Riparian Buffer Protection via Local Regulation

A Guide and Model Ordinance for Pennsylvania Municipalities

Riparian buffers—forested or otherwise vegetated lands bordering water bodies—deliver tremendous water quality and other public benefits. Pennsylvania municipalities may ensure the protection and restoration of riparian buffers with their land use regulations.

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Introduction

Forested or, to a lesser extent, otherwise vegetated lands bordering streams, lakes and other water bodies protect water quality and provide other environmental, economic, public health and safety benefits.

Only when a waterway is state-designated as Exceptional Value or High Quality and, even then, only in certain circumstances do state regulations protect these riparian buffers.

Pennsylvania law allows municipalities to adopt land use regulations to protect riparian buffers whether or not state regulations apply. These local regulations can ensure that riparian buffers are maintained as forest and, if not already under substantial forest canopy, are appropriately planted at the time of development. Particularly in the absence of state regulation, these municipal regulations play a crucial role in achieving and maintaining the quality of the Commonwealth's water.

This guide, including its *Model Riparian Buffer Protection Overlay District*, is designed to help municipalities draft and adopt practical, science-based, legally enforceable regulations to protect riparian buffers while respecting the rights of landowners.

Background

Riparian Buffer Defined

Riparian buffers are vegetated lands, ideally forested, that border streams, rivers, reservoirs, ponds, lakes, wetlands and other water bodies.

A variety of definitions adopted by governments, academic and research institutions, and others can be found on the world-wide-web but most if not all of them are consistent with the definition provided here.

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Services Provided By Buffers

Scientific research clearly documents that riparian buffers, particularly forested buffers, deliver tremendous public health and safety, economic, ecological, recreational, and other life-supporting benefits. Among their many services, riparian buffers:

- protect the quality of the water we drink;
- stabilize stream banks and minimize erosion;
- intercept non-point source pollutants carried by surface water runoff and remove the excess nitrogen, phosphorus and other nutrients and pollution that otherwise would enter local waterways;
- reduce flooding downstream by absorbing and slowing the flow of stormwater;
- prevent sedimentation, which can choke off stream bottom life;
- provide shade, which helps to control stream temperature fluctuations and prevent elevated temperatures harmful to aquatic life;
- provide food and habitat for wildlife of the land, water and air;
- maintain natural stream morphology (i.e., broad meanders with maximum stream bottom habitat);
- allow for wildlife movement within corridors;
- protect associated wetlands; and
- provide the potential for outdoor recreational opportunities.

Research further shows that riparian buffers at the headwaters of a stream—that is, at its highest reaches, where water may only flow perennially or intermittently—deliver the highest ecological values of any buffer.

The guides *The Science Behind the Need for Riparian Buffer Protection* and *A Scientific Foundation for Shaping Riparian Buffer Protection Regulations* describe the benefits of riparian buffers in greater depth.

The Problem

Loss And Degradation Over Time

Pennsylvania's streams, rivers, wetlands and other water bodies once provided drinkable, swimmable, fishable waters virtually everywhere in the Commonwealth. The waters positively teemed with life.

What made this possible? Largely, the forestlands bordering most of Pennsylvania's water bodies—the riparian buffers that provided food to aquatic life, kept excess nutrients from running off into the water, moderated water temperatures and so much more.

Not recognizing the critical ecological functions played by forested lands bordering Pennsylvania's waters, people over time cut down the trees. Along many streams, livestock then grazed to the water's edge, eating and trampling any remaining vegetation. Along other waterways, riparian lands were paved or otherwise developed. The result has been diminished water quality, loss of aquatic life, increased flooding and many other ecological, economic and social losses.

Protection Of Buffers Is Extremely Limited

Except along Exceptional Value and High Quality streams, state regulations do not protect riparian buffers, not even for streams designated as impaired and where pollutant load limits or TMDLs (Total Maximum Daily Loads) have been established. *This leaves seventy percent or more of Pennsylvania's riparian buffers reliant on protection from local land use regulation.*

Many local governments do not recognize that, in most cases, riparian buffer protection is deeply dependent on local land use regulations and that water quality will suffer without action by local government.

The good news is that an increasing number of townships, boroughs, cities and counties are enacting regulations to require buffer protection and restoration.

The Science Behind Riparian Buffer Protection

The guides *The Science Behind the Need for Riparian Buffer Protection* and *A Scientific Foundation for Shaping Riparian Buffer Protection Regulations* describe the scientific findings regarding the adverse effects that result from failure to protect riparian buffers. From these guides, one can draw principles to respect when developing riparian buffer protection regulations:

1. Prohibit development immediately adjacent to streams, rivers, lakes, wetlands and other water bodies. Avoid land disturbance, pavement and other impervious cover.
2. Maximize the width of these riparian buffers. While the minimum width needed depends to some extent on what benefits or eco-services are deemed important, virtually all sources recognize that the wider the buffer the better the eco-services performance.

3. Keep these riparian buffers in natural forested cover, since forested buffers provide substantially greater eco-services than their non-forested counterparts.
4. Protect forested riparian buffers in the headwaters, the small first and second order streams at the top of the watershed. The buffers on these small streams, which make up most of the stream mileage of a watershed, provide proportionately greater benefits than buffers on the larger streams they supply.

Obstacles To Enacting Regulatory Protections

While science can tell policy makers what needs to be done to achieve a certain end, politics dictates what is possible. In seeking to develop and implement effective riparian buffer protections, proponents may face a variety of obstacles:

- Landowners and other community members may not appreciate the value and importance of riparian buffers or the creeks, streams, ponds, lakes, and wetlands they protect.
- Those with a financial stake in being able to develop or otherwise use buffers as well as those ideologically opposed to restrictions on development may resist proposed regulatory protections during public hearings required for ordinance adoption.
- Some may be concerned that a long-anticipated deck, home addition, or shed may no longer be permitted to be constructed alongside their stream, wetland or farm pond.
- Some may want to exempt from regulatory restriction agricultural activities, such as soil tilling, crop production or livestock grazing, or forestry, such as logging, which can damage or eliminate buffers.
- Agreement on a riparian buffer width that is both politically acceptable and physically sufficient to provide desired environmental benefits may prove challenging.

Setting The Stage

While this guide presents model regulations and examples of adopted regulations, local governments seeking to develop riparian buffer protection regulations should obtain professional expertise to assist in drafting or reviewing proposed regulations.

Political will is necessary. While riparian buffer protections clearly benefit communities, the obstacles described above may necessitate the exercise of political leadership to achieve effective regulatory protection.

Before developing riparian buffer protection regulations, the interested parties should have a sense of the extent of water resources to be regulated. The municipality should have a basic map of its surface waters including wetlands. (The National Wetland Inventory Maps are crude, but somewhat helpful.) The basic map ideally would show which of the streams have been designated impaired by the Pennsylvania Department of Environmental Protection. Although not essential, a map of existing riparian buffers and areas where riparian buffers could be re-established is also a valuable visual aid for public meetings and hearings on any riparian ordinance amendment and can be generated using GIS technology and good aerial data.

It is not enough to draft and adopt regulations. To ensure effective protections in the long run, a municipality must fairly and consistently administer and enforce the regulations.

State-Level Regulation For Riparian Buffers

Chapter 102 "Erosion and Sediment Control" of the Pennsylvania Code, § 102.14 contains riparian buffer requirements applicable to activities near Special Protection Waters—those waters classified by the state as either Exceptional Value (EV) or High Quality (HQ) streams.

The riparian buffer regulations, a major step forward in water resource protection for the Commonwealth, were published in the Pennsylvania Bulletin on August 21, 2010. An expansion of this state-level protection to other waterways or to projects presently exempted appears unlikely as of 2014.

Applicability

No Buffer Regulations Except For Special Protection Waters

Chapter 102 largely prohibits land disturbance within 150 feet of Special Protection Waters for projects requiring a state permit and involving disturbance of more than one acre.

According to the Pennsylvania Department of Environmental Protection (DEP), 26,215 miles or about 30% of all Pennsylvania streams are classified as EV or HQ. Except

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for these EV and HQ streams, state government does not regulate for the protection of riparian buffers.

Exceptions
The regulations do not pertain to small projects such as home additions, garages, decks and other projects where land disturbance is held to under one acre. These and a variety of other exceptions to the riparian buffer requirements may be found in § 102.14(d) of the regulations. The requirements also may be waived in situations where riparian buffers are not feasible.

Regulatory Goals

The Chapter 102 regulations are designed to:

- protect existing riparian buffers and riparian forest buffers;
- promote conversion of existing riparian buffers to riparian forest buffers; and
- promote establishment of new riparian buffers and riparian forest buffers.

The regulations also promote use of riparian buffers and riparian forest buffers as best management practices even when not mandated by these regulations.

Important Differentiations

Chapter 102 makes several important differentiations in its riparian buffer regulations: Special Protection Waters versus all other Pennsylvania waters; riparian buffers versus riparian *forest* buffers; and impaired streams versus non-impaired streams.

All projects requiring a PCSM (post construction stormwater management) permit and located in a Special Protection Water that is *attaining its designated use* (i.e., not listed as "impaired") must maintain and protect a 150-foot "no disturbance" buffer from all perennial/intermittent streams, lakes, ponds, reservoirs. *If the site and its waterways are impaired*, the use must not only avoid disturbance of this buffer, but it must re-establish forest cover within this buffer if forest is lacking. (Only 714 miles (3%) of the 26,215 miles of Pennsylvania's EV or HQ streams (0.8% of all streams) are designated as impaired.)

Multi-Zone System

Chapter 102 regulations define a multi-zone system of riparian buffer zone management with Zone 1, directly adjacent to the water body and extending for a minimum of 50 feet, remaining "untouched." Zone 2 extends for a minimum of another 100 feet. Provisions for timber management including timber harvesting have been included for Zone 2. The objective for both zones is to maintain the riparian buffer zone in native trees and shrubs using a riparian forest buffer management plan where a minimum of sixty percent canopy cover is achieved. Crossings through riparian buffers are allowed only when authorized by DEP.

Role Of Local Regulation

Pennsylvania municipalities have been both empowered and mandated by state law (Clean Streams Law, Dam Safety and Encroachments Act, Flood Plain Management Act, Storm Water Management Act and Municipalities Planning Code) as well as federal law (Coastal Zone Management Act and Clean Water Act) to keep our water resources safe from degradation.

This empowerment is critical for protecting water quality, especially given that 70% of Pennsylvania streams, as well as other surface waters, such as ponds and lakes and wetlands, do not benefit from the state's Chapter 102 regulations, and many land disturbing activities within the other 30% of streams will not trigger Chapter 102's one-acre threshold.

Riparian buffer protection regulations, when fairly and consistently enforced by a municipality, can, among other benefits, help 1) prevent the further loss of riparian buffers; and 2) re-establish heavily degraded or non-existent riparian buffers through physical replanting and maintenance.

Local riparian buffer protection regulations typically apply to lands abutting streams, rivers, ponds, lakes, or reservoirs. They can also be used to protect or help restore wetland margins (strips of land encircling a wetland) that add a layer of protection for these highly sensitive natural resources, and introduce other environmental benefits such as wildlife habitat.

Authority For And Defensibility Of Local Regulatory Protection Of Riparian Resources

When enacting riparian buffer protection regulations, municipalities will want to avoid expensive and time-consuming challenges to the validity of the regulations. The good news is that a well-crafted ordinance has the strong support of the Pennsylvania Constitution, state law and the courts.

Such may not have been the perception in 1982, when the Commonwealth Court of Pennsylvania struck down an ordinance prohibiting development within 100 feet of a stream established by an eastern Pennsylvania municipality. (*Zoning Hearing Board of Willistown Township v. Lenox Homes*, 439 A.2d 218 (Pa. Comwlth. 1982)) Part of the blame for this decision rested with a narrowly focused defense and with the Court's lack of understanding of the extensive public benefits provided by 100-foot riparian buffers.

Since that time, important amendments to the Pennsylvania Municipalities Planning Code (MPC) have given municipalities far more authority in protecting riparian buffers and other natural resources, as has increased recognition of the people's right to "clean air, pure water…," which is enshrined in Pennsylvania's Constitution. Also, more recent cases on related environmental resource protection issues have received favorable decisions by the courts in regard to municipal regulation. DEP's action (Pennsylvania Bulletin, August 21, 2010) to establish 150-foot wide buffers along all Special Protection Waters, with an emphasis on protecting forested buffers, should also comfort those municipal officials who fear legal reprisals from applying reasonable restrictions regarding the use of riparian buffers.

Pennsylvania Constitution

The rights of Pennsylvanians to pure water and the preservation of natural resources are enshrined in Pennsylvania's Constitution. Often referred to as the Environmental Rights Amendment, Section 27 of Article 1 states:

> The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment. Pennsylvania's public natural resources are the common property of all the people, including generations to come. As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all people.

In the Fall 1998 issue of the Dickinson Journal of Environmental Law and Policy, Alan W. Flenner, P.E., R.E.M., in an article entitled "Municipal Riparian Buffer Regulations in Pennsylvania – Confronting the Regulatory Takings Doctrine," stated that the first sentence of the Environmental Rights Amendment grants a public the right to the listed environmental values. The second and third sentences establish the Commonwealth as the trustee of public natural resources. Mr. Flenner goes on to state that because all agencies of the Commonwealth, both state and local, share in the trusteeship responsibilities; boroughs, townships, counties are all trustees of the public natural resources (7 Dick. J. Env. L. Pol. 207, *214). In December 2013, the Pennsylvania State Supreme Court relied on the Environmental Rights Amendment and threw out two significant portions of Act 13 that restricted local zoning of oil and gas development.

Municipalities Planning Code

Municipalities pursuing riparian buffer resource protection by enacting local regulatory ordinances can find extensive support within the Pennsylvania Municipalities Planning Code. The Lehigh Valley Planning Commission, in offering Lehigh and Northampton County municipalities its 2011 *Riparian and Wetland Buffers Guide/Model Regulations* guide, notes the following supportive provisions from the Pennsylvania Municipalities Planning Code:[1]

Article VI—Zoning

Section 603(b):
Zoning ordinances "may permit, prohibit, regulate, restrict and determine" the following:

(1) Uses of land, watercourses and other bodies of water.

...

(5) Protection and preservation of natural and historic resources and prime agricultural land and activities.

Section 603(c)(7):
Zoning ordinances may contain "provisions to promote and preserve... environmentally sensitive areas."

Section 603(d):
"Zoning ordinances may include provisions regulating the siting, density and design of residential, commercial, industrial and other developments in order to assure the availability of reliable, safe and adequate water supplies to support the intended land uses within the capacity of available water resources."

Section 603(g)(2):
Requires that "zoning ordinances shall provide for protection of natural... features and resources."

Section 604:
Zoning ordinances "shall be designed" to "promote and facilitate... the public health, safety, morals, and the general welfare; ...the provision of a safe, reliable and adequate water supply for domestic, commercial, agricultural or industrial use, and other public requirements; as well as preservation of the natural, scenic and historic values in

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the environment and preservation of forests, wetlands, aquifers and floodplains."

Section 605:
Municipalities are authorized to establish zoning classifications "For the regulation, restriction or prohibition of uses and structures at, along or near:

...

(ii) natural or artificial bodies of water, boat docks and related facilities;

(iii) places of relatively steep slope or grade, or other areas of hazardous geological or topographic features;

...

(vi) floodplain areas, agricultural areas... and other places having special character or use affecting and affected by their surroundings."

Article V -- Subdivision and Land Development

Section 503:
Municipalities are authorized to enact subdivision and land development ordinances which include:

(2) Provisions for insuring that:
  (i) the layout or arrangement of the subdivision or land development shall conform to the comprehensive plan and to any regulations or maps adopted in furtherance thereof;
  ...
  (v) land which is subject to flooding... shall be made safe for the purpose for which such land is proposed to be used, or that such land shall be set aside for uses which shall not endanger life or property or further aggravate or increase the existing menace.
  ...

(5) Provisions for encouraging and promoting flexibility, economy and ingenuity in the layout and design of subdivisions and land development, including provisions authorizing alterations in site requirements and for encouraging other practices which are in accordance with modern and evolving principles of site planning and development."

Section 503(2)(i) requires that a municipality incorporate conservation measures into its comprehensive plan and zoning (or other) maps. Section 503(5) allows municipalities to require "modern ... principles of site planning and development" such as Low Impact Development (LID) or conservation design.

(Municipalities should include citations of the appropriate sections of the MPC, such as those listed above, with riparian buffer protection regulations included with either zoning or subdivision and land development ordinances.)

Pennsylvania Case Law

The Lancaster County Planning Commission includes, as an appendix to its *Model Conservation Zoning District and Natural Resource Protection Standards*, a summary entitled "Legal Framework: Federal and Pennsylvania Case Law," prepared by the Commission's solicitor, Fronefield J. Crawford, Jr., Esq. This summary focuses on the constitutional limitations and legislative authority, as well as case law, on natural resource protection standards and conservation zoning. Crawford, in assessing the authority that municipalities have in utilizing regulatory ordinance provisions to stringently regulate the disturbance of sensitive natural features, offered a three-part response:

1. The Pennsylvania legislature must have authorized the municipality to regulate sensitive natural features;
2. The manner of regulation must be consistent with due process of law, so that it cannot be arbitrary or unreasonable; and
3. The regulation cannot be so stringent as to deprive the owner of all reasonable use of his property.

Crawford elaborates on each of these. Regarding the first item, he explains that the Pennsylvania Constitution and the MPC (which was enacted by the Pennsylvania General Assembly) clearly authorize and encourage municipalities to regulate to protect sensitive natural features. Regarding the second item, he writes that regulations "must reasonably serve to protect the sensitive natural resources at issue." With regard to the third item, Crawford describes *Mock v. Pennsylvania DER*, 623 A.2d 940 (Pa. Cmwlth. 1993):

> The property at issue contained a total of 5.2 acres, of which 3.94 acres were wetlands. The property owner requested a permit to fill almost an acre of those wetland areas in order to build a proposed auto repair shop and associated driveways and parking spaces. DER (now DEP) denied the permit application. On appeal, Commonwealth Court concluded that the

> Lucas rationale did not here apply, because approximately 1-1/2 acres of upland area on the lot—unregulated by DER—were suitable for development. Thus, there was not a total regulatory taking of the property, and limited development potential remained, in spite of the prohibition against the fill of any portion of the wetlands.

This and other Pennsylvania case law provide guidance as to what the courts view as arbitrary or unreasonable regulations, or regulations which deprive all reasonable use of one's property. While there have been no court rulings on municipal riparian buffer protection regulations or challenges since the 1982 Willistown Township case, there have been several cases involving municipal ordinances that included extensive provisions to protect other natural resources (woodlands, steep slopes, streams). These Commonwealth cases include:

- Jones v. Zoning Hearing Board of the Town of McCandless, 578 A.2d 1369 (Pa. Cmwlth. 1990);
- Chrin Brothers Inc. v. Williams Township Zoning Hearing Board, 815 A.2d 1179 (Pa. Cmwlth. 2003)); and
- Taylor v. Harmony Township Board of Commissioners, 851 A.2d 1020 (Pa Cmwlth. 2004).

In summary, these cases demonstrate that municipalities can adopt restrictive regulatory ordinances in order to protect their unique natural resources. When carefully written to link the protection mechanism to clearly identified public benefits and respect private property rights by not precluding a landowner's reasonable economic use of his or her property, regulations will be supported by the Pennsylvania courts.

Jones V. Zoning Hearing Board Of The Town Of Mccandless

In *Jones v. Zoning Hearing Board of the Town of McCandless*, 578 A.2d 1369 (Pa. Cmwlth. 1990), a landowner challenged the validity of performance zoning regulations that were applied to his property. The performance zoning regulations imposed strict limitations on development of steep slope areas, and forest areas, and strictly regulated floodplain areas (Crawford, 2010). Mr. Jones argued that the protective provisions were unreasonable and confiscatory, or in other words, a regulatory taking. In this case, the Court did not agree with Mr. Jones' arguments, and upheld the validity of the ordinance, finding instead that the Town's ordinance was balanced, i.e., "a comprehensive plan to permit development….while preserving the sensitive natural resources such as steep slopes, forests, floodplains and streams." Interestingly, the Court found that Mr. Jones had "not been deprived of the viable use of his property" even though approximately 70% of his total tract area had been restricted by the ordinance provisions. The Court concluded that Mr. Jones'

> property just cannot be developed as intensively… as it could prior to the amendment of the ordinance. … Landowner has not been deprived of the viable use of this property.

Chrin Brothers V. Williams Township ZHB

In *Chrin Brothers v. Williams Township ZHB*, 815 A.2d 1179 (Pa. Cmwlth. 2003), Chrin Brothers sought to clear cut nearly 100 trees on five parcels they owned in Williams Township. Chrin filed zoning permits with the Township to harvest the timber but was denied such permits by the Township's zoning officer who found their permit applications not in compliance with the Township's timber harvesting regulations. The zoning regulations relating to commercial forestry activities required among other things: no clear-cutting on tracts larger than 2 acres; retention of at least 30% of the forest cover (canopy); submittal of an erosion and sedimentation control plan; and no clear-cutting on slopes greater than 25% or within a 100-year floodway (Crawford, 2010). Chrin challenged portions of the ordinance, including those which limited clear-cutting on sloped or floodway areas, and those which required retention of at least 30% of the forest canopy. During hearings of the Zoning Hearing Board, the Township engineer offered convincing testimony regarding not only the preventive benefits of tree roots and other vegetation with regard to soil erosion and sedimentation, but also of the absorptive capacity of tree canopies during rainfall and their ability to shield soils from excessive rainfall and resultant runoff. The Zoning Hearing Board found in favor of the Township's ordinances, and denied Chrin's appeal. Ultimately, Chrin appealed to the Commonwealth Court, having lost an appeal to the Northampton County Court, and subsequently lost that appeal. The Court reaffirmed the validity of regulations designed to protect environmentally sensitive resources. As noted by Crawford…"the prohibition against clear-cutting on steeply sloped areas (even categorizing 15% to 25% slopes as within the steep slope category) was within the authorization of Section 604(2)(ii) of the MPC" (Crawford, 2010).

Taylor V. Harmony Township Board Of Commissioners

In *Taylor v. Harmony Township Board of Commissioners*, 851 A.2d 1020 (Pa Cmwlth. 2004), a separate ordinance (outside the zoning ordinance) was challenged by a logging operation underway without proper permits and within an area determined by the township's code enforcement officer as landslide-prone or flood-prone, and therefore restricted by the ordinance from timber harvesting. The operation was shut down and Taylor ultimately appealed to Commonwealth Court. The Court sustained the validity of the separate ordinance by finding that it had many beneficial public purposes, and the Court found that the ordinance did not:

> unreasonably restrict forestry activities because it did not prohibit logging and timber harvesting activities, but instead limits those activities that are not flood or land-slide prone in order to prevent potentially hazardous results. (Crawford, 2010)

Local Regulatory Pathways For Protecting Buffers

Pennsylvania's local governments have approached riparian buffer protection through zoning ordinances, subdivision and land development ordinances, Act 167 stormwater management ordinances, floodplain ordinances, and through the use of an official map.

Regardless of where the riparian buffer regulations are placed, if the municipality has Special Protection Waters within its borders, it is helpful to include a provision that (1) directs applicants to Section 102's riparian buffer setback requirements and (2) requires an applicant to demonstrate, at the time of local approvals, PADEP approval of the project based on Section 102 compliance.

Zoning Or SALDO Regulations

Riparian buffer protection regulations are most commonly placed in either municipal zoning or subdivision and land development ordinances (SALDO). As contrasted with creating a freestanding riparian buffer ordinance, placement in the zoning or SALDO ordinance allows the riparian provisions to take advantage of other ordinance chapters such as definitions, non-conforming use provisions, variances, and enforcement.

Riparian buffer protection provisions included in either zoning or SALDO can be grouped with other natural resource protection provisions such as those regulating the use or disturbance of floodplains, steep slopes, wetlands, woodlands, rare plant and animal communities and high-water table soils.

Zoning Generally Results In More Consistent Protection

Differences between how zoning and SALDO ordinances operate generally point to placement of riparian regulations in zoning as the better choice for achieving riparian buffer protection:

1. Zoning ordinances apply all the time, not just to development scenarios (as is generally the case for SALDOs). Applicants for a local building permit for a residential dwelling or accessory garage, or a modification thereto, would be expected to comply with the zoning ordinance's buffer protection requirements as part of permit approval. Even a change in use where a zoning permit is required to insure adequate parking is provided for the new use could require an applicant to comply with riparian buffer regulations even if the current use did not.
2. In contrast, riparian buffer protection provisions placed solely within a SALDO would not apply to the average homeowner, since building permits for single-family dwellings are not subject to local SALDO approval. Similarly, a property owner seeking municipal approval of a change in use would not trigger SALDO review and approval.
3. When buffer provisions are solely limited to use within the SALDO, applicants for subdivision or land development approval can request a modification of these buffer provisions, along with any other SALDO standard or requirement, as part of their application approval. The relative ease with which modifications can be requested by applicants or their agents, and often granted, is likely to result in less consistent protective actions by a municipality than would be obtained through zoning.

Zoning Relief

If restrictive buffer regulations are placed in a municipal zoning ordinance, relief from those restrictions is typically only possible through the ordinance's variance provisions. Variance requests are heard and decided upon by a municipality's zoning hearing board. A hardship must be proven for variance approval, and decisions are appealable only to a court of law.

The Brandywine Conservancy has offered several of its client-municipalities a special modification procedure

within the zoning ordinance that may be preferable to the variance requirement in certain situations. This procedure allows elected officials to make minimal adjustments to their restrictive resource protection standards when faced with unique circumstances on a site-specific basis. A municipality can adopt a rigorous set of riparian buffer standards or requirements with this "safety valve" that can be used to avoid a situation where the imposition of one or more standards might otherwise eliminate all reasonable economic use of a property owner's land. While a zoning ordinance's variance procedure affords an applicant relief under similar circumstances, it is an extra, and often costly, step, with the decision resting with an appointed, and not an elected, body. The Conservancy's special modification procedure includes standards upon which decisions are based.

As drafted by the Conservancy, a modification from the zoning ordinance's restrictive resource protection standards can be requested by applicants seeking subdivision plan or land development plan approval, or by applicants seeking variance, special exception, or conditional use approval. . The frequency in which relief from these standards is sought is largely dependent on the rural vs. developed nature of a municipality, and scale of development. For example, the development of a large tract along a stream should allow buildings to be located away from the riparian resource, while a land development on a small existing lot located along a stream may require such relief due to cumulative ordinance requirements.

Examples Of Riparian Buffer Protections In Zoning And SALDOs

Halfmoon Township, in the Centre Region of Pennsylvania has enacted riparian buffer protection provisions within its zoning ordinance, as did West Pennsboro Township, in Cumberland County, PA, and Shrewsbury Township, in York County, PA. (*See* the Halfmoon and Shrewsbury case studies below.) Warriors Mark Township, in Huntingdon County, PA, essentially did the same, by including riparian protection provisions under a Stream Protection Overlay District.

Allegheny County, in western Pennsylvania, includes a Protection of Watercourses and Wetlands section in its Subdivision and Land Development Ordinance.

Model Riparian Buffer Protection Overlay District

The *Model Riparian Buffer Protection Overlay District*, which may be adapted to serve as a section of a municipal zoning ordinance, was developed in conjunction with this guide to provide municipalities with state-of-the-art riparian buffer protection provisions. The model is provided at the end of this guide and commented on in the section "Elements of Good Riparian Buffer Protection Regulations."

Act 167 Stormwater Management Ordinances

Riparian buffer protections may be placed in stormwater management ordinances. Act 167 requires that within six months following DEP approval of a countywide Act 167 Stormwater Management Plan, all of the county's municipalities must adopt ordinance requirements included in the plan. These requirements may or may not include riparian buffer protections. Municipalities may adopt their county's model ordinance or enact an alternative ordinance to address the requirements requirements.

For example, a number of Lancaster County municipalities have adopted or are in the process of adopting Lancaster County's Model Stormwater Management Ordinance. The model contains provisions for riparian corridor protection that include, in part, the following:

Section 306. Riparian Corridors

A. In order to protect and improve water quality, a Riparian Corridor Easement shall be created and recorded as part of any subdivision or land development that encompasses a Riparian Corridor.
B. Except as otherwise required by Chapter 102, the Riparian Corridor Easement shall be measured to be the greater of the limit of the 100 year floodplain or 35 feet from the top of the stream bank (on each side).
C. Minimum Management Requirements for Riparian Corridors.
    1. Existing native vegetation shall be protected and maintained within the Riparian Corridor Easement.
    2. Whenever practicable invasive vegetation shall be actively removed and the Riparian Corridor Easement shall be planted with native trees, shrubs and other vegetation to create a diverse native plant community appropriate to the intended ecological context of the site.

County model stormwater management ordinances are often designed to be stand-alone documents, although municipalities may incorporate county model provisions into local zoning or subdivision and land development ordinances. When included within a stand-alone stormwater ordinance, it is not immediately clear what protec-

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tion riparian buffer regulations would have from a legal challenge. For example, will municipalities with such adopted ordinances be able to rely on the enabling provisions of the MPC intended for zoning and subdivision ordinances? Perhaps to address this issue, the Lancaster County draft model ordinance is referenced as an implementation action of the County's integrated water resources plan, which was prepared in accordance with the provisions of the MPC in addition to Act 167. Administrative actions, according to this draft, are appealable by an aggrieved party within 30 days of the action to the officials of the adopting municipality. Appeals of the officials' decisions are appealable to the Court of Common Pleas. It is not clear from these drafts what criteria the municipal officials would use to decide upon an appeal of an administrative action under this ordinance. Also, the County's model includes a requirement for the conveyance of a riparian corridor easement to insure that the riparian buffer remains part of the overall stormwater management system, regardless of future land ownership or future zoning. The easement holder will have to monitor (and enforce) this easement in perpetuity and absorb the costs associated with such responsibility.

Other Regulatory Tools

Other regulatory tools available to local governments for protection of riparian resources include:

- Conservation by Design,
- steep slope ordinances,
- woodland protection provisions,
- Transferable Development Rights,
- Official Map and
- floodplain ordinances.

Conservation by Design

Through use of Conservation by Design, and associated mapping of potential conservation lands, a site's riparian resources can be identified.Through use of this tool's four-step design process, the site's riparian resources can be included for permanent protection as part of a proposed subdivision's secondary conservation areas and greenway lands (restricted open space).

Steep Slope Ordinances

Steep slope ordinances that prevent disturbance of steeply sloped lands (usually regulating slopes of 15 to 25% and greater) and also prevent the removal of stabilizing vegetation on these slopes provide protection to riparian buffers coinciding with steep slopes.

Woodland Protection Provisions

Woodland protection provisions placed in either zoning or SALDO ordinances can add another layer of riparian resource protection when the buffer includes significant stands of trees or is part of a larger forest. Woodland protection provisions typically limit the amount of wooded vegetation that can be removed by a development, and require the submittal of a forest management plan to the municipality that emphasizes erosion and sedimentation control. Good woodland protection provisions also protect the ecological values of the forest during a harvest, for example, by limiting tree removal that results in excessive tree canopy loss. Without specific riparian buffer protection language in place, woodland protection provisions may be the only way to protect forested buffers from degradation or loss. If a riparian protection ordinance is in place and, for example, allows timber harvests to occur in outer zones, overlapping woodland protection standards could provide stronger overall buffer protections.

Transferable Development Rights

Transferable development rights (TDR), a conservation and growth management tool enabled through municipal zoning, would provide landowners with riparian buffers an ability to be compensated for permanently preserving their buffer lands. Allocated by a municipality to riparian buffer lands through zoning, TDRs could be severed and sold by landowners voluntarily to buyers (typically a developer) to use on less-restricted parcels, preferably in an area planned for development. The buffer lands would be considered TDR *sending areas*, while the lands where the acquired TDRs are used for development are called *receiving areas*. Once the TDRs have been fully severed from the riparian buffer, a conservation easement or other restrictive covenant is normally required to be applied to the buffer and recorded to provide for permanent protection.

Official Map

The official map, created through municipal ordinance, depicts locations of future public investment or use, typically with respect to areas of a municipality shown by its adopted comprehensive plan as appropriate locations for schools, parks, roads, and trails. If a municipality felt that protection of riparian buffers along its streams and other waterways might be best achieved through public acquisition of the buffers or their associated parcels, these buffers could be highlighted on the adopted Official Map. Then, when a land use application that includes the buffer is

filed, the municipality would have up to one year, or as established by local ordinance, to acquire the lands containing the buffer. Even where the municipality is unable to raise funds sufficient for acquisition, it can use the Official Map to negotiate a better method of buffer protection than otherwise possible under zoning or subdivision regulation enforcement. The best known use of the Official Map for riparian buffer protection is Bushkill Township in Northampton County.

Floodplain Ordinances

Floodplain ordinances can be designed to provide riparian buffer protections, such as by incorporating elements of the Model Riparian Buffer Overlay District. However, this has not been the historical practice.

Most floodplain ordinances match FEMA's national floodplain ordinance model. While they restrict the construction of structures within the floodplain, they do not prevent removal of buffer vegetation or soil disturbance. They also may allow the floodplain to be paved with trails, roads, and parking lots, provided that such improvements do not impede the flow of floodwaters. As such, a floodplain ordinance of this sort would not protect riparian buffers.

Municipalities may overhaul their floodplain ordinances to protect riparian buffers without running afoul of FEMA requirements.

Elements Of Good Riparian Buffer Protection Regulations

A municipality may adapt and incorporate the *Model Riparian Buffer Protection Overlay District* (located at the end of this guide) as an article or section of its zoning ordinance. The model draws on the Brandywine Conservancy's work with several municipalities in developing riparian buffer regulations, and its provisions have received favorable support from municipal solicitors. Attorney Fronefield J. Crawford, Jr. attests to the model's legal defensibility and reasonableness vis-à-vis private property rights in a letter accompanying the model.

The following sections, which track the seven headings of the model, describe key matters to address in riparian buffer protection regulations. They explain the model's treatment of the matters and provide examples from ordinances adopted in Pennsylvania as well as the state Special Protection Water regulations.

100. Purpose and Intent
200. Definitions
300. Applicability
400. Riparian Buffer Delineation
500. Uses Permitted
600. Buffer Restoration and Planting Requirements
700. Modifications to Riparian Buffer Standards

100. Purpose And Intent

Riparian buffer protection regulations should begin with a statement of purpose or intent. The statement should reference the important ecological functions being protected through administration of the riparian buffer protection regulations. The model lists many functions due to its substantial buffer requirement of 100 feet. An ordinance providing a smaller buffer might not be justified in listing as many functions.

The intents of Halfmoon Township and Shrewsbury Township's riparian regulations are excerpted from their respective zoning ordinances and quoted below.

Excerpt From § 255-37 Of The Halfmoon Township Zoning Ordinance, 2008

1. Conserve the natural features important to land or water resources (e.g., headwater areas, groundwater recharge zones, floodways, floodplains, springs, streams, wetlands, woodlands, prime wildlife habitats).
2. Work with floodplain, steep slope, and other municipal ordinances that regulate environmentally sensitive areas to minimize the hazards to life, property, and important riparian features.
3. Conserve natural, scenic and recreation areas within and adjacent to riparian areas for the Centre Region's benefit.
4. Reduce the amount of nutrients, sediment, organic matter, pesticides, and other harmful substances that reach watercourses, wetlands, subsurface, and surface water bodies by using scientifically proven processes, including filtration, deposition, absorption, adsorption, plant uptake, and denitrification, and by stabilizing. Further, to minimize concentrated flows through the use of level spreaders and/or similar stormwater management devices used to disburse concentrated flow uniformly over the ground as sheet flow.
5. Improve and maintain the safety, reliability, and adequacy of the Centre Region's water supply for domestic, agricultural, commercial, industrial, and recreational uses along with sustaining diverse populations of aquatic plants and animals.

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6. Regulate the land use, siting, and engineering of all development to be consistent with the intent and objectives of this chapter and accepted conservation practices, as well as assure that the results of such uses remain within the carrying capacity of existing natural resources.
7. Assist in the implementation of pertinent state laws concerning erosion and sediment control practices, specifically Erosion Control, of the Pennsylvania Clean Streams Law, Act 394, P.L., 1987, Title 25, and any subsequent amendments thereto, as administered by the Pennsylvania Department of Environmental Protection and the Centre County Conservation District.

Excerpt From § 1301 Of The Shrewsbury Township Zoning Ordinance, 2010

1. To combine with present zoning requirements, certain restrictions made necessary for critical environmental areas in order to promote the general health, welfare and safety of citizens;
2. To limit, control and restrict the erection of permanent buildings and structures in Critical Environmental Areas;
3. To permit only those uses that can be appropriately located in critical environmental areas as listed in Section 1306;
4. To minimize the danger to public health by protecting the quality and quantity of surface and subsurface water supplies;
5. To provide sufficient drainage courses to carry abnormal flows or storm water in period of heavy runoff;
6. To provide areas for the temporary natural storage of floodwaters;
7. To protect adjacent landowners and property both upstream and downstream from damages resulting from development within riparian areas and the consequent obstruction or increase in flow of floodwaters;
8. To protect the entire township from individual uses of land that may have an effect upon subsequent expenditures for public works and disaster relief and adversely affect the economic well being of the citizens of the township.
9. To protect other municipalities within the same watershed from the impact of improper development and the consequent increased potential for flooding and/or unsuitable locations for development;
10. To allow natural migration of stream channels over time;
11. To reduce channel erosion and widening of channels;
12. To reduce erosion and sedimentation;
13. To allow for infiltration from storm water runoff;
14. To enhance the base flow of watercourses, springs and seeps;
15. To protect and maintain the aquatic environment or ecosystem of Critical Environmental Areas from nutrient loadings, pesticides, sediments and temperature increases, as well as other pollutants.
16. Providing the organic matter that is the source of food and energy for the aquatic ecosystems.
17. Provide wildlife habitat including that of rare and endangered species.
18. Maintaining, enhancing or creating open space, scenic values and recreational opportunities.

Chesapeake Bay Watershed Municipalities

Pennsylvania municipalities located in the Chesapeake Bay watershed should include, as part of ordinance's stated purposes, compliance with state, county, or regional Chesapeake Bay water quality goals or objectives. For example, Halfmoon Township acknowledges the Chesapeake Bay Tributary Strategy goals and objectives. The model also includes a special purpose statement for those municipalities within the Chesapeake Bay watershed.

200. Definitions

Riparian buffer protection regulations should define terms specific to the regulation of riparian buffers to ensure clarity in the interpretation of the regulations. Although the model includes a definition section that defines terms that might not otherwise appear in a municipality's zoning ordinance, the terms would be more appropriately added to the zoning ordinance's definitions chapter.

Some ordinances establish the riparian buffer width requirements as part of a definition in the ordinance's definition section, for example, Lower Milford Township in Lehigh County.

Excerpt From The Lower Milford Township Zoning Ordinance, 2009

RIPARIAN BUFFER **-** An area of trees and other vegetation adjacent to a watercourse that forms a transition area between the aquatic and terrestrial environment. The riparian buffer is designed to intercept runoff from upland

sources for the purpose of mitigating the effects of nutrients, sediment, organic matter, pesticides or other pollutants prior to entry into surface waters. For the purposes of this Ordinance, the riparian buffer shall be divided into two Zones:

> Zone One: Inner Riparian Buffer - This zone shall begin at each edge of any identified wetland or watercourse and shall occupy a margin of land on each side, each with a minimum width of fifteen (15) feet from any wetland or twenty-five (25) feet from any watercourse, whichever is greater. The width of such margin shall be measured horizontally on a line perpendicular to the applicable edge of the wetland or, in the case of a watercourse, to the nearest edge of the water at bankful flow. Where very steep slopes (+25%) are located within and extend beyond such margin, Zone One shall extend to include the entirety of the very steep slopes up to a maximum dimension of one hundred (100) feet on either side of a watercourse, or seventy-five (75) feet of a wetland.
>
> Zone Two: Outer Riparian Buffer - Zone Two begins at the outer edge and on each side of any area delineated within Zone One and occupies any additional area, if any, within one hundred (100) feet of the nearest edge of any watercourse, or seventy-five (75) feet of a wetland, measured as for Zone One.

[Note: Additional riparian buffer and wetland margin protection standards are provided within the Natural Resource Protection Standards chapter of the Lower Milford Township Zoning Ordinance.]

300. Applicability

All Uses Versus Subdivisions And Land Developments
Riparian buffer protection regulations should apply to all uses subject to zoning, not just to proposed subdivisions or land developments. The purposes for protecting riparian buffers are valid regardless of whether one is applying for a subdivision or land development approval, zoning variance, special exception, conditional use, change in use, building permit, or zoning permit. Just as Section 102 regulations for special protection waters essentially apply to all uses subject to state permit, local regulations should apply broadly. The *Model Riparian Buffer Protection Overlay District* states that it applies when the above-listed applications or permits are required.

Perennial Streams
Riparian buffer protection regulations should apply to all perennial streams. Perennial streams are readily located on USGS published topographic maps as blue-line streams. Soil maps published by the Natural Resource Conservation Service (NRCS) often show greater perennial stream detail than USGS maps.

Intermittent Streams
Intermittent streams can be more difficult for a municipality to consistently and fairly regulate. NRCS soil maps may show intermittent streams (dashed lines extending from solid perennial stream lines), but, in general, intermittent streams are not as easily discernible on most published mapping. Field interpretations as to what constitutes an intermittent stream can also vary widely, making difficult the administration and enforcement of riparian buffer regulations on intermittent streams. Waters of the Commonwealth are regulated by state and federal agencies if they have a defined bed and bank, whether they have water in them or not. The definition for Watercourse within the model ordinance provided with this guide, for example, uses the terms "defined bed and banks."

Wetlands
Wetlands should be protected, whether or not through riparian buffer protection regulations. Federal law administered by the U.S. Army Corps of Engineers (COE) and PADEP provides protections to many wetlands. Some municipalities choose not to regulate wetlands through municipal zoning ordinances, relying instead on PADEP and COE review and approval.

Wetlands surrounded by vegetation are far better protected from pollution and disturbance from adjoining land uses. As such, this guide recommends including, either as part of riparian buffer regulations, or as part of separate wetland protection regulations in the zoning or subdivision and land development ordinance, the establishment of an undisturbed wetland margin or protective buffer. The *Model Riparian Buffer Protection Overlay District* applies a fifty-foot undisturbed buffer (Zone 1) to the wetland perimeter.

Special Protection Waters Under Section 102
Riparian buffer protection regulations should account for the state's Section 102 regulations where a municipality has PADEP-designated Special Protection Waters within its boundaries.

A municipality with EV or HQ streams may choose to either (a) rely on the protection afforded by Section 102

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regulations or (b) provide stronger protection for EV and HQ streams than delivered by Section 102. In making a decision, the municipality will want to consider the following:

- Since the state's Section 102 regulations do not apply to land disturbances of less than an acre, the municipality may want to ensure that local regulation covers this regulatory gap.
- State regulations are subject to change or even rescission. Could such a change or rescission leave the municipality's EV and HQ streams with less buffer protection than the municipality's other streams?
- Do the municipality's EV and HQ streams merit greater protection, for example, a wider buffer than provided by present state regulations?

The *Model Riparian Buffer Protection Overlay District* assumes that the riparian buffer provisions of Section 102 may not always protect buffers adequately, and makes its provisions applicable when more restrictive than those provisions of Section 102. At a minimum, municipalities with Special Protection Waters should require all applicants under the zoning or subdivision ordinance to demonstrate, at the time of local approvals, PADEP approval of the project based on Section 102 compliance. Murrysville, for example, includes the following provision in its zoning ordinance:

> In addition to the requirements of this article, all applicants must comply with all the requirements of the Commonwealth of Pennsylvania, Title 25, Chapter 102 (Erosion and Sedimentation Pollution Control Rules and Regulations), Chapter 105 (Dam Safety and Waterway Management), and the Clean Streams Law.

400. Riparian Buffer Delineation

Widths And Zones

Riparian buffer protection regulations should require a minimum forested buffer width of 100 feet. The model proposes a minimum riparian buffer width of 100 feet, divided into two zones:

- Zone 1, closest to the water and subject to strict use restrictions, is a minimum of 50 feet in width; and
- Zone 2 extends upland from Zone 1. Its width equals 100 feet less the width of Zone 1. A greater range of activities is allowed in it.

A buffer width of 100 feet will support most of the documented ecological functions of forested buffers. Adoption of a stepped, or multi-zone, buffer can provide the landowner or developer with use flexibility within the outer zone without unduly harming the functionality of the overall buffer.

In choosing buffer widths, a municipality may want to consider that the state's Section 102 riparian buffer regulations for Special Protection Waters establishes a 50-foot width for Zone 1 and a 100-foot width for Zone 2.

For those ordinances that require restoration/planting of degraded or non-existent buffers, planting requirements can be specified by zone (see later discussion).

Width Adjustment For Natural Features

The minimum riparian buffer width required by regulations should be adjusted when certain natural features, or existing conditions, are present. Regulation that establishes a uniform buffer width, regardless of terrain, is easier to administer, monitor, enforce, and explain to private property owners, elected officials, and developers than one that varies the required width to accommodate natural landscape features worthy of protection. However floodplains, wetlands and steep slopes do not follow uniform lines and may go unprotected if only a uniform width is established.

Halfmoon Township extends "zone one" beyond its minimum width depending on existing topography, woodlands, and other natural conditions, for example, where slopes of 15% - 25% or more exist within the buffer. Other riparian buffer ordinances extend the outer edge of the buffer to match the 100-year flood plain boundary. These types of regulations that increase the buffer width when other sensitive natural resources overlap are a good practice, but may be unnecessary if other portions of the zoning ordinance include protective standards for these same natural resources.

Width Adjustments For Impaired Waters

The minimum riparian buffer width required by regulations can be adjusted for addressing impaired waters. Waters of the Commonwealth that have been listed by PADEP as impaired in DEP's "Integrated Water Quality Report, 2012" have special water quality enhancement needs, and have more stringent PADEP stormwater management requirements than non-impaired waters. Increasing the required buffer width for such streams is an appropriate best management practice (BMP).

Measurements
Riparian buffer width should in all cases be measured from the top of the bank of a stream or watercourse, and from the high water level at the shoreline of a pond, lake or reservoir, and outer edge of a wetland. The Lehigh Valley Planning Commission's Riparian and Wetland Buffers Guide/Model Regulations have excellent graphics depicting how buffer widths, or setbacks, should be measured.

500. Uses Permitted

Riparian buffer regulations should substantially restrict uses within the buffer in order to ensure the buffer's effectiveness in achieving the purposes of the regulations. Ideally the entire buffer should be left undisturbed, except when enhancing or maintaining the buffer, to maximize its effectiveness. However, it is not always practicable, or desirable, to prohibit most uses across the width of the entire buffer. The model recognizes this by establishing two zones: Zone 1 must be left undisturbed with few exceptions; greater flexibility is provided in Zone 2.

Oddly, the State's Section 102 riparian buffer regulations, even though working with a two-zone buffer, permit the same uses in either zone.

The Lehigh Valley Planning Commission's model riparian buffer regulations recognize that municipalities may wish to allow for the following uses within the protected riparian buffer: stream restoration projects; horticultural practices used to maintain the health of the vegetation within the buffer; removal of non-native vegetation or dangerous trees; agricultural practices existing at the time of ordinance adoption; and roads, bridges, trails, storm drainage, stormwater management facilities and utilities when no other feasible alternative can be shown to exist.

Warriors Mark Township in Huntingdon County prohibits all development (requiring a zoning permit or subdivision or land development approval) within its stream protection overlay district. The only permitted activity within the overlay district is the selective clearing of understory vegetation when existing groundcover and canopy trees remain, and the planting of canopy trees to shade the stream.

Shrewsbury Township, York County, prohibits all development within its 100-foot riparian buffer, but permits agriculture, forestry, hunting and fishing preserves, passive recreation or parks, and wildlife preserves or refuges.

Lower Milford Township's riparian buffer and wetland margin protection standards permit the following limited uses within zone 1: regulated activities permitted by the Commonwealth, trails and trail access with minimum wooded vegetation disturbance, selective removal of hazardous or invasive vegetation, or vegetation management in accordance with an approved landscape plan or open space management plan. Within zone 2, Lower Milford's riparian buffer provisions permit zone 1 uses plus timber harvesting operations (subject to separate ordinance requirements), as well as any use permitted by the underlying zoning, provided no more than 20 percent of the outer zone (buffer) will be re-graded, filled, built upon, or otherwise subject to land disturbance.

Halfmoon Township's riparian buffer overlay zoning district limits permitted uses in the 100 foot buffer to: agricultural uses, forestry, removal of dead, diseased, or hazardous trees, required yards (limited to one-half) of private lots, stream bank stabilization, and stream crossings for farm vehicles or livestock. Within the first 35 feet of this buffer (Zone One), the regulations allow other stream crossings subject to conditional use, and within the second 65 feet of this buffer (Zone Two), the regulations allow, subject to conditional use, passive use areas such as camps, campgrounds and picnic areas, and active recreational areas, naturalized stormwater basins, level spreaders and similar stormwater structures that disperse concentrated stormwater flow.

Use Of Discretionary Approvals To Add Some Flexibility In Use
The use of the ordinance's special exception or conditional use provisions can provide for appropriate uses and activities within the regulated buffer under certain conditions. Restrictive buffer ordinances should be tailored to local conditions, with permitted uses divided between "by-right" and those that require some level of discretionary review. For example, a natural trail with limited ground disturbance might be found acceptable within portions of a riparian buffer without requiring more than a careful review by the municipal zoning officer. A paved trail, on the other hand, with grading and impervious surfaces, may only be acceptable within the regulated buffer under certain conditions. By requiring approval of a special exception or conditional use, and the use of reasonable conditions of approval, the use can be limited in extent or its associated use impacts mitigated.

Uses Within Buffer Typically Exempt From Regulation Or Exceptional Situations
Riparian buffer protection regulations should exempt certain public, or beneficial, uses from the restrictive regulations that, because of their nature, are typically proposed in or near streams

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and other water features. These are typically necessary public improvements or maintenance projects, including but not limited to: floodplain restoration, stream bank stabilization, aquatic habitat improvements, road crossings, bridges, culverts, utility repair and maintenance, impoundments and trails. Wording should state that existing riparian buffers are to be left undisturbed to the extent practicable, and municipal review of engineering or construction plans is required prior to work commencing. Necessary road crossings should be perpendicular to the riparian buffer.

600. Buffer Restoration And Planting Requirements

Riparian buffer protection regulations should rigorously protect the forested character of buffers or, in the absence of substantial forest cover, require restoration to a forested state with a suitable mix of native vegetation. Buffers with a mix of native ground cover, shrubs, and larger canopy trees are far more functionally productive than buffers consisting only of grasses.

The Commonwealth's Section 102 riparian regulations define a riparian forest buffer to consist predominantly of native trees, shrubs and forbs that provide at least 60% uniform canopy cover. For impaired EV or HQ designated streams, landowners/developers are required to remove any invasives, replant missing or enhance poorly vegetated buffers with native vegetation, and maintain the newly planted materials.

The Lehigh Valley Planning Commission's Riparian and Wetland Buffers Guide/Model Regulations has an informative section explaining types of buffer vegetation and the functional values that they contribute. LVPC's model regulations permit riparian buffers, once established through zoning, to grow in naturally, rather than require a landowner or developer to plant the buffer at the time of subdivision or development construction.

West Pennsboro Township, Cumberland County, has vegetative design objectives for each of its three riparian zones and, at the time of construction, requires planting consistent with the objectives. Plantings are only required to the extent that existing, native vegetation does not fully meet the zone's design objectives. For example, West Pennsboro's Zone 1, which is required to be at least 15 feet in width, must include mature canopy trees and a ground cover of warm season grasses. Zone 2, the next 50 feet in width, must include mature canopy trees generally three rows deep with a natural undercover. Zone 3, the final 10 feet in width, must be planted with warm season grasses that are allowed to mature naturally without mowing.

The *Model Riparian Buffer Protection Overlay District* utilizes restoration planting specifications developed for PADEP that target a density sufficient to provide three hundred trees per acre at maturity. Municipalities may wish to refer to PADEP's Bureau of Watershed Management Document Number 394-5600-001, entitled "Riparian Forest Buffer Guidance," November 27, 2010.

The model also exempts building permits for the construction of single-family dwellings and additions thereto from the restoration requirements, but requires adherence to all other buffer limitations (setbacks, limits of disturbance).

Maintenance Requirements

Ordinances that require buffer plantings at the onset of subdivisions and land development construction should also require maintenance of the new plantings. Requiring the landowner to maintain the newly restored riparian buffer – at least until it is well established and less vulnerable to invasive plants, deer, rodents, and floods – and following up with municipal inspection and enforcement, if necessary, ensures that the intent of the ordinance is fully implemented. Ordinances should be crafted so as not to restrict a landowner's efforts to remove invasive vegetation, non-native plants and trees, and dangerous trees.

The *Model Riparian Buffer Protection Overlay District* includes provisions requiring final subdivision plan, final land development plan, or zoning permit applicants to submit a planting and maintenance plan for the impacted riparian buffer. This plan requires applicants to show how they will achieve the sixty percent minimum uniform canopy coverage as well as commit to a minimum of five years of buffer maintenance.

700. Modifications To Riparian Buffer Standards

An ordinance should provide for relief from its rigorous buffer protection restrictions or standards in a particular circumstance only to the extent needed to allow a reasonable use of the property as permitted by zoning to continue. If a municipality adopts a riparian buffer protection ordinance consistent with the *Model Riparian Buffer Protection Overlay District*, the model has provisions (see Section 700) that allow regulatory relief as necessary to ensure that an owner is not deprived of all reasonable use of his or her property.

For example, while existing uses not adhering to newly adopted standards are considered existing non-

conforming uses that may continue, regulatory relief may be necessary in more developed municipalities where small, narrow lots border water bodies, or where existing uses lying adjacent to a water body are proposed for expansion or a change in use. The case could exist where a landowner is caught between meeting an ordinance requirement calling for more on-site parking, and the only area on site to satisfy such parking requirement includes a regulated riparian buffer where reforestation is required.

The *Model Riparian Buffer Protection Overlay District*'s modification section affords relief under unique circumstances such as this, and includes standards for use by the appropriate municipal decision-making body in allowing limited alterations.

Case Studies

Halfmoon's Riparian Buffer Overlay Zoning District

Halfmoon Township is a rural and agricultural community located in Pennsylvania's Centre County, home to Penn State and coldwater fisheries that provide superb native trout fishing. The Township amended its zoning ordinance in 2008 by adding a riparian buffer overlay zoning district. In doing so the Township adopted, essentially unchanged, the model ordinance developed by a committee of municipal officials, local water and sewer authorities, agricultural preservation representatives and conservationists, and Centre Regional Planning Agency (CRPA) staff.

Use Of CRPA's Model

D.J. Liggett, Senior Planner for CRPA reported that in addition to Halfmoon, three municipalities participating in the CRPA[2] adopted modestly modified versions of the model, one inserted pieces of the model into its already existing ordinance provision and another applied the model only to a small area of their township. Some of the municipalities formed their own committees and spent considerable time reviewing CRPA's model ordinance and its benefits and landowner impacts before enacting their ordinances.

Although the model was designed for placement within municipal zoning ordinances, Liggett noted that several municipalities placed the provisions in their subdivision and land development ordinances in order to give the municipalities greater discretion in adjusting the requirements for any particular project if conflicts arose. (Obtaining a variance from a Zoning Hearing Board for a zoning variance is generally more challenging than getting approval to deviate from the requirements of a SALDO.)

Permitted And Prohibited Uses Under Halfmoon's Regulations

Halfmoon Township's riparian buffer overlay district "applies to the first 100 feet from each defined upper edge of an identified intermittent and perennial watercourse or surface water body at top of bank, or shall equal the extent of the one-hundred-year floodplain, whichever is greater." Within this 100 feet, zone one extends from the top of the back for 35 feet, and zone two extends from the end of zone one another 65 feet. Either zone's width may be increased by the Township due to existing site features (wetlands, woodlands, steep slopes, etc.). Wetlands and waterbodies isolated from streams have a 50-foot minimum buffer width requirement. The ordinance provisions apply to subdivisions, land developments or redevelopments, any other improvements that require a zoning or building permit, or any existing structure either within or touching the buffer greater than 150 square feet in size.

Within zones one and two, uses permitted by right include:

- agricultural uses
- forestry uses with an approved erosion and sedimentation control plan
- removal of dead trees
- up to one-half of any required yards (of private lots)
- wildlife sanctuaries, nature preserves, forest preserves, etc.,
- stream bank stabilization and/or recommended native tree reforestation
- stream crossings for farm vehicles or livestock, and
- research and monitoring devices.

Uses permitted by conditional use in zone one and two include new stream crossings for roads, railroads, and other forms of public infrastructure when meeting certain design standards and mitigation requirements. Within zone two, the following additional uses are permitted subject to conditional use:

- passive use areas such as camps, campgrounds and picnic areas, and active recreation areas when not resulting in concentrated stormwater flow, and

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- naturalized stormwater basins, level spreaders or other similar stormwater structures.

Specifically prohibited uses include:

- removal or disturbance of vegetation when inconsistent with erosion and sedimentation control and riparian buffer protection
- storage of any hazardous or noxious materials,
- use of fertilizers, pesticides, and other chemicals in excess of federally prescribed standards or the recommendations of the Centre County Conservation District
- roads and driveways
- motor or wheeled vehicle traffic when exceeding what can be accommodated adequately, and
- parking lots.

Regulatory Safety Valves

Halfmoon Township's ordinance has several safety valves to address situations when strict compliance with the riparian buffer requirements is problematic due to severe economic hardship or unique circumstances on the property. Under a set of management provisions within the ordinance, a subdivision, land development, or use requiring a building or zoning permit may be permitted within the overlay district only when "the impacts of such actions are mitigated at a 1:1 square foot replacement ratio," following the ordinance's riparian buffer management guidelines for restoration improvements by insuring that dominant native vegetation as part of any required replacement is consistent with the ordinance's selective native riparian buffer plantings list. Another safety valve is the use of buffer width averaging, a technique that allows for a narrower buffer at some points along the stream in exchange for a wider buffer at other points. A third safety valve is the request for a variance from the Township's Zoning Hearing Board.

Implementation

Halfmoon Township's Zoning Officer, David Piper, reported that, because of the economic recession, the Township has experienced little development of significance to test the regulations. However, he did note a few instances where the regulations applied. For example, where a farm owner needed to provide driveway access to a house on his property and the driveway impacted the 100-foot buffer. The regulations allowed this driveway encroachment to occur within the buffer subject to its 1:1 square foot replacement ratio requirements. Without this flexibility, the zoning officer felt the landowner might not have had any other options available to access a portion of the property. In his opinion, this flexibility is crucial to the long-term success and survival of the ordinance.

Shrewsbury's Critical Environmental Areas

In 2010, Shrewsbury Township, located in southern York County, Pennsylvania, adopted a new zoning ordinance that included riparian buffer protections. The purpose of Article 13, entitled "Critical Environmental Areas (CEAs) and Wellhead Protection," is

> to establish minimal requirements for the design of buffers to protect Critical Environmental Areas including watercourses, wetlands, and floodplains of Shrewsbury Township; to protect the water quality of watercourses, reservoirs, lakes, and other significant water resources within Shrewsbury Township; to protect Shrewsbury Townships riparian and aquatic ecosystems; and to provide for the environmentally sound use of Shrewsbury Township's land resources (Shrewsbury Township Zoning Ordinance, 2010).

The importance and intent behind this purpose is explained at considerable length.

Buffer Width

The ordinance provides for the protection of a 100-foot riparian buffer at minimum around watercourses, including springs and seeps. This required width expands as slope increases and also to encompass floodplain or wetland located within or immediately adjoining the 100-foot buffer. The ordinance also requires that a 35-foot buffer be established at the outer edge of these floodplains and wetlands

According to former Township Supervisor and retired Baltimore County planner, David Solomon, the Township previously had an 85-foot riparian buffer width. However, this width was increased to a minimum of 100 feet for two reasons: 1) to match that of adjoining Baltimore County, Maryland, and 2) the realization by the Township ordinance drafting committee that current scientific documentation demonstrates that nitrogen, phosphorus, and other pollutant removal is essentially ineffective at a vegetative buffer width of less than 100 feet.

Permitted Uses

The only uses permitted within Shrewsbury Township's 100-foot riparian buffer area are agriculture, forestry, hunting and fishing preserves, passive recreation or parks,

and wildlife preserves/refuges, and necessary public improvements such as floodplain restoration, stream bank stabilization, aquatic habitat improvements, road crossings, and so forth.

According to Solomon, who was instrumental in developing the ordinance, the riparian buffer regulations were directed at land planned for development within the township's small growth boundary. A large percentage of the Township is in restrictive agricultural zoning, where a one dwelling unit per thirty acre density and a minimum 50,000 square foot lot size keeps suburban development and its associated land and environmental impacts at bay within most of the Township. The Township did not see the need to include agriculture in the buffer restrictions as farming practices had dramatically improved over the past decade, and it did not want to burden farmers who traditionally till close to the Township's surface waters and streams. However, an "applicability" provision within Article 13 gives the Township the discretion to apply the buffer requirements to agricultural operations in situations where severe erosion and sedimentation is occurring or livestock are damaging the stream banks or severely polluting the watercourse.

Implementation
Solomon indicated that little significant development has occurred since the new zoning ordinance was adopted but believes this buffer requirement will go a long way toward meeting the Township's water quality protection objectives.

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Model Riparian Buffer Protection Overlay District

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Official Map

Experts
John Theilacker, John Snook, Ann Hutchinson, Tom Comitta

[1] See also, M. Royer, Citizens for Pennsylvania's Future, "A Legal Analysis of Riparian Buffer Protection Ordinances in Pennsylvania," March, 2006; and A. Flenner, Dickinson Journal of Environmental Law and Policy, Fall, 1998, "Municipal Riparian Buffer Regulations in Pennsylvania – Confronting the Regulatory Takings Doctrine."

[2] CRPA has six participating municipalities: State College Borough, College Township, Ferguson Township, Halfmoon Township, Harris Township, and Patton Township.

Model Riparian Buffer Protection Overlay District

Proposed Regulations For Use In A Municipal Zoning Ordinance

Edition of April 25, 2014

Section 100. Purpose and Intent. The specific purposes and intent of this article are to:

A. Conserve, protect, and restore natural riparian resources through scientifically supported processes.

B. Maintain and improve surface water quality by reducing the entry of detrimental substances, including nutrients, sediment, organic matter, pesticides, and other harmful substances that reach watercourses, wetlands, and surface and subsurface water bodies.

C. Reduce the entry of detrimental substances by restricting development and uses in riparian areas that intercept surface water runoff, wastewater, subsurface flow and deep groundwater flows from upland sources and where the processes of filtration, deposition, absorption, adsorption, plant uptake, sediment and phosphorus attenuation, denitrification and infiltration may occur; encouraging sheet flow and minimizing, mitigating and preventing concentrated flows of storm water runoff across riparian areas, and securing increased channel and bank stabilization that avoids stream bank erosion and associated water quality, quantity and flow harms.

D. Attenuate flooding and reduce soil loss.

E. Reduce adverse aquatic health impacts due to changes in the temperature of receiving waters (both temperature increases and temperature decreases) as a result of storm water runoff, loss of vegetative shading and direct discharges to water bodies.

F. Enhance in-stream processing of nutrients and pollutants such as pesticides and reduce the downstream movement of pollutants.

G. Improve and maintain the safety, reliability and adequacy of the water supply for domestic, agricultural, commercial, industrial and recreational uses along with sustaining diverse populations of aquatic flora and fauna.

H. Provide wildlife habitat, protect native plant species, and provide opportunities for passive recreation.

I. Conserve headwater areas, groundwater recharge zones, floodway, floodplain, springs, seeps, streams, wetlands, woodlands, prime wildlife habitats and other features that provide recreational value or contain natural amenities, whether on developed or undeveloped land.

J. Integrate with floodplain, steep slope, woodland protection and other ordinance requirements contained herein that regulate environmentally sensitive areas to minimize hazards to life, property and riparian features.

K. Conserve scenic and recreation areas within and adjacent to riparian areas.

L. Protect the watercourses and wetlands otherwise not regulated or superseded by Section 102 of the Pennsylvania State Code.

M. Regulate the use, siting, engineering and maintenance of all development to be consistent with the purposes and intent of this article and accepted conservation practices and to work with the carrying capacity of existing natural resources.

N. (*When applicable*) Further the Chesapeake Bay Tributary Strategy goals and objectives by implementing best management practices (BMPs) to address point and non-point pollution sources.

Section 200. Definitions. (*in addition to other definitions typically found within the zoning ordinance*)

APPLICANT – a landowner or developer who has filed an application for subdivision or land development or for any zoning or building permit that will result in land disturbance, including his heirs, successors and assigns or the equitable owner of property with the owner's permission. Applicants must either be the legal or beneficial owner or owners of land subject to the application, including the holder of an option or contract to purchase (whether or not such option or contract is subject to any condition), a lessee if he is authorized under the lease to exercise the rights of the landowner, or other person having a proprietary interest in land.

BANKFULL FLOW OR LEVEL – The discharge that just fills the water channel to the top of its banks and at a point where the water beings to overflow onto a floodplain.

BEST MANAGEMENT PRACTICE (BMP) – A structural or non-structural device designed to temporarily store or treat stormwater runoff in order to mitigate flooding and pollution, and reduce soil loss and water quality degradation caused by runoff containing nutrients, animal wastes, toxins, and sediments.

FORESTED RIPARIAN BUFFER – A riparian buffer that consists predominantly of native trees, shrubs and/or herbaceous plants that provide a minimum of sixty (60) percent uniform canopy coverage.

IMPACTED RIPARIAN BUFFER – A riparian buffer that, as a result of land use or land development activity, contains impervious cover or landscape use or

management activity such that it no longer meets the definition of "forested riparian buffer".

IMPERVIOUS COVER – Those surfaces that do not readily absorb precipitation and surface water. The term includes but is not limited to buildings, parking areas, driveways, roads, sidewalks, swimming pools, and any areas in concrete, asphalt, packed stone, or other equivalent surfaces, including those with a coefficient of runoff of 0.7 or higher. Impervious surfaces also include disturbed soils with a bulk density of ninety-five (95) percent of the value at which plant growth limitation is expected for average plant material.

LAND DISTURBANCE – Any activity that exposes soils, alters topography, and/or alters vegetation.

NORMAL POOL ELEVATION –

- For water bodies which have no structural measures to regulate the height of water, the height of water at ordinary stages of low water unaffected by drought.
- For structurally regulated water bodies, the elevation of the spillway, outlet control, or dam crest which maintains the water body at a specified height.
- The term does not apply to wetlands.

RIPARIAN – Belonging or related to the bank of a water body, river, stream, wetland, lake, pond, or impoundment.

RIPARIAN BUFFER – A vegetated area, including trees, shrubs, and herbaceous vegetation, adjacent to a water body.

TOP OF BANK – The elevation at which rising waters begin to inundate the floodplain. In case of ambiguous, indefinite, or non-existent floodplain or question regarding the location, the Top of Bank shall be the bankfull water elevation as delineated by a person trained in fluvial geomorphology and utilizing the most recent edition of *Applied River Morphology* by Dave Rosgen, or comparable reference book. "Top of Bank" shall be synonymous with "edge of water."

WATER BODY – Any natural or manmade pond, lake, wetland, impoundment, or watercourse. This shall not include any pond or facility designed and constructed solely to contain stormwater, or a swimming pool.

WATERCOURSE – Any channel of conveyance of surface water having a defined bed and banks, such as a stream, river, brook, or creek, whether natural or artificial, with perennial, intermittent or seasonal flow. This shall not include any channel or ditch designed and constructed solely to carry stormwater.

WETLAND OR WETLANDS – Those areas 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, ponds, lakes, and similar areas. Wetlands shall include any area so delineated by the National Wetlands Inventory of the U.S. Fish and Wildlife Service and all lands regulated as wetlands by the Pennsylvania Department of Environmental Protection (PADEP) or the U.S. Army Corps of Engineers (ACE). In the event there is a conflict between the definitions of these agencies, the more restrictive definition that defines the wetlands most expansively shall apply.

Section 300. Applicability.

A. The provisions of this article shall apply to any water body as defined herein, except as further clarified in subsection D. below.

B. The provisions of this article shall apply in accordance with subsection A. above where any application for special exception, conditional use, variance, subdivision, land development, or building or zoning permit is required, or when a violation of the provisions of this article require an enforcement action.

C. The provisions of this article shall not apply to the footprints of existing primary and accessory uses, including but not limited to all agricultural uses and research related thereto, buildings, transportation facilities, fences, lawns, gardens, utility lines, roads, driveways, sidewalks, bikeways, decks, piers, water, septic and sewage supply facilities and their related appurtenances (well houses, utility pump and lift stations, manholes, etc.).

D. For lands lying within a PADEP-designated Special Protection Watershed, the riparian buffer requirements of Section 102.14 of Chapter 102 (Erosion and Sedimentation Pollution Control Rules and Regulations) of the Commonwealth of Pennsylvania, shall apply when more restrictive than the regulations provided herein. Pursuant to Section 102.14, earth disturbance activities subject to post-construction stormwater management (PCSM) permits cannot be located within one hundred fifty (150) feet of a watercourse in an exceptional value (EV) or high quality (HQ) watershed. At the time of plan and/or permit approval under this Zoning Ordinance, applicants are responsible for demonstrating compliance with Section 102.14 of Chapter 102, when applicable, including providing copies of all related correspondence and relevant PADEP approvals to the Zoning Officer.

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Section 400. Riparian Buffer Delineation. The riparian buffer area shall extend a minimum total width of one hundred (100) feet from the edge of a water body, or shall equal the extent of the 100-year floodplain, whichever is greater.

A. The riparian buffer area will consist of two distinct zones designated as:

   1. Zone One: Zone One begins at each edge of a water body and shall extend landward a minimum width of fifty (50) feet, measured horizontally on a line perpendicular to the nearest edge of the water body, as reviewed and approved by the municipal engineer.

      a. Where steep slopes (15% to 25% or more) are located within fifty (50) feet of the edge of a water body, Zone One shall extend the entire distance of this steep sloped area, including any steep sloped area that begins within fifty (50) feet and extends beyond one hundred (100) feet. If the sloped area extends beyond one hundred (100) feet, there will be no requirement for the establishment of Zone Two. If the distance is less than one hundred (100) feet, but greater than fifty (50) feet, the width of Zone Two will be adjusted so that the total riparian buffer width (Zone One and Zone Two) is one hundred (100) feet.

   2. Zone Two: Zone Two begins at the outer edge and on each side of any area delineated within Zone One and extends further landward to a minimum total width of one hundred (100) feet including Zone One, and where the floodplain extends greater than one hundred (100) feet from the water body, shall extend to the outer edge of the defined 100-year floodplain.

B. Isolated wetlands and water bodies. Wetlands and water bodies not located along a watercourse, where the wetland or water body is greater than 5,000 square feet in area, shall have a minimum buffer width consistent with Zone One, as defined above, from the edge of the wetland or water body around the entire perimeter.

C. Buffer increase for impaired water bodies. In the case of a water body that has been listed by PADEP as impaired (see PADEP's "Integrated Water Quality Report, 2012", or if applicable, a later revision thereof, for a listing of impaired water bodies), Zone Two begins at the outer edge of any area delineated within Zone One and extends further landward to a minimum total width of a one hundred fifty (150) feet including Zone One.

D. Applicant to initially delineate. The applicant shall delineate, for the property as a whole, any riparian buffer areas as specified in subsections 400.A through 400.C above on any plan that is submitted for the following approvals:

1. Conditional use, special exception, or variance.
2. Subdivision or land development.
3. Any other improvements that require a zoning or building permit for the activities within the Riparian Buffer Overlay Zoning District.

Section 500. Uses Permitted.

A. The following uses or activities are permitted by right in Zone One:

1. Wildlife sanctuaries, nature preserves, forest preserves, fishing areas, passive areas of public and private parklands.
2. Temporary stream restoration projects, stream bank restoration projects and vegetation restoration projects to restore the stream or riparian zone to an ecologically healthy stage utilizing natural channel design practices to the greatest degree possible. The project duration and timing shall be subject to Zoning Officer approval.
3. Stream crossings for farm vehicles and/or livestock if part of a federal, state, and/or county conservation district and/or local nonprofit riparian buffer improvement project.
4. Provision for stone-dust or natural trail and related trail access when determined by the Zoning Officer to result in minimum disturbance to existing trees and shrubs.
5. Research and monitoring devices, such as staff gages, water recording, water quality testing, cross vanes, weirs and related demonstration facilities.

B. The following uses or activities are permitted by right in Zone Two:

1. Uses or activities permitted in Zone One.
2. Timber harvesting operations, when conducted in compliance with a timber harvesting plan prepared, submitted, and approved in accordance with Section ____ of the Zoning Ordinance. Clear-cutting of timber, or high-grading of forests, as defined therein, shall not be permitted within the regulated riparian buffer.
3. Any other use or activity permitted in the underlying (base) district, provided that:
   a. no more than twenty (20) percent of Zone Two shall be re-graded, filled, or otherwise altered or subject to land disturbance; and
   b. with the exception of paved trails approved by the Zoning Officer, no new impervious surfaces shall be created as a result of any per-

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mitted uses or activities except as permitted in paragraph 500.D, below.

C. The following uses or activities are permitted by Special Exception (*or Conditional Use, if so desired*) approval in Zone One:

1. Structures that, by their nature, cannot be located anywhere except within the riparian buffer. These structures shall include docks, boat launches, public water supply intake structures, facilities for natural water quality treatment and purification and public wastewater treatment plant sewer lines and outfalls. The structures shall provide for the minimum practicable disturbance of the riparian buffer by minimizing size and location and by taking advantage of collocation, if possible.
2. Road crossings (when perpendicular to the stream or buffer), bridges, culverts, utilities, and impoundments.
3. Provision for paved trail and related trail access when determined by the Zoning Hearing Board to result in minimum disturbance to existing trees and shrubs.

D. The following uses or activities are permitted by Special Exception (*or Conditional Use, if so desired*) approval in Zone Two:

1. Uses permitted by Special Exception in Zone One.
2. Stormwater conveyance structures and outfalls.
3. The grazing of livestock or growing of agricultural crops provided existing forested riparian buffers in either zone are not removed or otherwise impacted.
4. Any other use or activity permitted in the underlying (base) district, provided that no more than twenty (20) percent of Zone Two shall be regraded, filled, altered, subject to land disturbance, or covered with impervious surfaces.

E. The following activities or practices are expressly prohibited in Zone One and Zone Two:

1. Removal or disturbance of vegetation in a manner that is inconsistent with erosion and sedimentation control and riparian buffer protection.
2. Storage or discharge of any hazardous or noxious materials, except those used during emergencies for the treatment and/or maintenance of any public sewer and public water treatment facilities (i.e., generator sets or alternative drive units).

3. Use of fertilizers, pesticides, herbicides, and/or other chemicals, except:
    a. where permitted by a valid conservation plan, forest management plan, or approved planting and maintenance plan (see Section 600.E. below);
    b. for selective herbicide application by a qualified professional to control noxious weeds and invasive species of plants in riparian buffers.
4. Motor or wheeled vehicle traffic in any area not designed to accommodate adequately the type and volume of vehicular movement.

Section 600. Buffer Restoration and Planting Requirements.

A. All riparian buffer areas shall be continually maintained with a dominant mix of native trees, shrubs, and/or herbaceous plants so as to constitute a forested riparian buffer where not otherwise occupied by any existing use excepted in accordance with Section 300.C., or any authorized use permitted in Section 500.

B. Impacted riparian buffer areas shall be restored by an applicant to a forested riparian buffer, as a condition of approval of any final subdivision plan, final land development plan, or building or zoning permit approval, except as provided in subsection G., through invasive removal and planting of a diverse mix of native tree and shrub species as follows:
    1. For water bodies identified as impaired by PADEP, the applicant shall restore the first one hundred (100) feet of the impacted buffer area.
    2. For all other water bodies, the applicant shall only restore Zone One.

C. Restoration of the impacted riparian buffer shall occur as follows:
    1. Zone 1. Undisturbed native trees must occupy Zone 1 in its entirety. Predominant vegetation must be composed of a variety of native tree species planted in accordance with subsection D. below.
    2. Zone 2. For restoration adjacent to impaired water bodies, in addition to the planting requirements for Zone 1, managed native trees and shrubs must occupy at least the first fifty (50) feet of Zone 2, beginning at the outer edge of Zone 1. Predominant vegetation must be composed of a variety of native riparian tree and shrub species planted in accordance with subsection D. below.

D. Restoration plantings shall be planted at a density sufficient to provide three hundred (300) trees per acre at maturity. To achieve this density, no less than three hundred fifty (350) (@ approximately 10 x 10 feet spacing)

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trees per acre should be planted initially. The following guide is recommended for tree spacing and density based on plant size at installation:

1. Seedlings – 6-10 feet spacing (approx. 700 seedlings/acre)
2. Bare root stock – 14-16 feet spacing (approx. 200 plants/acre)
3. Larger and container – 16-18 feet spacing (approx. 150 plants/acre)

Additional planting guidance may be obtained from PADEP's Bureau of Watershed Management Document Number 394-5600-001, entitled "Riparian Forest Buffer Guidance, November 27, 2010.

E. Applicants shall submit, and as a condition of approval of any final subdivision plan, final land development plan, or permit, implement a planting and maintenance plan for the impacted riparian buffer. The plan shall be prepared by a registered landscape architect or professional plant ecologist. The plan shall identify the number, density and species of native trees and shrubs appropriate to the geographic location that will achieve a minimum of sixty (60) percent uniform canopy coverage and describe the maintenance program to be conducted by the buffer owner for a minimum of five (5) years, include measures to initially remove, and thereafter control, invasive species, control deer and rodent damage, and require replacement of deceased trees for a minimum of the first three (3) years.

F. Any riparian buffer that is included within a lot created after the effective date of this ordinance shall include as a condition of approval of the subdivision creating the lot, a restrictive covenant approved by the municipal solicitor, and recorded with the final subdivision or land development plan and the deed for the lot. The restrictive covenant shall clearly define the riparian buffer area, shall include binding provisions for the adequate long-term functioning and integrity of the riparian buffer, and shall include a requirement for notification of all subsequent lot owners of its restrictive nature.

G. Restoration to a forested riparian buffer shall not be required for issuance of a building permit for a single-family residence or addition thereto.

Section 700. Modifications to Riparian Buffer Standards.

A. For any use or activity subject to Subdivision or Land Development review, as part of applicable Plan submission, modification(s) may be requested to the provisions of Sections 400 or 600 of this Article. Requested modification(s) may be granted at the discretion of the Board of Supervisors pursuant to the provisions of the Subdivision and Land Development Ordinance.

B. For any use or activity not subject to Subdivision or Land Development review, but subject to application for approval of a Conditional Use, Special Exception, or Zoning Variance under the provisions of this Ordinance, the applicant may request modification(s) to the provisions of Sections 400 or 600 of this Article.

C. For any use or activity not falling within the scope of subsections A or B, the applicant may request modification(s) to the provisions of Sections 400 or 600 of this Article in the form of an application for grant of a Special Exception by the Zoning Hearing Board. (*Optional: Such applications shall be submitted to the Planning Commission for review and comment prior to formal Special Exception application to the Zoning Hearing Board.)*

D. Applicants shall provide appropriate documentation in support of their modification request, and the Board of Supervisors or Zoning Hearing Board (as applicable) may request additional documentation of an applicant, or of its municipal consultants, to help reach its decision.

E. In consideration of approval of any applicant request for modification(s) under this Article, the following standards shall serve as the basis for a decision:

   1. That there are unique physical circumstances or conditions, including but not limited to irregularity, narrowness, or shallowness of lot size or shape, excessive frontage along a water body, presence of existing buildings or structures, or exceptional topographical or other physical conditions peculiar to the particular property. That because of such physical circumstances or conditions, it is impracticable for the property to be developed in strict conformity with the buffer requirements of this Article and that the approval of the modification is therefore necessary to enable the reasonable use of the property under base zoning provisions.

   2. That the modification, if approved, will result in the minimum reduction in performance of the riparian buffer, pursuant to the purposes set forth in Section 100, as needed to provide for the lawful intended use.

F. No alteration of the Use Regulations set forth in Section 500 shall be authorized as modification pursuant to this Section 700. Any such requested alteration shall constitute an application for a variance, meeting all applicable requirements for same, to be submitted to the Zoning Hearing Board.

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Letter from Fronefield Crawford, Jr.

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Re: **Model Riparian Buffer Protection Overlay District**
Proposed Regulations for Use in a Municipal Zoning Ordinance
Brandywine Conservancy and Pennsylvania Land Trust Association
Edition of April 25, 2014

John and Andy:

Per your request, I have reviewed the edition of April 25, 2014 of the Model Riparian Buffer Protection Overlay District draft, incorporating several of the questions and comments which I had raised in reviewing the prior drafts.

In my opinion, subject to individual tailoring of the model ordinance for compatibility with the existing zoning regulations of a particular municipality, the model ordinance is a strong and technically defensible regulation (as needed, given the importance of riparian buffers to stream quality) and not unreasonably restrictive of private property rights.

In particular, up to 20% of the area of the Zone 2 riparian buffer can be re-graded, filled or otherwise altered while still maintaining, within both Zone 1 and Zone 2, a forested buffer in accordance with the specifications set forth in the ordinance.

As is the case with any restrictive provision in a zoning ordinance, there may be individual cases where strict compliance with the regulations (for example, the planting requirements for restoration of a forested buffer area) may be so costly in comparison to the proposed use or improvement of the remainder of the tract, that the property owner will be entitled to relief. The ordinance recognizes this possibility, providing authority for the granting of modifications to the provisions of Sections 400 or 600, and also recognizing that any proposed modification of the use regulations of Section 500 will be treated as an application for a use variance, with the burden of proof upon the property owner to demonstrate unnecessary hardship.

As you have articulated in the companion document (*Riparian Buffer Via Local Regulation—A Guide for Pennsylvania Municipalities)*, the Pennsylvania Municipalities Planning Code provides ample authority for municipal zoning ordinances to restrict areas in close proximity to water bodies.

In my opinion, the fact that Pennsylvania Environmental Quality Board has enacted regulations within Chapter 102 to require the preservation of forested buffers adjacent to streams located within special protection water sheds (EV or HQ), does not have the effect of preempting municipal regulations that are not inconsistent with the DEP regulations. Historically, both the state (through DEP) and municipalities have complementary roles in protecting sensitive environmental features, and there is no reason to believe that the context of riparian buffer regulation would lead to a different result.

The guide for Pennsylvania municipalities that you have drafted as a companion document to the model ordinance constitutes a thorough documentation of the purposes to be served by enactment of riparian buffer protections as an overlay district within municipal zoning ordinances, and there is no need for me, as this point, to restate all of the thorough research which you have done in support of the model overlay district ordinance.

Please do not hesitate to contact me if you have any further questions at this stage.

Sincerely yours,

Fronefield Crawford, Jr.

FCJR/ljb

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Submit Comments and Suggestions

The Pennsylvania Land Trust Association would like to know your thoughts about this guide: Do any subjects need clarification or expansion? Other concerns? Please contact Andy Loza at 717-230-8560 or aloza@conserveland.org with your thoughts. Thank you.

Acknowledgements

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