of regulations that are in addition to the base zoning district and is usually applied to specific locations within the municipality. Techniques such as conservation subdivisions, buffer strips and numerous performance standards are usually included in overlay regulations.

Performance Standards

“Performance zoning” is a flexible alternative to traditional land use zoning. Where traditional zoning specifies land uses within districts, performance zoning specifies the intensity of land use that is acceptable in consideration of the surrounding environment. With performance standards municipalities can steer development away from natural features, limit the intensity of development, and limit negative effects of development on public infrastructure. This option allows developers more flexibility in design since the use of a property is not restricted as long as the impacts to the surrounding land are not negative.

Sliding Scales

Sliding scale zoning limits the number of times a parcel can be subdivided to a maximum number established by the zoning ordinance. This method prevents the complete residential subdivision of large parcels, because of the diminishing returns as tract size increases. Conventional zoning would permit a fixed number of lots per acre regardless of tract size. Sliding scale zoning allows some residential development without using the entirety of the land. For example, a sliding scale would permit one building lot for every 10–20 acres, two lots for every 20–40 acres, three lots for every 40–80 acres and only four lots for parcels over 80 acres.

Conservation Subdivision Design

A conservation subdivision is a land development of common open space and clustered compact lots. The purpose of a conservation subdivision is to protect natural resources while allowing for the maximum number of residences under current municipal zoning and subdivision regulations. Conservation subdivision ordinances generally require permanent dedication of 40% or more of the total development parcel as open space. Open space design requirements often include contiguity and connection to other open space or conservation areas.

Planned Residential Development (PRD)

Planned residential development is a form of mixed use development that includes open space. They may consist of single-family dwellings, duplexes, multifamily dwellings, or a mixture of housing types. PRD encourages well-planned developments. The planned residential development option is intended to give landowners greater flexibility in developing tracts of land on a project basis by relaxing the various lot area, lot width, setback, yard and other regulations. PRD regulations can also mandate open space, similar to conservation design.

Lot Averaging

Lot averaging is a method that allows flexibility in lot size. This technique permits one or more lots in a subdivision to be undersized, as long as the same numbers of lots in the subdivision are oversized by an equal or greater area than what the zoning district permits. This allows a developer to work around existing natural features, such as wetlands, by making adjacent lots smaller, and locating them in protected open space.

Transfer of Development Rights (TDR)

The transfer of development rights “transfers” development to another part of the municipality where development and infrastructure may already exist. The goal of a TDR is to direct growth to an already developed, or developing, area. Landowners of these properties, usually in farmland or rural areas (senders) sell development rights to developers in areas designated for higher density development (receivers). The municipality or a nonprofit agency can act proactively, by purchasing the development rights and “retire” them, making them unavailable for future use, or “bank” them, making them available to interested developers for their use in receiving areas. An excellent resource on the TDR option is *Transfer of Development Rights* by the Environmental Management Center of Brandywine Conservancy.

Protecting Environmental Features through Zoning

Outside of creative methods to shape or otherwise limit development, significant natural features can be protected by specific stand alone ordinances or sections of the zoning ordinance. In practice, across the Lehigh Valley, it is the most proactive and successful approach a municipality can undertake in protecting natural features.

Floodplains

Floodplain areas absorb and store large amounts of water, which is a source of aquifer recharge. The floodplain is defined by the 100-year or base flood which has a 1 percent chance of being equaled or exceeded in a given year. The floodplain includes floodways and flood fringes. The majority of communities have floodplain regulations of varying regulatory restrictiveness. Natural vegetation supported by floodplains helps trap sediment from upland surface runoff, stabilizes stream banks and reduces soil erosion. Floodplains also provide shelter for wildlife and proper stream conditions for aquatic life. Many of the most scenic areas in Lehigh and Northampton counties are found within the floodplain of the Delaware River, Lehigh River, and larger streams such as the Little Lehigh Creek, Jordan Creek and Bushkill Creek.

Water quality is also affected by the action of water in a floodplain. When soil particles are scoured from the surface of the earth by water erosion, they can travel into fish habitats and human drinking sources. Reduced sedimentation in streams and rivers can aid in protecting an area from serious flooding by not clogging stream channels and drainage ditches. The intent of regulating development in floodplain areas is to eliminate loss of life, health hazards and property damages which may be caused by floods; to preserve the capacity of stream channels and adjacent floodplain areas to carry flood waters; and to encourage the use of flood prone land for open space uses.

Riparian buffers

A riparian buffer is an area of trees and other vegetation adjacent to a watercourse that forms a transition area between land and the watercourse. A riparian buffer ordinance establishes riparian buffers and regulates the size and permitted disturbances of the buffer. The riparian buffer is designed to intercept runoff from upland sources for the purpose of neutralizing the effects of nutrients, sediment, organic matter, pesticides or other pollutants before they enter the watercourse.

To be most effective, buffers should be considered along all streams, including intermittent and ephemeral channels. The effectiveness of a riparian buffer can be improved by limiting impervious surfaces and strictly enforced on-site sediment controls. Both grassed and forested buffers are effective at trapping sediment, although forested buffers provide other benefits as well, such as providing wildlife habitat.

Steep slopes

Steep slope regulations limit or prohibit development on areas of steep slope. The definition of steep varies from municipality to municipality, with 15% typically the minimum gradient classified as steep. Steep slopes are vulnerable to damage resulting from site disruption, primarily related to soil erosion. Such damage is likely to spread to areas that were not originally disturbed. Such erosion reduces the productivity of the soil, and results in increased sedimentation in drainage ways, wetlands and streams. Development of steep slopes, especially adjacent to stream corridors, can increase erosion of stream banks, resulting in pollution and decreased water quality.

Increased sedimentation also increases flood hazards by reducing the floodwater storage capacity and elevating the flood level of the drainage system in low-lying areas. Beyond these threats to the public safety, disruption of steep slopes also increases the likelihood of slippage and slumping — unstable soil movements, which may threaten adjacent properties, buildings, and public facilities such as roads and utilities.

Woodlands and Trees

Woodland and tree preservation regulations control and regulate the excessive removal, cutting, and destruction of trees. Woodlands stabilize the soil, control water pollution and provide a natural habitat for wildlife. Development can lead to tree loss and remaining trees lose vigor because of damage sustained during construction. Municipalities can limit both tree loss and tree damage with well conceived tree preservation ordinances or policies.

The goals of tree preservation are twofold. First, it seeks to protect designated trees. Secondly, it attempts to minimize impact to those trees during construction. The protection of native, non-invasive species of vegetation and older specimens of trees is accomplished by designing standards that regulate the type of vegetation to be removed and the circumstances under which it can be removed.

Wetlands

Wetlands are all lands regulated as wetlands by the Pennsylvania Department of Environmental Protection and/or the United States Army Corps of Engineers. Such areas are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions, including swamps, marshes, bogs and similar areas.

Many of these wetlands are seasonal (they are dry one or more seasons every year). The quantity of water present and the timing of its presence in part determine the functions of a wetland and its role in the environment. Even wetlands that appear dry at times for significant parts of the year (vernal pools) can provide habitats for wildlife. A wetland must have “hydrophytic vegetation,” defined as plants adapted to tolerate oxygen-poor, wet conditions. A wetland also must have “hydric soil,” which is soil that formed when oxygen was lacking because of prolonged inundation or saturation.

Wetlands have important filtering capabilities for collecting runoff from higher dry land before the runoff reaches streams and rivers, maintain stream flow during periods of drought, and can assist in replenishing groundwater. They also serve an important role in flood management since the holding capacity of a wetland can lessen the effects of a flooding event.

Wellhead protection

A wellhead protection ordinance regulates land use activities within defined critical recharge areas surrounding public water supply wells. The ordinance is structured to prohibit certain land use types, which could contaminate the water supply, from locating within the defined critical recharge areas. It can be a stand alone ordinance or be part of a zoning or subdivision and land development ordinance.

Sinkholes

The majority of the Lehigh Valley is underlain by soluble carbonate rock. When areas within a municipality are underlain with carbonate bedrock, these areas are often unstable and susceptible to collapse and the formation of closed depressions and sinkholes. This process can threaten the local groundwater supply by leaving the water vulnerable to contamination that moves through the rock's fractures and openings. The goal of this type of regulation is to protect groundwater resources and reduce the frequency of property damage due to sinkhole collapse.

The "Net Out" of features

The net out of resources refers to the technique of deducting environmentally constrained lands from development density calculations. Netting out is intended to protect and preserve environmentally constrained areas by reducing or eliminating the credit given for these lands toward the amount of development permitted on a given site.

Financial Implementation

The conservation of land for open space and/or greenways can create costs (lost tax revenue) and benefits (increased values for nearby properties, recreational and other amenities) for municipalities. There are several options for acquiring open space, ranging from or a combination of pay-as-you-go using tax revenue; borrowing funds via traditional loans or general obligation bonds; or federal, state and local grant programs.

With pay-as-you-go approaches, the government spends revenues from general appropriations or from a dedicated funding source such as property taxes, earned income taxes, real estate transfer taxes, dedicated open space tax or budget surpluses with no borrowing costs. This approach is an incremental approach, with a focus on acquisition of small parcels or completion of projects in stages. The cost of the open space is essentially borne by the present residents of the municipality.

Utilizing a borrowing approach, municipalities issue bonds or borrow from commercial lenders. It allows the municipality to expeditiously fund significant acquisitions or complete major projects. Borrowing spreads the cost of the open space over present and future residents of the municipality. Municipalities can combine the two approaches, borrowing funds for acquisition debt and implement a dedicated tax for open space acquisition. Revenues from the dedicated tax pay off the debt.

Another less commonly known method is the Installment Purchase Agreement (IPA). An IPA puts the purchase price into a tax-free annuity instead of giving the money directly to the landowner. The landowner receives tax-free interest from the annuity for a fixed number of years and then at the end of the period the full amount of the principal is transferred to the owner. In this way the landowner postpones the taxation of the principal amount, and in the interim, receives tax-free payments semiannually. The municipality typically purchases bonds to cover the payments. Deferral of payment of the purchase price for up to thirty years allows the municipality to make additional purchases or complete projects than could otherwise be made over the short term.

Since the municipality will own the easements forever, spreading the payments over time means that the cost is evenly distributed between present and future residents. The implementation of a municipal open space program is based on many variables and all options should be carefully considered to fit local natural resources protection goals and political needs.

Three excellent resources on financing options published by Heritage Conservancy are:

Public Finance for Open Space: A Guide for Pennsylvania's Municipalities, by Gary Gordon, PhD., 2003.

Using Conservation Easements to Preserve Open Space: A Guide for Pennsylvania's Municipalities by Debra Wolf Goldstein, Esq., 2002.

Implementing a Municipal Open Space Program: A Guide for Pennsylvania's Municipalities, by Michael Frank, 2003.

County Implementation Measures

Lehigh County Green Future Fund

Adopted in 2004, the Lehigh County Green Future Fund was developed:

1. To expedite the distribution of funds and project execution.
2. To support the recommendations of *Lehigh County Parks 2005* and the *Comprehensive Plan The Lehigh Valley ... 2030*.
3. To leverage additional funds.
4. To encourage park planning with multi-municipal and private partnerships.
5. To help municipalities meet National Recreation and Park Association suggested guidelines.
6. To improve public parks, both county and municipally owned.

Funding is available for the County and its municipalities for real property purchases and the creation and/or improvement of physical assets that preserve open space or increase recreation opportunities. The program funding goal is \$30,000,000 over a 10 year period or \$3,000,000 a year. The funds are allocated as follows: 1/3 for the preservation of parks and open space, 1/3 for park improvements and 1/3 for the purchase of agricultural conservation easements.

Northampton County 21st Century Open Space Initiative

Also adopted in 2004, the Northampton County 21st Century Open Space Initiative was developed:

1. To preserve and enhance the natural environment.
2. To protect the county's important natural features by assisting municipalities and nonprofit organizations acquire and permanently preserve land where these resources are found.
3. To assist municipalities acquire land for park and recreation purposes and to improve existing parks.

4. To provide county funds that can be used to match state funds for the purchase of agricultural conservation easements.

Funding is available to acquire the interests in open space and natural areas real estate and for municipal park acquisition and development. In 2002, Northampton County voters authorized the borrowing of \$37,000,000 to fund this initiative. The funding was organized as follows: \$14,000,000 for open space and natural areas, \$11,000,000 for municipal park acquisition and development and \$12,000,000 for farmland preservation.

The LVPC has assisted Lehigh and Northampton counties in developing the recommendations and guidelines for both programs. Additionally, the LVPC staff provides the governing bodies and advisory committees with technical support as needed to further implement each program.

Municipal Implementation Measures

Many municipalities in the Lehigh Valley have developed recreation and open space master plans and update them periodically. These plans address the funding, acquisition, development and improvement of parks and open space. The adoption of such plans is an important step in the protection of municipal lands that are naturally, historically and culturally important. The following municipalities have existing park and recreation plans (current as of January 2006):

Lehigh County

Alburtis Borough	North Whitehall Township
Allentown City	Salisbury Township
Emmaus Borough	Slatington Borough
Fountain Hill Borough	South Whitehall Township
Hanover Township	Upper Macungie Township
Heidelberg Township	Upper Milford Township
Lower Macungie Township	Upper Saucon Township
Lower Milford Township	Washington Township
Lowhill Township	Weisenberg Township
Lynn Township	Whitehall Township

Northampton County

Allen Township	Lower Nazareth Township
Bath Borough	Upper Saucon Township
Bethlehem Township	Lower Saucon Township
Bushkill Township	Moore Township
Chapman Borough	Nazareth Township
East Allen Township	North Catasauqua Borough
Easton City	Palmer Township
Forks Township	Tatamy Borough
Glendon Borough	Upper Nazareth Township
Hanover Township	Williams Township
Lehigh Township	

It is the implementation of these plans that has been a challenge. Methods of acquiring public open space require initiative and a dedicated funding source. Funding for open space can come from various resources, both public and private. However these funds need to be leveraged with local dollars. Municipalities can decide to pay for these programs year by year through finance mechanisms that include property taxes, earned income taxes, real estate transfer taxes, budget surpluses and/or general appropriations. Few Lehigh Valley municipalities have taken the additional steps necessary to fund a successful open space program. However, those that have taken the initiative have discovered overwhelming support from the voters.

State Support for Municipal Implementation

The state of Pennsylvania has shown incredible initiative in funding land conservation efforts throughout the Commonwealth. These programs are highlighted below:

Pennsylvania State Funding Programs

Pennsylvania Department of Conservation and Natural Resources Community Conservation Partnerships Program. Pennsylvania's funding source for local parks, recreation, land conservation, trails and river conservation. The department provides matching grants for land acquisition and transaction costs, as well as for planning and studies. Contact: 717-783-4734 or www.dcnr.state.pa.us/grants.htm.

Pennsylvania Agricultural Conservation Easement Purchase Program. The Pennsylvania Department of Agriculture provides funds to counties for the purchase of easements on agricultural land by municipalities and the counties themselves. To be eligible a property must be part of a voluntarily formed Agricultural Security Area and apply to the county agricultural preservation board. Contact: your county Agricultural Preservation Board.

Pennsylvania Department of Agriculture Land Trust Agricultural Easement Program. Provides up to \$5,000 per transaction to reimburse non-profit land trusts for transaction costs such as appraisals and surveys. Municipalities working with a land trust on their open space acquisitions can access this funding source through the land trust. Contact: your local land trust, or call the Department of Agriculture's Bureau of Farmland Preservation at 717-783-3167.

Pennsylvania Department of Environmental Protection Growing Greener Grant Program. Provides funds to municipalities for open space planning and implementation. Contact: 717-705-5400 or 877-PAGREEN or www.dep.state.pa.us/growgreen/defaultdep.htm.

Federal conservation funds are available to state governments through several programs including: the Land and Water Conservation Fund (LWCF); Forest Legacy; the North American Wetlands Conservation Act; and the Cooperative Endangered Species Conservation Fund. Local governments do not have direct access to these funding sources.

Source: *Public Finance for Open Space: A Guide for Pennsylvania's Municipalities*, Gary Gordon, Ph.D.

Ballot Measures to Raise Public Funds for Land Acquisition

PENNSYLVANIA

Growing Greener II, Environmental bond for watershed protection, expansion of open space and farmland, and maintenance

5-17-2005 61% YES/39% NO Total funds approved by voters - \$625,000,000; \$297,500,000 acquisition funds

LEHIGH COUNTY

Bond to finance purchase of agricultural easements, parks, and open space

5-21-2002 71% YES/29% NO Total funds approved by voters - \$30,000,000

NORTHAMPTON COUNTY

Bond for watersheds, wetlands, farmland and parks

11-05-2002 65% NO/35% YES Total funds approved by voters - \$37,000,000

Bushkill Township, Northampton County

0.25% earned income tax increase to purchase development rights on open space and farmland

11-28-2005 66% YES/34% NO Total funds approved by voters - \$3,140,000

Lower Mount Bethel Township, Northampton County

0.25% earned income tax increase to fund open space preservation

5-16-2006 76% YES/24% NO Total funds approved by voters - \$3,000,000

Lower Saucon Township, Northampton County

5-year, 0.25% earned income tax increase for the preservation of open space, farmland and recreational lands

11-07-2006 60% YES/40% NO Total funds approved by voters - \$3,500,000

Moore Township, Northampton County

0.25% earned income tax increase to fund farmland and open space preservation

5-17-2005 55% YES/45% NO Total funds approved by voters - \$10,000,000

Williams Township, Northampton County

0.25% earned income tax increase to acquire open space and property development rights on farmland and open space

11-02-2004 70% YES/30% NO Total funds approved by voters - \$4,500,000

Source: *The Trust for Public Land, LandVote[®] Database*