

Protecting Your Water

Resources

Clean Water Fund, Delaware Riverkeeper Network and Green Valleys Association have developed a Model Municipal Water Resources Ordinance designed to protect public health, the environment and the economic interests of municipalities in Pennsylvania. This document introduces the

Table Of Contents

Comprehensive Stormwater Management	3
Riparian Buffer Zone Management	5
Steep Slope Conservation Districts	6
Woodland Protection	7
Wellhead Protection	8
Wetlands Protection	9
Floodplain Protection	10
Comprehensive Water Supply/Use Management	11
Comprehensive Wastewater Management	12

Prepared by Clean Water Fund, Delaware Riverkeeper Network and Green Valleys Association.
The Model Municipal Water Resources Ordinance was created by Cahill Associates, Environmental Consultants.
Funded by William Penn Foundation.
January 2007



CLEAN WATER FUND
1315 Walnut St., Suite 1650
Philadelphia, PA 19107
Phone: 215.545.0250
Fax: 215.545.2315



DELAWARE RIVERKEEPER NETWORK
300 Pond Street, 2nd Floor
Bristol, PA 19007
Phone: 215.369.1188
Fax: 215.369.1181



GREEN VALLEYS ASSOCIATION
1368 Prizer Road
Pottstown, PA 19465
Phone: 610.469.4900
Fax: 610.469.4990

COMPREHENSIVE STORMWATER MANAGEMENT

Summary The purpose of comprehensive stormwater management is to protect the health, safety and welfare of residents by sustaining and enhancing surface waters and groundwater. This ordinance requires mitigative and preventative methods to ensure that precipitation infiltrates into the ground where it falls, mimicking pre-development conditions.

This ordinance is designed to ensure that development will not cause sewers and natural waterways to be

Benefits of Ordinance This ordinance protects human health, the environment and property and helps a municipality comply with various State and Federal requirements.

With this ordinance a municipality maintains the pre-development water cycle between watersheds and protects or restores the natural hydrology wherever possible. Volume and rate of runoff, volume of infiltration and groundwater recharge, stream baseflow, evapotranspiration, and other elements of the hydrologic cycle are all simultaneously addressed with comprehensive stormwater management.

The ordinance is centered on stormwater discharge volume control. Peak rate discharges and water quality control are also addressed with this approach, thus preventing costly engineering to separately address all three aspects of stormwater management.

By preventing increases in surface runoff for both small and larger storms, a municipality avoids exacerbating flooding downstream in the watershed, enlarged floodplains, property and infrastructure damage and harm to aquatic biota. To maintain safe drinking water and recreational areas, this ordinance rigorously controls non-point source pollution directly, and erosion and sedimentation indirectly.

This model Stormwater Ordinance:

- Is consistent with the new PADEP Stormwater BMP Manual
- Addresses certain requirements of the Municipal Separate Storm Sewer System (MS4) National Pollution Discharge Elimination System (NPDES) Phase II Stormwater Regulations.
- Meets legal water quality requirements under state law, including regulations at 25 Pa. Code Chapter 93.4a to protect and maintain “existing uses” and maintain the level of water quantity to support those uses in all streams and to protect and maintain water quality in “special protection” streams.

continued...



... continued

Ordinance Description A prescribed “Site Planning and Design Procedure” must be followed so as to promote the maximum use of appropriate **structural and non-structural Best Management Practices (BMPs)**. Extensive guidance is included for site and soil testing, to perform stormwater calculations, to meet reporting requirements and to maintain structural BMPs.

This ordinance is based on standards, as set forth below. Although the standards themselves must be satisfied, the adopting municipality allows for and promotes flexibility in determining how these standards are achieved.

Standard 1: Compared to pre-development conditions, the post-development site shall have no increase in the total volume of stormwater runoff for up to the 2-year storm.

Standard 2: The peak rate of stormwater discharge from the post-development site for up to the 100-year storm shall not exceed the peak rate of the pre-development site.

Standard 3: For the cases where a Total Adjustment from Standard 1 is issued and volume is not being managed, then additional peak rate standards must be met.

Standard 4: Significant loadings of nonpoint source pollutants shall not be discharged into either surface or groundwater; satisfying Standard 1 typically results in satisfying this water quality requirement.

Standard 5: For all those land uses considered to be high pollutant producers, the municipal engineer may impose additional water quality requirements that go beyond those included in Standard 4.

Standard 6: Additional requirements on stormwater discharges may be imposed to afford special protection to downstream structures or natural features or to increase infiltration volumes to improve groundwater recharge.

To encourage the maximum use of environmentally sensitive, conservation-oriented site planning, this ordinance outlines reasonable and appropriate **incentives to implement non-structural BMPs**.

A variety of provisions which relate to **stormwater calculation methodologies** and assumptions used in stormwater calculations are set forth in this ordinance.

Specific stormwater management **system design requirements** are extensively outlined for

- Infiltration/Recharge Facilities
- Extended Detention and Retention Basin Facilities
- Stormwater Collection (Drainage) Systems

RIPARIAN BUFFER ZONE MANAGEMENT

Summary Riparian buffers are naturally vegetated areas adjacent to waterways, including streams, ponds, estuaries and wetlands. This ordinance promotes the use of a **regulatory overlay** to preserve riparian buffer zones.

This ordinance promotes the use of a regulatory overlay to preserve riparian buffer zones.

Benefits of Ordinance The protection and restoration of buffer zones along waterways helps encourage infiltration of rainfall and runoff, provide for the absorption for high stream flows, filter out pollutants, capture sediment, regulate stream water temperature and process many contaminants through vegetative uptake.

Ordinance Description The ordinance, to be defined in the zoning ordinance and referenced in the subdivision/land development regulations, establishes a Riparian Buffer Zone (RBZ) based upon US Geological Survey 1:24,000-scale topographic quadrangle maps. Within the RBZ, it establishes three sub-zones, Zones 1 through 3, extending away from the water from the top of the streambank.

- **Zone 1** is a 25-foot setback zone (increased to a 50-foot setback zone in Special Protection Waters) measured from the top of the bank of the waterbody, where no disturbance of vegetation and soil except for restoration shall occur.
- **Zone 2** is a 75-foot managed buffer zone (increased to a 150-foot managed buffer zone in Special Protection Waters) extending outward from the edge of Zone 1, where disturbance of natural vegetative cover shall be limited to selective logging and other activities which minimally disrupt existing tree cover and soil mantle. Residential and agricultural uses are allowed, provided certain conservation practices are utilized.
- **Zone 3** is a zone of varying width extending outward from Zone 2. Zone 3 only exists in those cases where upslope areas adjacent to Zone 2 are being disturbed during land development and where direct discharge of stormwater would otherwise occur. Here, devices must be used to break up concentrated channels of stormwater so that discharges from the area are spread out as they enter Zone 2.

Existing uses within the RBZ, unless otherwise addressed by the above provisions, are not subject to the requirements of this Ordinance.

As described above, this ordinance **permits mostly passive uses** in Zones 1 and 2. Review and approval by the municipality is required for uses such as trails, stream crossings, or utility lines. Uses such as clear-cutting of trees and other vegetation in Zones 1 and 2, storage

of any hazardous or noxious materials, and parking lots that would harm the functions and values of riparian buffer zones are not allowed in any of the zones.



STEEP SLOPE CONSERVATION DISTRICTS

Summary This ordinance minimizes erosion and flooding by regulating the intensity of land development and use in areas with steep slopes. These areas are fragile and their destruction often causes erosion, siltation of waterways and property damage.

A municipality can protect public health and prevent costly damage to land and property by protecting the natural conditions in areas

Benefits of Ordinance Steep slopes are very fragile areas. Erosion, loss of soil, land destruction, property damage, flooding and surface water degradation all result from the improper land use on steep slopes, including removal of existing vegetation and disturbance of the soil mantle. A municipality can protect public health and prevent costly damage to land and property by protecting the natural conditions in areas with steep slopes.

Ordinance Description The ordinance, to be defined in the zoning ordinance and referenced in the subdivision/land development regulations, establishes **Steep Slope Conservation Districts**. These are overlay zones, meaning all other zoning conditions continue to apply in addition to the provisions of this ordinance. There are two types of Steep Slope Conservation Districts:

- **Prohibitive Slope:** those slopes greater than 25%.
- **Precautionary Slope:** those slopes greater than 15% and less than or equal to 25%.

In **Prohibitive Slope Areas**, no development, re-grading or stripping of vegetation shall be permitted except for unavoidable roadway or utility construction. The ordinance lists parks, woodcutting, yarding and limited grading as uses permitted as of right that must be undertaken with care and stringent provisions for erosion control.

In **Precautionary Slope Areas**, the site design and grading for development shall minimize disruption of the natural topography. The same uses permitted as of right for the Prohibitive Slope Areas are also listed for Precautionary Slope Areas.

The administration of this ordinance is as follows: For all earth-moving activities in Steep Slope Conservation Districts, the applicant must submit a **site plan** prepared by an engineer. Mandatory elements of this plan include: a map of the slopes, waterbodies and other natural features at the proposed site, specific methods for erosion control, a re-vegetation plan, a hydrological analysis and other relevant information.

The site plan is reviewed by the Municipal Engineer who accepts, rejects or sets conditions for the applicant's site plan. The ordinance outlines specific criteria to guide the Engineer's review. All such criteria are aimed at minimizing the disturbance to steep slopes.



WOODLAND PROTECTION

Summary This ordinance aims to preserve the maximum number of trees throughout developments in the municipality. Standards are set to ensure that trees are removed only when necessary, are protected during construction and that removed trees are replaced appropriately.

Trees are one of a municipality's greatest stormwater management and environmental assets.

Benefits of Ordinance Trees are one of a municipality's greatest stormwater management and overall environmental assets. By protecting woodlands, hedgerows and vegetation, this ordinance offsets drainage costs, and reduces air-borne dust and loss of soil fertility. It increases groundwater recharge, property values, aesthetics and noise reduction, and improves air quality. Indeed the objectives of many other provisions of the Model Ordinance (stormwater management, riparian buffer zone management, floodplain protection, etc.) are supported by the protection of woodlands.

Ordinance Description No person shall remove trees in the municipality **during land development activity** without complying with the provisions of the ordinance. All applicants seeking approval for development or construction that disturbs significant sections of trees must get a **Tree Removal Permit**, which are granted by the municipality.

Permits are granted only if the applicant displays how certain tree removal is necessary to accomplish the proposed development and how remaining woodlands will be protected throughout construction. The ordinance outlines extensive criteria to guide the clearing and retaining of trees.

If woodland disturbance is to exceed 20,000 square feet or 25 percent of any wooded area (whichever is less) then a process of **woodland replacement** must be followed. The caliper of the removed tree must be nearly matched by the sum of 3" caliper replacement trees; for example, the removal of one 12" tree necessitates four 3" replacements and the removal of one 30" tree necessitates ten 3" replacements.

The ordinance lists numerous exemptions which include nurseries, orchards, Christmas tree farms, cemeteries, certain small residential parcels, certain municipal removal of trees, working farms and the removal of trees that are unhealthy or which pose a threat to structures or human health.

WELLHEAD PROTECTION

Summary This ordinance regulates land uses in areas close to wells for community water systems in order to prevent contamination of the groundwater that supplies these wells. The ordinance does not deal with individual household wells.

What happens on the surface of the land effects groundwater.

Benefits of Ordinance What happens on the surface of the land effects groundwater; there are countless examples where polluting activities have contaminated groundwater. This ordinance is a preventive measure, aimed at protecting groundwater resources from contamination. Regulating the types of uses allowed near community wellheads is more protective of public health and is also cheaper than cleaning up contamination after it occurs or drilling new wells.

Ordinance Description The ordinance, to be defined in the zoning ordinance and referenced in the subdivision/land development regulations, establishes three zones around the wellhead for a community water system. These zones are overlay zones, meaning all other zoning conditions continue to apply in addition to wellhead protection provisions.

- **Zone 1** is immediately surrounding a well with a radius of roughly 400 feet.
- **Zone 2** has a radius of approximately ½ mile.
- **Zone 3** is the area that contributes surface and groundwater to Zone 2.

The Wellhead Protection Ordinance contains a **schedule of regulated land uses** that are restricted depending on their likelihood of causing groundwater contamination. Some uses such as landfills and junkyards are not allowed in any of the zones because they are a highly likely source of contamination. Other land uses like gas stations or heavy manufacturing facilities are deemed to be less of a threat and are therefore allowed as special exceptions in Zone 3 or Zone 2. The municipality may grant **special exceptions** provided that the applicant takes adequate measures to fulfill the groundwater protection purposes of the ordinance.

Pre-existing land uses that would not generally be allowed in a zone (non-conforming uses) may continue provided they are otherwise in compliance with federal, state and local environmental regulations and are not materially altered, changed or expanded.

General Exceptions include the transport of hazardous materials through the wellhead protection zone(s) and the residential use of hazardous materials in a manner associated with normal household use.

Enforcement of the ordinance is done through the zoning process of the municipality, including its Code Enforcement Officer, Zoning Hearing Board and Planning Commission.



WETLANDS PROTECTION

Summary Wetlands are regulated by both Federal and State agencies, though not perfectly. Disputes often arise over whether wetlands exist at a location or not. This ordinance gives a municipality greater authority over project approval. This also calls for a Wetlands Buffer Zone to offer extra protection for wetlands in Special Protection Waters.

Wetlands are an irreplaceable part of a natural hydrology that require protection.

Benefits of Ordinance Wetlands are an irreplaceable part of a natural hydrology that require protection. They reduce flooding by absorbing runoff and filter pollutants out of runoff before releasing the water into the ground or nearby streams. They also provide important habitat for many plant and animal species.

Ordinance Description This ordinance is defined in the zoning ordinance and referenced in the subdivision/land development regulations. One or more of the following indicates wetlands:

- The National Wetlands Inventory as prepared by the US Fish and Wildlife Service of the Department of the Interior
- Hydric soils, or soils with hydric inclusions
- Existence of a wetland hydrology

Federal/State wetlands are formally defined in the *Federal Manual for Identifying and Delineating Jurisdictional Wetlands, January 19, 1989*, as amended. In most cases, Federal/State wetlands jurisdiction is marked by the presence of all three above indicators in combination.

In addition to obtaining all State and Federal wetlands permits, applicants are encouraged by the ordinance to have a qualified wetlands professional examine the site and produce a **report regarding the existence of wetlands**. If no such report is submitted to the municipality, or if it is disputed, the municipality may request that a federal or state agency perform a jurisdictional analysis of the site. If such agencies cannot do this in a timely fashion, a wetlands scientist may be hired **at the expense of the applicant**.

If wetlands are confirmed to exist at the site, and if the proposed disturbances at the site are within 100 feet from the edge of the wetlands, final approval from the municipality shall not be granted until all wetland related permits, waivers or agency actions are complete.

Near Special Protection Waters, as designated by the State, applicants should establish a buffer zone extending with a 100-foot radius around all mapped wetlands. In non-Special Protection Waters, this buffer should be at least 25 feet in width. This is called the **Wetlands**

Buffer Zone. Disturbance here should be strongly discouraged, and only allowed after the applicant demonstrates that no reasonable alternatives exist.



FLOODPLAIN PROTECTION

Summary The objective of this ordinance is to minimize or prevent the removal of vegetation in the floodplain and the manipulation, like compaction, of the soil. This goes beyond the Federal Emergency Management Agency (FEMA) requirements and includes recommendations for floodplain buffers.

These are pro-active measures that prevent human injury and property damage.

Benefits of Ordinance By complying with the provisions of this ordinance a municipality will maximize their floodplains' permeability, its water quality filtering potential, its flood carrying capacity, and its ability to slow flood flows. These are pro-active measures that prevent human injury and property damage.

Ordinance Description This ordinance, to be defined in the zoning ordinance and referenced in the subdivision/land development regulations, regulates land uses in floodplains- areas that are determined by FEMA or official Flood Hazard Boundary Zone mapping. It suggests that the regulations also apply to functional flood hazard zones (characterized by alluvial soils), which have not been included by FEMA or FHBZ mapping.

Uses permitted in floodplains must incorporate measures to leave intact or mimic natural conditions. Such uses include:

- Passive recreation areas
- Cutting of unhealthy trees in riparian buffers of streams or rivers
- Sealed water supply wells and pipelines
- Road, railroad and utility crossings with no feasible alternative location

Uses prohibited in the floodplain include:

- Clearcutting of trees or vegetation
- The use of hazardous materials
- Health care facilities and institutional uses
- All commercial, industrial and residential uses

Where these requirements impose undue and excessive economic burden, these **requirements may be waived** wholly or in part by the municipality. Existing uses within the floodplain, unless otherwise addressed, are not subject to the requirements of this Ordinance.

Because storms appear to be worsening, **the ordinance recommends that future subdivisions and land developments utilize a floodplain buffer in their site planning.** All applicants will be required to calculate the pre-development site area required to pass 125

percent of the 100-year FEMA-calculated flood flow, although compliance with this performance standard is voluntary.



COMPREHENSIVE WATER SUPPLY/USE MANAGEMENT

Summary This ordinance is written to protect water resources from going dry by coordinating the various local demands for water. Through this provision, quantitative water supply/use impacts are to be integrated with stormwater and wastewater management. A Water Budget Impact Zone is established as an overlay zone and significant water uses in that area are regulated.

Municipalities can maintain the balance of their local hydrologic cycle even with continued land

Benefits of Ordinance Municipalities can maintain the balance of their local hydrologic cycle even with continued land development. When too much water is taken from an area the system goes bankrupt- the water table falls, stream base flow is reduced, vegetation suffers and wells may go dry. The water uses in each watershed must all be coordinated so as to prevent adverse impacts on the quantity and quality of local water.

Ordinance Description The **Water Budget Impact Zone (WBIZ)** consists of all areas of the municipality except those areas served by a water system that sources its water from a non-local source. Uses within the WBIZ are regulated by this ordinance. The WBIZ is an overlay zone, meaning all other zoning conditions continue to apply in addition to the provisions of this ordinance.

The ordinance also defines **Significant Water Uses** as any of the following:

- Non-residential uses that use 1,000 gallons per day (gpd) or more
- Uses where an especially large quantity of water is consumed or depleted
- Large water extraction/bottling facilities
- Dense residential uses
- Some wastewater treatment facilities

All new land developments classified as Significant Water Uses and which are located in the WBIZ are required to perform a **Water Budget Impact Analysis**. The objective of this Analysis is to:

- **Calculate the “supply”** (the maximum allowable water impact budget at the site).
- **Calculate the “demand”** associated with the proposed use.
- Where “demand” exceeds “supply”, **the Analysis must propose a solution**

The Water Budget Impact Analysis is subject to the review, comment and approval of the municipality and any other pertinent government agencies. Approval of this Analysis is required in order for the preliminary plan to be approved.

COMPREHENSIVE WASTEWATER MANAGEMENT

Summary This ordinance promotes the use of sewage treatment technologies that maximize the return of treated wastewater into/onto the ground in accordance with sound environmental principles. The ordinance is intended to complement sewage treatment planning provisions set forth in a municipality's Act 537 plan.

The export of locally-sourced water out of a watershed as treated wastewater negatively impacts local hydrology

Benefits of Ordinance The export of locally-sourced water out of a watershed as treated wastewater negatively impacts local hydrology, potentially causing shortages of groundwater or insufficient stream flow in the future. The promotion of sewage treatment technologies that maximize the return of treated wastewater into and onto the ground serves to protect the seasonal and annual balance of inflow, outflow and storage of water in a watershed and overall watershed sustainability. This ordinance presents a proactive approach that protects both public health and the quality of the municipality's surface water and groundwater.

Ordinance Description Wastewater treatment technologies that maximize the return of treated wastewater into/onto the ground are **recommended** by this ordinance, especially when the water supply is from an on-site source or from reasonably locally-based sources. As a corollary, the ordinance discourages the export of treated wastewater out of the watershed and states that such export should only be an option of last resort. As is consistent with the previous section (Comprehensive Water Supply/Use Management) the export of treated wastewater requires a **Water Budget Impact Analysis**.

Wastewater treatment technologies with **optimum return efficiency** include:

- On-site septic systems
- Community on-site disposal systems
- Drip irrigation systems

Other land-based wastewater treatment options that are **less efficient**, but still beneficial, include:

- Spray irrigation systems
- Sand mound systems
- Other technologies

Pre-existing systems that export locally-based water sources out of the watershed as treated wastewater should be remedied whenever possible.