

## RIPARIAN BUFFER PRESERVATION

The growing body of scientific evidence documenting the beneficial role of riparian buffers in protecting water quality has led to action by conservation groups and governmental bodies to preserve existing buffers. In many cases, retaining existing buffers is the most cost effective method of protecting waterways from runoff, sediment pollution, streambank erosion and destructive flooding which are often associated with unbuffered waterways. A variety of preservation tools are available to interested communities and landowners to guide and limit development along stream corridors. These tools can be designed to fit local conditions.

Among the approaches that have been used to protect existing buffers are:

- **Fee simple acquisition:** purchase of the full ownership of riparian land by conservation groups or local governments
- **Conservation easements** for land along riparian corridors
- **Municipal planning tools** which incorporate riparian buffer preservation into the County Comprehensive Plan and an Official Municipality Map
- **Riparian buffer ordinances**
- **Development tools** that promote conservation of riparian buffers during land development

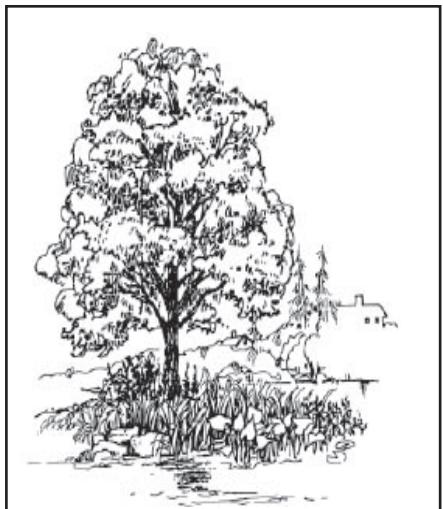
An overview of these methods will be discussed in this chapter in order to provide a basis for selecting buffer preservation options appropriate to a specific locality.

### Fee Simple Acquisition of Riparian Land

Fee simple acquisition, that is, gaining the full ownership of riparian land, provides the greatest amount of control over the use and maintenance of a property. This type of ownership is most desirable if the resources contained on the land are highly sensitive and protection of the resources cannot be reasonably guaranteed using other approaches for conservation.

Some landowners may prefer to sell their land outright through a fee simple transaction because it eliminates concerns about landowner liability and maintenance. Those who relinquish certain rights to their land (e.g. development rights, timber harvesting) through a conservation easement still maintain long term liability and management responsibilities.

Typically, fee simple acquisition of the land is through purchase or donation. Alternatively, a municipality may seek to trade a parcel of land it owns that is less environmentally sensitive for privately held riparian land. Whether by



### What are Development Rights?

- Fee simple land ownership provides landowners with a bundle of rights. Each right, such as mineral rights, water rights, air rights or development rights, may be separated from the rest and transferred to someone else while the original owner still retains ownership of the land.
- A development right is a right to develop land, as distinguished from the ownership of land
- Development rights entitle property owners to develop land in accordance with local land use regulations.
- In some jurisdictions, these rights may be sold to public agencies or qualified non-profit organizations through the purchase of an agricultural conservation easement or purchase of a development rights program.
- Development rights may be sold to individuals or to a public agency through a transfer of development rights program. In this case, the buyer acquires a right to develop land on a site that can accommodate a higher density.

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purchase, donation or trading of land, the municipality or conservation group will hold the deed and have control over its use as well as be responsible for monitoring, maintenance, insurance, taxes and long term property management.

The Pennsylvania Department of Conservation and Natural Resources (DCNR) offers funds for land acquisition projects for the purpose of preserving natural and critical habitat areas and open space through the Community Conservation Partnership Program. The funds are available to conservation groups, municipalities, nonprofit land trusts and conservancies to encourage the preservation of open space and natural areas either through fee simple acquisition or acquisition of conservation easements. Lands acquired with these funds must be open to the public.

Another option for financing the fee simple acquisition of riparian land by a conservation organization entails the purchase of a property that can potentially be subdivided. Division of the parcel and sale of the less sensitive sections could reimburse the organization for a portion of the purchase price while maintaining ownership of the riparian area.

Other options exist for a conservation group to impact the control of sensitive riparian property. For example, a governmental entity may consider donating property that has been foreclosed because of delinquent taxes to a conservation group. Alternatively, the group may find a conservation-minded buyer for this property in order to ensure protection of the riparian buffer. These types of transactions would benefit the municipality by putting a delinquent property back onto the tax rolls and by protecting local water resources.

The Pennsylvania DCNR Bureau of Recreation & Conservation's Community Conservation Partnerships Program can provide communities and non-profit organizations with the technical assistance or grant funding necessary to undertake conservation projects.

Learn more about the Pennsylvania DCNR Community Conservation Partnership Program at:  
[www.dcnr.state.pa.us/brc/grants](http://www.dcnr.state.pa.us/brc/grants)

## Conservation Easements

An alternative to buying riparian land is the purchase of the property owner's right to use that riparian land for specific purposes through the purchase of a conservation easement. A conservation easement is a written legal agreement between a landowner and a land trust and/or a local government that permanently restricts some landowner rights to the use of a property in order to protect its conservation value. In determining the easement value, a real estate appraiser evaluates the monetary value of the economic activities foregone because of easement restrictions.

For example, a riparian buffer conservation easement would pay landowners for the economic loss resulting from restrictions to timber harvest or grazing within the designated riparian corridor. A landowner may also be fully or partly compensated for the loss of development rights through the easement price. The landowner and easement holder negotiate the details of

*Purchasing an easement does not transfer the burden of maintenance, insurance, taxes and management to the easement holder.*

the restrictions. Not only is the purchase of a conservation easement less expensive than fee simple acquisition, purchasing an easement does not transfer the burden of maintenance, insurance, taxes and management to the easement holder. Easement holders are however, responsible for enforcing the easement, taking legal action if necessary to correct violations of the easement restriction.

Local governments can partner with land trusts in the acquisition of conservation easements. This type of relationship is beneficial in that land trusts often have less regulatory constraints than a municipal entity. In many instances they can act more quickly, raise tax-deductible funds for purchase and purchase at above appraisal prices. Land trusts also have more experience coordinating the acquisition process.

Some easement transactions offer tax benefits. A landowner who donates an easement or sells it for less than fair market value may be entitled to a federal income tax deduction. Such land must be used exclusively for conservation purposes. Another option is donation or a bargain sale of an easement by a landowner to a land trust. The easement is legally transferred, but at no cost or at a value below-market value to the easement holder. This allows the landowner to qualify for a tax-deductible charitable donation.

### ***Legal Aspects of Conservation Easements***

Although conservation easements have been recognized under common law in Pennsylvania for many years, the state legislature enacted the Conservation and Preservation Easements Act in 2001 (Pub.L. No. 330) to give state authority to perpetual conservation and historic preservation easements. The Act shifted the rules of legal interpretation in favor of the grant of easement. In other words, the burden of proof is now on the person who challenges the validity of an easement, rather than on the easement holder.

Pennsylvania has further supplemented PA Act 330 with Act 153, which gives authority to townships, cities, and boroughs to purchase conservation easements for the protection of water resources, watersheds, and natural resources such as floodplains and steep slopes. The act also allows municipalities to use various taxing schemes to raise funds for the acquisition of open space and agricultural land.

Easements may appear more attractive to the landowner because Pennsylvania allows property tax assessments to be restricted to the land use value imposed by the covenant. A landowner who donates an easement or sells it for less than fair market value is also entitled to a federal income tax deduction as well as an Estate Tax subtraction (see Allegheny Land Trust “Land Conservation Handbook” or Heritage Conservancy “Using Conservation Easements to Preserve Open Space”).

***Locating a Land Trust***  
*The Pennsylvania Land Trust Association (PALTA) is a state level entity representing land trusts. Contact them at: 707-230-8560; email: [palta@earthlink.net](mailto:palta@earthlink.net); [www.conserveland.org/landtrust](http://www.conserveland.org/landtrust)*



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**Landowner Liability** – Liability for injuries arises if the eased or purchased land is open for public access. If that is the case, Pennsylvania has two recreational use statutes to limit the potential liability of the landowner. The Recreation Use of Land and Water Act, Act #586 of 1966, limits landowner liability to willful or malicious failure to warn or guard against a dangerous condition, use, structure or activity.

This statute was specifically drafted to encourage landowners to make their land and water areas available for traditional recreational uses, such as hunting and fishing. The Pennsylvania Rails-to-Trails Act, Act #188 of 1990, also limits liability for property owners with property surrounding or adjoining a rail trail.

## Planning Tools for Municipalities

The legal basis for local governments to protect Pennsylvania's streams and regulate the use of the adjoining riparian land resides in the Pennsylvania Municipalities Planning Code, Act 247. This legislation sets a framework for municipality planning and specifies the types of controls that may be used to regulate land use and the acceptable purposes for which municipalities may enact land use regulation.

In the Planning Code, authority is given to municipalities to protect water supply and enact riparian corridor protection ordinances. Additionally, many riparian features such as woodlands, historic resources, wildlife habitat, wetlands, wooded areas, and scenic vistas can be protected under the Code.

Municipalities have several avenues in which to plan for and determine land use. A **County Comprehensive Plan** is created to determine future location, character and timing of land development in the county and is updated every ten years. According to the Municipalities Planning Code, zoning ordinances enacted in the county are required to have general consistency with the comprehensive plan, which should contain planning for natural and historic resource protection.

An **Official Municipality Map** designates existing and proposed open space reservations. The map designates areas within a municipality that will eventually be used for public purposes and declares the intent of the municipality governing body to purchase that land. It is a tool that can be used to protect existing vegetated buffers. However, municipalities are legally obligated to purchase such lands within twelve months of a landowner's expressed intent to develop the land; therefore, if a municipality fails to act, the designation is null and void.

### **Land Use Resources:**

*For access to the PA Municipalities Code and current bills introduced in the PA General Assembly relating to land use planning issues, go to:  
PA Land Use Law Library  
[www.landuselawinpa.com](http://www.landuselawinpa.com)*

*For important news on the latest Pennsylvania land use issues, go to:  
10,000 Friends of Pennsylvania  
[www.10000friends.org](http://www.10000friends.org)*

### **Comprehensive Plans**

*Not all of the counties in Pennsylvania have comprehensive plans or buffer zoning ordinances. If you are planning to work with buffers, call first to check your municipality's riparian buffer protection regulations.*

### **Weed Ordinances**

*Many PA communities have antiquated weed ordinances that may interfere with preserving or restoring buffers. Check for local regulations before starting buffer work.*

## Municipal Riparian Buffer Ordinances

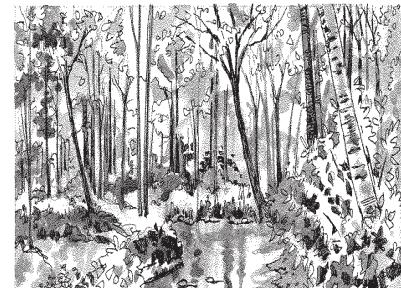
### Zoning

Land use ordinances define land use restrictions and plans. Zoning is one of the most common types of land use ordinances. In Pennsylvania, municipalities including county level entities can adopt zoning regulations. It is a tool commonly used to control the location and intensity of development. Zoning is useful in protecting public health, safety and welfare as well as guiding growth.

Zoning that protects riparian wetland buffers may be part of an existing natural resource protection ordinance, storm water ordinance or floodplain ordinance. These regulations should be reviewed for their adequacy in protecting riparian areas. An overlay zoning ordinance pertaining to riparian buffer protection is appropriate in a municipality that already has a zoning ordinance in place. For a municipality that does not have zoning ordinances in place, a separate, freestanding ordinance may be necessary to protect riparian buffers.

**Components of a Riparian Buffer Ordinance** - Typically zoning ordinances consist of two parts: a text defining the elements listed below and a map of the districts zoned. A chart following this section provides information for acquiring copies of several buffer ordinances enacted in Pennsylvania. Generally speaking this type of ordinance is constructed in the following manner:

- *Definition of a buffer* – This section describes the location as “including creeks, lakes, intermittent watercourses, and wetlands.” The definition should further refer to specific features of the community to be protected such as the names of streams and ponds. It also describes the functions of the buffer e.g., the removal of nutrients, sediment, organic matter, pesticides and other pollutants prior to entry into surface water.
- *Legislative intent/purpose of the ordinance* – This section provides a rationale for the regulation using scientifically proven benefits of riparian buffers for community benefit. Ordinances should clearly tie health, safety and welfare issues to any ordinance so that the requirement cannot be seen as an arbitrarily applied “taking”.
- *Definition of buffer boundary* – Depending on the goals of the buffer, there are many different approaches to defining buffer width, boundaries and allowable activities. Examples include:
  - Zoned buffers – designates minimum distances for streamside zones, middle zones and outer zones with the most restrictions placed on the streamside areas; typical width for the streamside zone is 25 feet, 50 to 100 feet for the middle



### How Wide Should A Buffer Be?

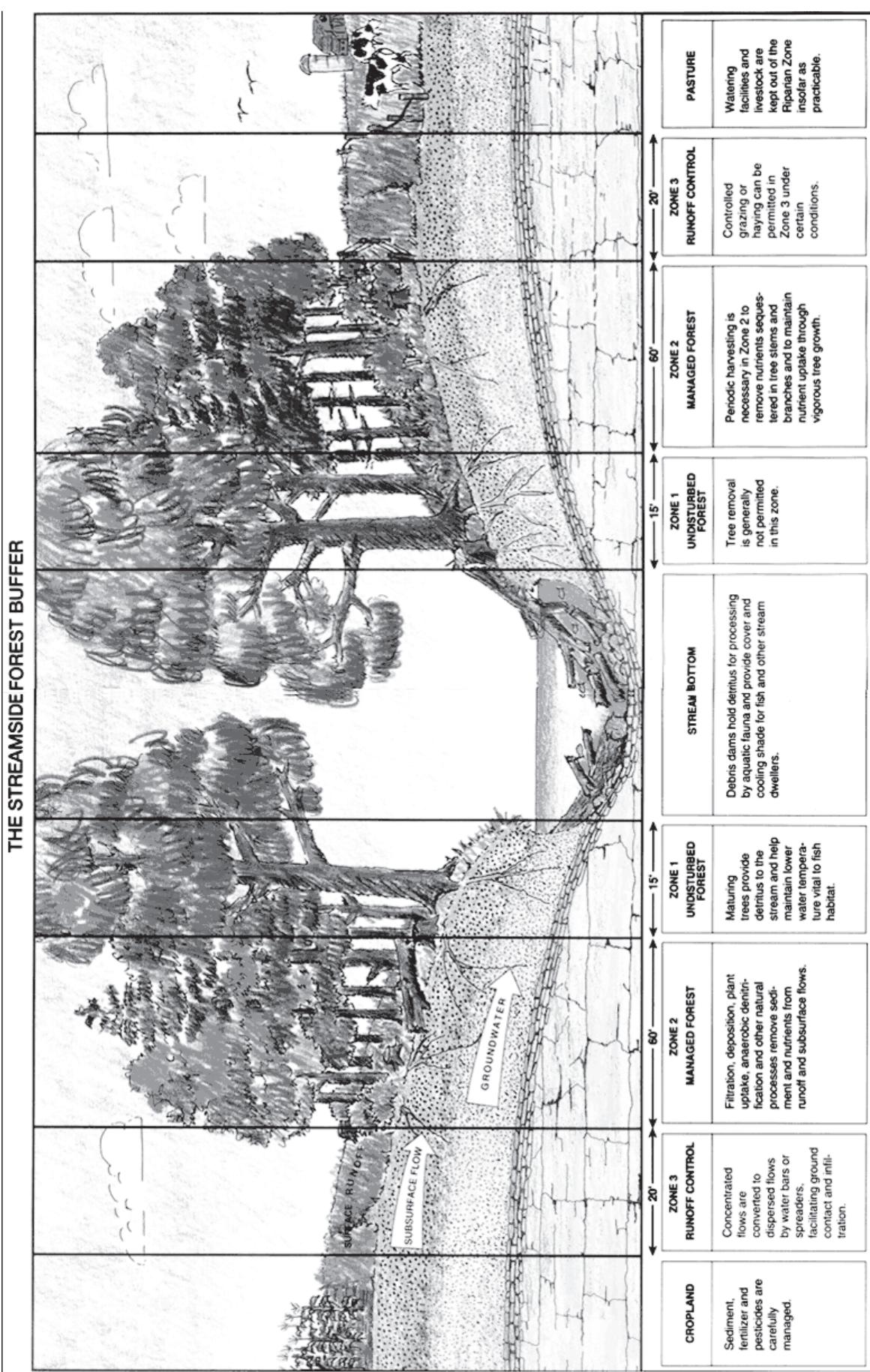
Field Studies have shown that the water quality benefits of riparian buffers increase as buffer widths increase.

Buffer widths of at least 75-100 feet have been suggested as a minimum to produce water quality benefits; however, measurable benefits to bank stabilization, the aquatic food web, wildlife habitat and water temperature moderation can be realized at lower buffer widths.

Buffer width determination should also consider:

- Existing or potential value of the resource to be protected
- Site, watershed and buffer characteristics
- Intensity of adjacent land use
- Specific water quality functions and habitat goals desired

These considerations should be weighed along with the concerns for property owner rights when strategies for buffer preservation are considered.



- and 20-30 feet for the outer zone;
- Designated width based on stream size or order, adjacent land slope, or relationship to floodplain, wetland or easement boundaries, and greenways;
  - Buffer averaging – allows for variable buffer widths within a development site; allows developers to narrow the buffer width at some points if the average width of the buffer meets the minimum criteria; streamside zones should not be encroached upon.
  - *Specified quality of vegetation in buffer* – A list of appropriate native tree and shrub species may be created by the municipality, as well as rules concerning minimum plant density.
  - *Permitted uses within the buffer* – Permitted uses may include passive use areas, livestock crossings, and streambank stabilization. Ordinance language typically allows tree removal by the property owner as part of normal maintenance so long as the disturbance is under a determined square footage. Land uses would again be primarily passive.
  - *Uses specifically prohibited in riparian buffer* – These restrictions could be specified by buffer zone. In the zone closest to the stream, the ordinance might prohibit all removal of plants except invasive plants and those presenting a hazard to safety or property. Restrictions applied to all zones may include clear cutting of vegetation and storage of hazardous or noxious materials.
  - *Regulation of nonconforming structures and uses* – Nonconforming structures and uses are those that legally exist prior to adoption of the ordinance. Their regulation under the ordinance should be defined.
  - *Procedures to file for appeals or exemption* – Include procedures to follow for those property owners wishing to file appeals or to seek exception from, or modification to, particular sections of the riparian buffer ordinance.
  - *Delineation requirements* – Ordinances can require that buffers appear on clearing and grading plans and that they be physically delineated on site to protect the integrity of the buffer during construction; a pre-construction meeting to review any site constraints that may impact a buffer can also be required.
  - *Buffer management and maintenance* – Ordinances can clearly outline post-construction maintenance responsibilities. In buffer management and maintenance agreements, allowable activities can be listed, authority to inspect a buffer can be defined and conditions under which a landowner is responsible for repairs can be described.

## Riparian Buffer Ordinance Terms:

### Overlay Zoning District:

A designated area within a municipality that contains a unique characteristic. The overlay is an amendment that adds a riparian buffer overlay zone in addition to or superseding the underlying zoning district(s). The overlay zone can span more than one zoning district and can impose more restrictive regulations than those in the underlying zoning district.

### Takings:

Takings are an exercise of governmental authority in restricting a property owner's use of his property. To minimize a charge of takings, a riparian buffer ordinance should include wording in the legislative intent to justify the buffer on the basis of sound science and concern for public safety and health.

### Net Out Regulations:

The technique of deducting environmentally constrained lands, such as wetlands, steep slopes, floodplains and woodlands, from the total developable area used for development density calculations. It is intended to protect and preserve environmentally sensitive land particularly in areas that are nearly fully developed and where there is greater development pressure on environmentally sensitive land.

## ***Case Studies in Buffer Ordinances***

Some municipalities in Pennsylvania with riparian buffer ordinances are listed below. This list is not exhaustive and is meant to provide an assortment of examples for reference.

Municipality	Ordinance Title	How to obtain a Copy
Upper Salford Township Montgomery County	RCC – Riparian Corridor Conservation Overlay District	Upper Salford Township Phone: (610) 287-6160 Web: <a href="http://www.dvRPC.org">http://www.dvRPC.org</a> under Regional Planning, then Municipal Natural Resource Protection
Horsham Township Montgomery County	Stream Corridor Protection Ordinance	Horsham Township Phone: (215) 643-3131 Web: <a href="http://www.dvRPC.org">http://www.dvRPC.org</a> under Regional Planning, then Municipal Natural Resource Protection
Kennett Township Chester County	Natural Resource Protection Ordinance	Kennett Township Phone: (610) 388-1300 Web: <a href="http://www.dvRPC.org">http://www.dvRPC.org</a> under Regional Planning, then Municipal Natural Resource Protection
Warwick Township Lancaster County	Riparian Buffer Easement section of Stormwater Ordinance	Warwick Township (717) 626-8900
Radnor Township Delaware County	Riparian Buffer Conservation Ordinance	Radnor Township Phone: (610) 688-5600 Web: <a href="http://www.radnor.com">http://www.radnor.com</a> then New Additions

**Upper Salford Township** - Upper Salford Township in Montgomery County adopted a Riparian Corridor Conservation Overlay in 1999. This very specific ordinance establishes an overlay district along waterways and wetlands. A working group with the help of the Montgomery County Planning Commission drafted the ordinance. It is a very detailed and specific ordinance that defines clearly the types of water bodies and watercourses that are covered by the overlay district. Township officials have found that the specific language has prevented legal challenges to the ordinance. The ordinance separates the riparian area into two zones with zone one being a minimum of 25 feet and zone two a minimum of 50 feet. Permitted land use in each zone is itemized in the ordinance, as are prohibited uses.

**Horsham Township** - Horsham Township in Montgomery County passed a Riparian Corridor Preservation Ordinance in 1998 as part of its Environmental Ordinance. At the time the ordinance was enacted, the township was approximately 60% developed. A board of interested parties was formed to develop the ordinance and address citizen concerns in its initial draft. The ordinance uses the Horsham Township Open Space Plan to identify all waterways protected by the ordinance. Like the Upper Salford ordinance, two zones are defined with a minimum width of 25 feet for zone one and a minimum

width of 50 feet for zone two. Land uses and prohibitions are specified by zone. The Zoning Hearing Board is responsible for hearing petitions for exceptions.

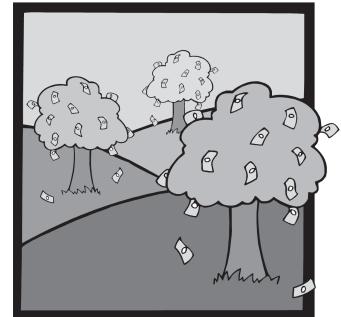
Horsham Township has put a lot of effort into encouraging citizens to restore riparian vegetation. They have incorporated citizen groups into local park riparian restorations and used these plantings as models for other organizations. Free consultation is also given to citizens to help them design riparian plantings. A display about riparian vegetation has been placed in the Township building's lobby.

**Kennett Township** - Kennett Township in Chester County protects sensitive natural areas including streams with a Natural Resource Protection Ordinance. The ordinance restricts development within two zones delineated as a riparian corridor, prohibits filling, building, or channeling the floodplain and requires Pennsylvania DEP and U.S. Army Corps of Engineers approval of restricted activities in a delineated wetland.

**Warwick Township** - Warwick Township is located in Lancaster County in the Lititz Run watershed. As part of Warwick's Storm Water Ordinance, a Riparian Buffer Easement provision was enacted to control land use along riparian corridors. The easement requires a minimum 35 foot zone (measured from the centerline of the watercourse) and requires the preservation of existing vegetation and "the planting of additional native trees, shrubs and other plant material as determined necessary in order to create a suitable riparian canopy and understory" within the buffer easement. The planting requirements are based on published practices and guidelines. The easement is incorporated into the deed of all newly developed property and in some cases is also written as a separate specific agreement between the landowner and township.

When the easement provision was enacted in 1999, it codified and mandated what had been initially a voluntary riparian buffer restriction in the township. Township officials have found that early intervention in the planning stage of land development is key to acceptance of the easement by developers. The township will identify properties with applicable riparian areas and work with the developer in the early planning stages to protect and perhaps restore the riparian zone. Open space and trails along waterways in a newly developed property have been well-received amenities by homebuilders and developers.

**Radnor Township** - On December 8, 2003, The Riparian Buffer Conservation Ordinance was adopted by the Board of Commissioners. This new zoning ordinance in Radnor Township, Delaware County was designed to protect streams, wetlands, pond edges, lake shore or any area of hydric soil. Though the township is almost completely built-out, the new ordinance



### ***Property Value Benefits of Riparian Buffers***

A national study found that riparian buffers were thought to have a positive or neutral impact on adjacent property values in 32 of 39 communities surveyed.<sup>1</sup>

In a national study of ten programs that diverted development away from flood prone areas, researchers discovered that land next to protected floodplains had increased in value by an average of \$10,427 per acre.<sup>2</sup>

<sup>1</sup>Schueler, T.R., *Site Planning for Urban Stream Protection*. Center for Watershed Protection, Ellicott City, MD 1995

<sup>2</sup>Burby, R., *Cities Under Water: A Comparative Evaluation of Ten Cities' Efforts to Manage Floodplain Land Use*. Institute of Behavioral Science #6, Boulder, CO 1988

imposes flexible setbacks for established homes and regulates any further development of larger properties in the township by establishing a mandatory buffer of 35 feet. An initial public hearing enabled citizens to express concern about the impact of the proposal. The township revised the ordinance to reflect these concerns and held a second hearing before adopting the ordinance.

### **Landscape Regulations**

Landscape regulations can be used to protect existing vegetation in a riparian corridor. This type of ordinance may protect designated existing vegetation or specify the planting of native vegetation in protected areas. These “tree ordinances” have historically focused on specimen trees that are old or rare; however, they have the potential to be used to protect existing stands of forest.

### **Streambank Setbacks**

Similar to overlay zoning, a streambank setback establishes a corridor along streams that may not be developed. It leaves open other, non-built options for using the setback zone making it less protective than a riparian buffer zoning ordinance.

## **Development Tools that Promote Conservation of Riparian Buffers**

Article V of the Municipal Planning Code grants municipalities the power to control the development of subdivisions. Municipalities can take a regulatory or incentive-based approach to protect riparian areas in new developments. The degree of riparian area protection is likely to vary with the approach. Best results occur when a municipality identifies riparian areas to protect early in the planning stage of a new development. Intervention during early planning stages often promotes good will efforts from the developer. Amenities such as greenways or trails along stream corridors that result from municipal intervention can benefit the developer as well as protect the water resource as these green spaces can enhance the desirability of property within a new development.

### **Conservation Development/Open Space Development**

Conservation or open space development provides the developer with the option to develop a property using smaller lot sizes and/or providing for higher densities in return for retaining open natural space. Minimum lot sizes, setbacks and frontage distances are relaxed to provide common open space. When carefully designed, open space developments can be compatible with adjacent land uses, preserve natural areas and be highly desirable places to live.

A property may be developed in such a way that the upland areas are



### **What is a Riparian Corridor?**

A riparian corridor is a perennial or intermittent body of water, its lower and upper banks, and the vegetation that stabilizes its slopes.

It includes the channel plus an adjoining strip of the floodplain, usually 100 feet on each side of the channel.

### **What does a Riparian Corridor Do:**

- protects the waterway from erosion and sedimentation
- provides cover and shade
- maintains wildlife habitat
- filters out air and water pollution

As much as 80% of nitrogen in runoff and shallow ground water can be reduced after passing through a riparian zone.

developed leaving an adjacent riparian corridor undeveloped. Sensitive natural resources such as stream corridors can be part of the “net-out” of environmentally constrained lands during development. These areas are deducted from the total land to be developed before permitted density for the land is calculated.

Under DCNR’s Growing Greener initiative dealing with conservation subdivision design, a variety of density options are designed to fit zoning districts that are nearly urban to nearly rural. Training programs conducted by the Natural Lands Trust are available to municipalities to learn how to apply these open space principles to local ordinances. A Conservation Planning Workbook provides a wealth of technical information and examples of municipalities that have adopted this approach.

### ***Transferable Development Rights***

A tool to be aware of when introducing new zoning restrictions is Transferable Development Rights (TDR). TDR is based on the concept that development should be redirected from areas where it is not appropriate (sending zone), to areas where it is more appropriate (receiving zone). This redirection of development rights, usually expressed as residential dwelling units, are sold to developers in the same manner that land is sold. TDR provides off-site rather than on-site density compensation.

The right to develop can be sold from one property and applied to another less environmentally sensitive property that could accommodate increased development densities. This technique is newly authorized in Pennsylvania and has been utilized by several municipalities.

### ***Corridor Management Planning***

A corridor management plan may be required of any new development to ensure protection of sensitive riparian corridors during the planning stage. It addresses the long term objectives and management of the riparian corridor.

### ***Density Bonuses and Penalties***

Developers can be awarded increased building densities for developments that conserve natural areas, such as riparian corridors. Conversely, municipalities can employ density penalties to encourage conservation of natural areas. A jurisdiction could establish a minimum and maximum density and permit the higher density to a developer that plans for natural areas and open space techniques while lowering the allowable density for developments that do not incorporate preservation of natural areas.

### ***Stormwater Credits***

A stream buffer can be used as a stormwater credit, which is a technique that developers can use to reduce their stormwater management costs. These techniques reduce runoff volumes, which helps to avoid the

### ***Transferable Development Rights***

*Brandywine Conservancy’s publication, “Transfer of Development Rights: A Flexible Option for Redirecting Growth in Pennsylvania” outlines steps for developing a successful TDR program.*

[www.brandywineconservancy.org](http://www.brandywineconservancy.org)  
610-388-2700



### ***Stormwater Credits***

*A series of six stormwater credits are provided for Pennsylvania designers using non-structural practices to reduce water impacts on site.*

*They include:*

- *Natural Area Conservation*
- *Disconnect of Rooftop Runoff*
- *Disconnect of Non-rooftop Runoff*
- *Sheet Flow to Buffers*
- *Grass Channel*
- *Environmentally Sensitive Development*

*Appendix D: “Stormwater Credits for Effective Site Planning”;*  
[www.dep.state.pa.us/dep/deputate/watermgt/wc](http://www.dep.state.pa.us/dep/deputate/watermgt/wc)

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construction of costly stormwater management facilities. A stormwater credit for a stream buffer would be given when runoff from upland areas is treated by a grass or wooded buffer. Pennsylvania's new stormwater management protocol now allows for stream buffer credit areas. Runoff treated with a stream buffer may be deducted from the calculation of total site area when computing the volume of stormwater runoff that must be stored and treated.

## Additional Resources

Allegheny Land Trust. "Land Conservation Handbook." Pittsburgh, PA. 1995

Alliance for the Chesapeake Bay. "Streamside Buffer Monitoring Protocol: For Maryland's Tributary Strategies Teams." Baltimore, MD. 1999.

Brandywine Conservancy, Environmental Management Center. "Transfer of Development Rights: A Flexible Option for Redirecting Growth in Pennsylvania." Chadds Ford, PA. 2003.

Center for Watershed Protection. "Better Site Design: A Handbook for Changing Development Rules in Your Community." Ellicott City, MD. 1998.

Goldstein, Debra Wolf, Esq. "Using Conservation Easements to Preserve Open Space." Doylestown, PA.

Montgomery County Planning Commission. "Guidebook for Riparian Corridor Preservation" Norristown, PA. June 1997.

The Streamside Forest Buffer. EPA Chesapeake Bay Program, "Chesapeake Bay Riparian Handbook: A Guide for Establishing and maintaining Riparian Forest Buffers."

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