ARE YOU LOVING PAXTON CREEK *TO DEATH?*

Do any of these pictures look familiar? They all represent actions that can negatively affect your local streams. Read more to learn how you can protect and restore Paxton Creek!

Lawns are mowed right up to the stream edge and forest buffers are cleared

Sediment enters waterways through storm drain inlets and in unmanaged construction site runoff

Oil and grease spills and pesticides can enter waterways in stormwater runoff

Runoff from rooftops and excessive pavement increases the total volume of runoff reaching the stream

Paxton Creek Watershed and Education Association
Center for Watershed Protection
2004

About the Paxton Creek Watershed

Do you live, work or play in the Paxton Creek Watershed? You might and not even know it.

Forested headwater stream of Paxton Creek

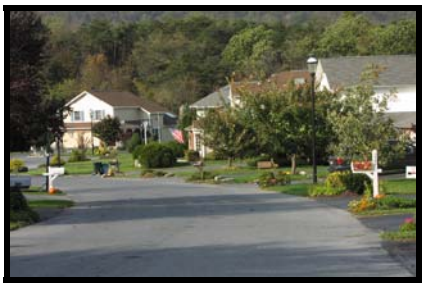
Many small headwater streams flow into the tributaries of Paxton Creek, which empties into the Susquehanna River in the City of Harrisburg, and ultimately flows to the Chesapeake Bay. All of the land area drained by Paxton Creek and its **63 miles** of tributaries and headwater streams is called the **Paxton Creek watershed.**

The Paxton Creek watershed is approximately **27 square miles,** and covers portions of Dauphin County: Susquehanna Township, Lower Paxton Township, the City of Harrisburg, and Penbrook Borough. Land use in the watershed includes forested mountain headwaters, low and medium density development surrounding Harrisburg, and highly urban development near the City portion.

Channelized portion of Paxton Creek

What is a Watershed?

A watershed is the area of land that drains to a particular point along a stream. A watershed boundary is defined by the highest elevations surrounding the stream. A drop of water falling outside this boundary will drain to another stream. We all live in a watershed.



Residential development in headwater area

Commercial development in moderately developed portion

Highly urban development in the City of Harrisburg

About the Paxton Creek Watershed and Education Association

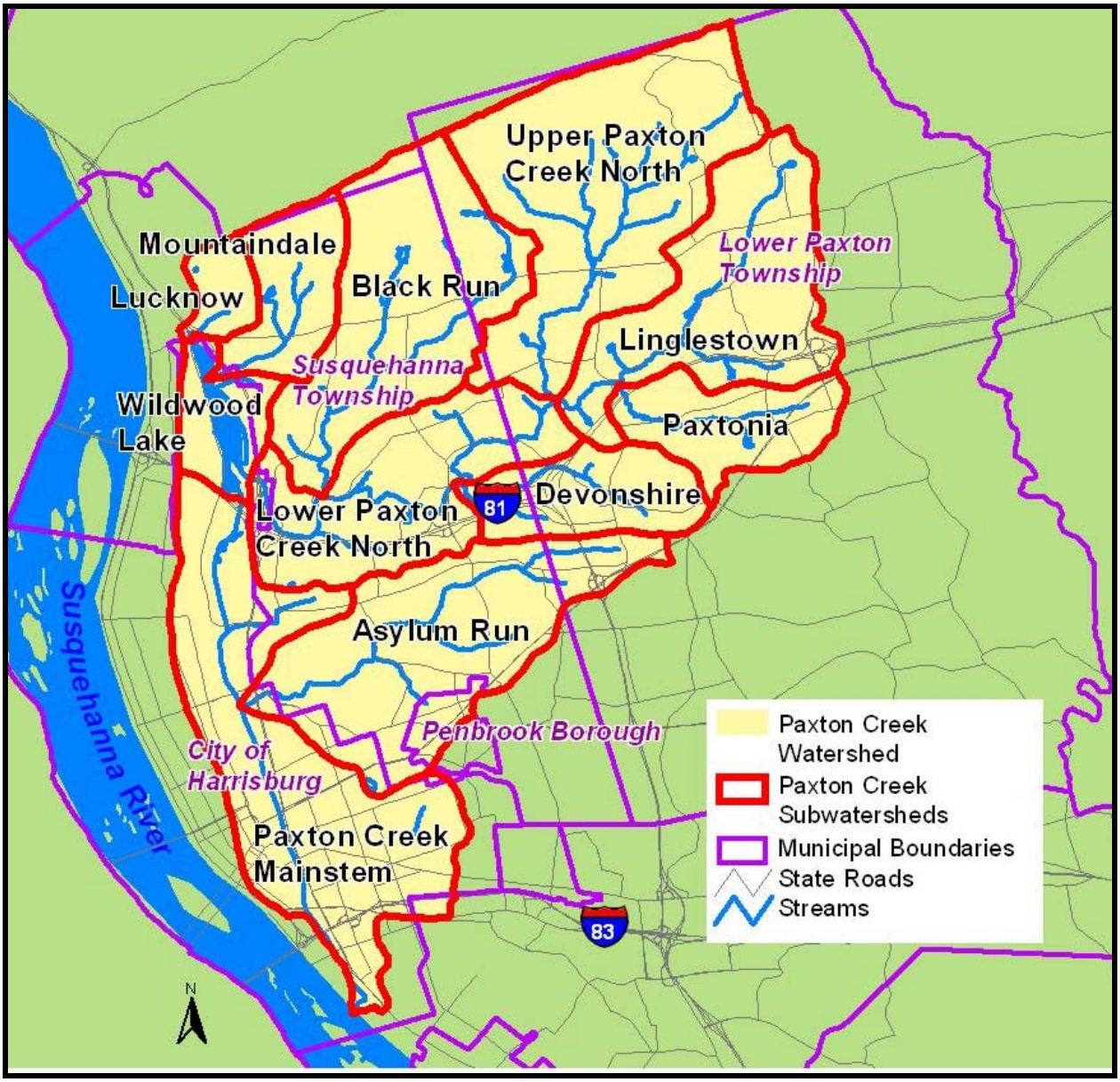
The Paxton Creek Watershed and Education Association (PCWEA) was formed in 2001 with funding from a Growing Greener grant. PCWEA's mission is to **solve watershed problems**, **protect and enhance watershed resources**, and **facilitate hands-on environmental education**. PCWEA operates with volunteers who organize and participate in many activities and events in the Paxton Creek watershed. Current PCWEA goings-on include: a website and newsletter, regular water resource monitoring, rehabilitation projects, and a draft of a Rivers Conservation Plan for Paxton Creek watershed. For more information about PCWEA's activities, and to find out how you can get involved, contact PCWEA at pcwea@paxtoncreek.org or check out their website at www.paxtoncreek.org

PCWEA field crew

Where Do You Live in the Paxton Creek Watershed?

Where do you live, work or play in the Paxton Creek watershed?

The land area draining into each major tributary of Paxton Creek is called a subwatershed. The Paxton Creek watershed is made up of 11 subwatersheds. Can you identify which subwatershed you live in on the map below?



Paxton Creek Subwatersheds

Asylum Run	Lower Paxton Creek North	Paxtonia
Black Run	Lucknow	Upper Paxton Creek North
Devonshire	Mountaindale	Wildwood Lake
Linglestown	Paxton Creek Mainstem	

Paxton Creek Problems and Impacts

Paxton Creek has many of the typical impacts seen in urban streams. The Pennsylvania Department of Environmental Protection (DEP) lists **16.5 miles of impaired stream** in the Paxton Creek watershed on its 303(d) list. The primary reasons cited for the listing are **urban runoff**, **construction**, and **storm sewers**. The Paxton Creek mainstem is also listed for **combined sewer overflows** that occur in the City of Harrisburg. Pollution estimates developed by the Susquehanna River Basin Commission (SRBC), based on USGS storm event monitoring for portions of the watershed, confirm that loading rates in Paxton Creek are significantly higher for **sediment** and **phosphorus** when compared to agricultural and forested watersheds in the basin.

Urban runoff is transported through storm sewers and outfalls directly to this tributary of Paxton Creek

Runoff from this construction site in the Paxton Creek watershed has high sediment loads

Combined sewer overflows discharge untreated wastewater to the stream when treatment plants are at capacity

Stormwater Runoff

One factor that contributes to the above impacts is uncontrolled **stormwater runoff**. Stormwater runoff is rainfall that does not infiltrate into the ground, and runs off **impervious surfaces** such as roads, driveways, buildings and parking lots. Urban areas tend to have a lot of impervious surfaces, and therefore have increased stormwater runoff. High volumes of uncontrolled stormwater runoff lead to **more frequent and higher flood peaks**, **channel erosion**, **degradation of aquatic habitat**, **unreplenished aquifers,** and other impacts. In addition, when water runs off impervious surfaces, it picks up **pollutants** deposited there and washes them into nearby streams. Pollutants commonly found in urban stormwater runoff include:

- Oil and grease from automobiles and kitchen wastes
- Sediment from eroding stream banks and construction sites
- Nitrogen and phosphorus from fertilizers
- Bacteria from pet waste and sewer overflows
- Metals (lead, nickel, copper) from automobiles
- Pesticides from lawns

Stormwater runoff in this parking lot in the Paxton Creek watershed goes to the storm drain and ultimately to the stream

High sediment loads in the Paxton Creek watershed contribute to large sediment deposits clogging channels to Wildwood Lake

Increased runoff from impervious surfaces in the Paxton Creek watershed contribute to bank erosion, which is made worse by the lack of a forested buffer

What Can You Do to Protect and Restore Paxton Creek?

Depending on whether you are a homeowner, business owner, developer, or local government official, you can do your part in protecting and restoring the Paxton Creek watershed. This brochure contains a number of fact sheets on how you can protect and restore the Paxton Creek watershed. The table below lists the fact sheets and who they apply to. Each fact sheet has a color-coded header that matches the color-coding in the table below to indicate which audience each action applies to.

Fact Sheets	Homeowners	Businesses	Developers	Local Governments
Lawns and Landscaping	X	X		X
Downspout Disconnection	X	X	X	X
Stream Buffer Management	X	X	X	X
Outdoor Storage		X		X
Dumpster Management		X		X
Better Site Design			X	X
Erosion and Sediment Control	X	X	X	X

Homeowners

Homeowners can reduce the impacts of stormwater runoff from their property by disconnecting their downspouts from the storm sewer system. Three ways that homeowners can reduce pollutants that enter Paxton Creek are to: reduce the amount of fertilizer applied to lawns and landscaped areas, use native landscaping instead of turf, and protect or replant a forested buffer next to the stream. Homeowners can also act as neighborhood watchdogs to ensure that erosion and sediment control practices are used on construction sites to prevent sediment inputs to the stream.

Businesses

Business owners can also reduce runoff and pollutants by disconnecting their downspouts, using native landscaping, reducing fertilizer application, and planting or preserving stream buffers. In addition, businesses can prevent water pollution by using proper techniques to store materials outdoors and to manage solid waste. These techniques can ensure that trash and other materials that could potentially become pollutants do not end up in stormwater runoff. Business owners can also act as neighborhood watchdogs to ensure that erosion and sediment control practices are used on construction sites to prevent sediment inputs to the stream.

Developers

Developers can prevent additional stormwater runoff and pollution by using site design techniques that reduce impervious cover, preserve stream buffers and other natural areas, and store, treat, and infiltrate stormwater runoff on-site. These techniques are called Better Site Design practices. In addition, developers can use proper erosion and sediment control measures to ensure that construction sites do not become a source of sediment pollution to the stream.

Local Governments

Local governments can encourage the use of site designs that reduce impervious cover and preserve natural areas by making sure that local codes and ordinances allow this, and by proving incentives for developers to use these techniques. Local governments are also responsible for creating and enforcing regulations regarding erosion and sediment control on construction sites and preserving stream buffers during construction. Local governments should also reduce stormwater runoff and pollutants on their own properties by reducing fertilizer use, disconnecting downspouts, planting stream buffers, and using proper material storage and dumpster management techniques.

Do You Fertilize Your Lawn?

Whether you are a homeowner or business owner managing a small lawn area, or a local municipality managing hundreds of acres of turf, you probably use fertilizers. Unfortunately, not many lawn care managers realize that lawn fertilizer can cause water quality problems. Furthermore, lawn care managers are usually unaware of the actual nutrient needs of their lawns. Surveys indicate that over 50% of homeowners fertilize their lawns, yet only 10 to 20% of lawn owners take the trouble to perform soil tests to determine whether fertilization is even needed (CWP, 1999). In addition, the majority of lawn owners are not aware of the phosphorus or nitrogen content of the fertilizer they apply (Morris and Traxler, 1996).

What if I Use a Landscaping Company?

If you use a professional lawn care company to establish or maintain your landscaped areas you should request that they follow the same guidelines listed on the reverse page. In particular, you should request that the company test your soil before adding any fertilizers and use only the minimum amount necessary to maintain a healthy lawn.

This bright green lawn may be the envy of the neighbors, but it is a source of nutrients to the stream, which can cause algal blooms or "green pond" syndrome

What's So Bad About Fertilizing My Lawn, Anyway?

Nitrogen and phosphorus from fertilizers are often found in high concentrations in runoff from urban and suburban lawns, often as much as four times greater than in runoff from impervious surfaces (CWP, 2003). Since lawns can comprise more than 50% of the total area in suburban watersheds, this can mean significant inputs of nutrients to downstream surface waters like Paxton Creek (CWP, 2003). These nutrients are essential for plant growth, but excessive concentrations can cause water quality problems such as excessive algae growth, oxygen depletion and even fish kills.

How Can I Have a Healthy Lawn and Help Keep Our Waters Clean?

Mulching grass clippings into lawns can reduce or eliminate the need for fertilizer. However, if you must fertilize, you should first have your soil tested to see what nutrients, if any, your lawn needs.

Soil Testing

Testing the soil for nutrients and pH is important to provide your lawn with the proper balance of nutrients while avoiding over-application. Soil testing takes the guesswork out of fertilization, is extremely cost effective, and can eliminate over-usage of fertilizers that contribute to pollution in our streams.

Performing a soil test is quick and easy. Two options for conducting a soil test are provided below. Each should come with specific directions on how to take and handle the soil sample.

- **Home testing:** Soil test kits are available at many local garden centers. These kits will give a general idea of the nutrients in your soil, but are not as reliable as lab tests.

- **Dauphin County Cooperative Extension Office:** Soil test bags, which can then be analyzed at a lab, can be purchased from Dauphin County Cooperative Extension Office for $9. For more information, call the DCCE Office at (717) 921-8803, or go to http://dauphin.extension.psu.edu or send email to DauphinExt@psu.edu.

Testing should be done every two or three years. Sample more frequently if you desire closer monitoring of the nutrient levels in your lawn.

LAWNS AND LANDSCAPING

What does N:P:K on a Fertilizer Package Mean?

Fertilizer packages are labeled with three numbers that indicate the percentage by weight of the three nutrients most essential to plants. The order is always nitrogen, phosphate, and potassium or N:P:K.

Nitrogen promotes overall grass shoot growth.
Phosphate supplies phosphorus, which promotes strong root growth.
Potassium helps grass withstand stresses such as drought or disease.

Example: **16-4-8** =
16% Nitrogen, 4% Phosphate,
8% potassium, 72% inert filler

The fertilizer application recommendations on the fertilizer packages are often greater than that recommended by local Cooperative Extension offices, which are familiar with local soil conditions. You should have your soil tested before applying fertilizers to find out if you need to apply these nutrients and in what ratio.

Tips for fertilizing

If you do need to fertilize, try to keep the following in mind (MD CES):

- **Use organic fertilizer** - consider using organic fertilizers such as compost; they release nutrients more slowly. Use commercially available compost or make your own using garden waste. Mixing compost with your soil means your plants will need less chemical fertilizer and puts your waste to good use.
- **Check the weather** - don't apply fertilizer before a rainstorm, to frozen ground or on dormant lawns.
- **Use fertilizers sparingly** - many plants do not need as much fertilizer as you might think.
- **Use a drop spreader** - use a drop spreader instead of a rotary spreader in restricted spaces, when near water, driveways, or sidewalks.
- **Stay away from pavement** - keep fertilizer off of paved surfaces. If granular fertilizer gets onto paved surfaces, collect it for later use or sweep it onto the lawn.
- **Calibrate your spreader** - properly calibrate your spreader to make sure you are not over-applying fertilizer.
- **Use proper maintenance techniques** - fill and wash spreaders over grassy areas, not on hard surfaces.
- **Avoid the stream** - avoid getting fertilizer into natural drainage areas on your property.

Alternatives to Lawns

Lawn conversion is the practice of converting lawn or a section of turf to a more natural state using hardy native plant species of grasses, shrubs, wildflowers and/or trees. Native species typically require **less maintenance** than the conventional lawn because they are better adapted to local environmental conditions. In the long run, lawn conversion can save time, money, and energy, and are better for water quality. Native plants may even be used to solve landscaping problems such as shady or wet areas. Check out the Alliance for the Chesapeake Bay webpage listed below for a list of PA native plants.

Lawn alternative in the Paxton Creek watershed

For More Information

- Alliance for the Chesapeake Bay (ACB). Bayscapes. http://www.acb-online.org/project.cfm?vid=85
- Center for Watershed Protection (CWP). 2003. *Impacts of Impervious Cover on Aquatic Systems*. Watershed Protection Research Monograph No. 1.
- Center for Watershed Protection (CWP). 1999. Diazinon sources in runoff from the San Francisco Bay Region. Technical Note 106. *Watershed Protection Techniques*. 3 (1): 613-616.
- Maryland Cooperative Extension Service (MD CES). Fact Sheet 702 - Lawns and the Chesapeake Bay.
- Morris, W. and D. Traxler. 1996. Dakota County Subwatersheds: Residential Survey on Lawn Care and Water Quality. Dakota County, Minnesota, Decision Resources, Ltd

How Does My Rooftop Runoff Affect Paxton Creek?

When rain falls on a rooftop, runoff travels through the gutter to the **downspouts**, also known as roof leaders. In the Paxton Creek watershed, many downspouts are **directly** or **indirectly** connected to the stormdrain system. Indirect connections occur when the downspout drains to an impervious surface on the lot, such as sidewalk or driveway, which then directs the flow to a stormdrain inlet.

Both directly or indirectly connected downspouts allow runoff to reach the stormdrain. Once runoff gets into the stormdrain system, it flows untreated to Paxton Creek, bringing pollutants such as oil and grease, bacteria, and nutrients with it, as well as contributing to excessive stormwater runoff volumes that can lead to streambank erosion and flooding. Disconnecting your downspouts from the storm drain system can help protect Paxton Creek.

Downspout directly connected to stormdrain system

Rooftop runoff indirectly connected to stormdrain over driveway

Disconnected downspout drains to lawn

How Can I Disconnect My Downspouts?

There are several simple practices to disconnect downspouts to prevent or reduce the amount of runoff that enters the stormdrain system or stream including: **directing runoff to a pervious area**, and use of **rain barrels**, **rain gardens**, **french drains** or **dry wells**.

Spreader directs runoff away from house

1. Direct Runoff To Pervious Areas, such as lawns or landscaped areas. Spreading rooftop runoff from individual downspouts across the lawn or yard allows the water to be absorbed into the ground and can reduce the amount of watering required for that area. If concerned with foundation or basement flooding, a spreader can be used to direct water away from the house. Spreaders can usually be purchased at lawn care stores. In general, at least 15 square feet of lawn is necessary for this practice so that the water can be absorbed into the ground and prevent runoff onto impervious surfaces.

2. French drains and dry wells are non-engineered trenches filled with gravel that temporarily store rooftop runoff and allow the water to soak into the soil. Typically, each practice serves a small drainage area, such as a single rooftop. These practices help minimize erosion, ponding and wet basements by promoting infiltration. The unit cost to install a dry well ranges from $900 to $1,400 (LGPC, 2003), and the unit cost for a french drain ranges from $15-$17 per linear foot.

DOWNSPOUT DISCONNECTION

3. Rain barrels or cisterns are rainwater collection systems that store rooftop runoff to be used later for activities such as lawn and garden watering, car washing, and even window cleaning. Collecting rooftop runoff can not only lower your water bills, but also help to decrease water demand during the hot summer months, when water demand is high. Also, the more rainwater that is reused, the less need there is for chlorinated or chemically treated tap water.

Where Can I Get a Rain Barrel?

You can purchase a rain barrel at most major lawn and garden centers. Call your local center to see if they carry them or can order a rain barrel for you. Barrel sizes range from 50 to 250 gallons, and prices range from $99 to $325 plus shipping charges. Or, if you are feeling especially creative, you can make your own rain barrel using a large trashcan, agricultural supply container, or other large container and a little ingenuity. Check out the www.paxtoncreek.org website for a fact sheet on how to build your own rain barrel.

Disconnection to rain barrel

4. Rain gardens use native landscaping to soak up rainwater directed from your downspout. The middle part of the garden holds several inches of water, allowing it to slowly soak into the ground instead of being delivered to the stormdrain all at once. Rain gardens allow 30% more water to soak into the ground than a conventional lawn. This helps to replenish the groundwater supply and reduces the amount of pollution that reaches the stream through stormwater runoff. Rain gardens require less watering and fertilizer than conventional lawns, and can provide habitat for birds and butterflies.

Residential rain garden (Source: Roger Bannerman)

How Do I Install a Rain Garden?

Installing a rain garden is not complex. Check out the www.paxtoncreek.org website for a fact sheet with details on how to install a rain garden at your home or business.

For More Information

- Rain gardens: A household way to improve water quality in your community. University of Wisconsin – Extension and Wisconsin Department of Natural Resources. http://clean-water.uwex.edu/pubs/raingarden/gardens.pdf

- Student BaySavers Projects. Build Your own Rain Barrel http://www.cbf.org/site/DocServer/rain_barrel_guide.pdf?docID=681

- Lake George Park Commission (LGPC). 2003. *Stormwater Management Guide for Minor Projects*. Lake George, NY. http://www.lgpc.state.ny.us/strmguid.htm

- Center for Watershed Protection. How to Build and Install a Rain Barrel/How to Install a Rain Garden. Slideshow and factsheet. www.cwp.org/Community_Watersheds.htm or www.paxtoncreek.org

Is There A Stream On Or Near Your Property?

Many residential, commercial and municipal properties in the Paxton Creek watershed have a stream on or near their property. Unfortunately, most of these streams are lacking a forested stream buffer, or have a stream buffer that has been severely impacted by development or landowners.

What is a Stream Buffer?

A stream buffer physically protects and separates a stream from land development activities. The area should have trees and shrubs and restrict or prohibit human disturbance.

What a Stream Buffer is Not.

- Lawn mowed to the stream edge
- Dumping spot for yard waste or trash
- Storage area for lawn care products
- Forest with all undergrowth cleared in order to grow turf grass

There are many common landowner practices that impact the stream buffer, such as **mowing to stream edge**, **removing trees and shrubs**, **replacing understory and leaf litter with turf**, **dumping trash and other materials**, or **building in the floodplain**. These practices limit the ability of the stream buffer to provide maximum benefits to the stream and can contribute to erosion, input of pollutants to the stream and excessive runoff and flooding.

Examples of poor stream buffer management along Paxton Creek tributaries

What Are The Benefits Of Stream Buffers?

The benefits of stream buffers are well documented:

- ❑ Increases nearby property values
- ❑ Reduces stormwater runoff and flooding
- ❑ Reduces bank erosion/property damage
- ❑ Provides in-stream and terrestrial habitat for wildlife
- ❑ Provides stream shading (regulates temperature for fish)
- ❑ Filters pollutants from runoff before entering the stream

This forested stream buffer provides many benefits

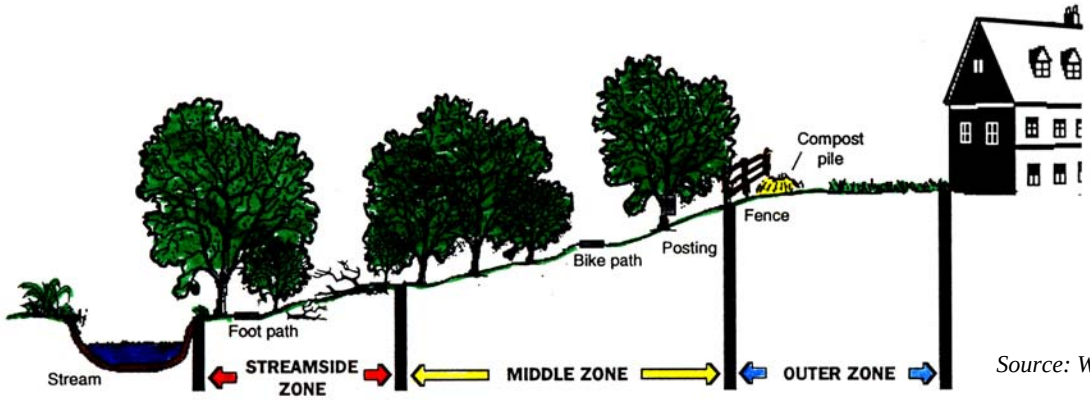
How Wide Should My Stream Buffer Be?

The width of a riparian forest buffer will typically be dictated by a local stream buffer ordinance and will take into account the amount of available land and natural features such as the 100-year floodplain and any wetlands, steep slopes or sensitive natural areas present at the site. If no local stream buffer ordinance exists, the landowner must decide how wide to make the buffer. Buffer widths of 75 feet are common; however, a wider buffer will provide greater benefits, such as pollutant removal and wildlife habitat.

STREAM BUFFER MANAGEMENT

How Do I Design A Good Stream Buffer?

Stream buffer design is based on the 3-zone buffer design promoted by Welsch (1991), but modified for an urban watershed. The three stream buffer zones have different requirements for width, allowable uses, vegetation, and maintenance and protection. These are described below.

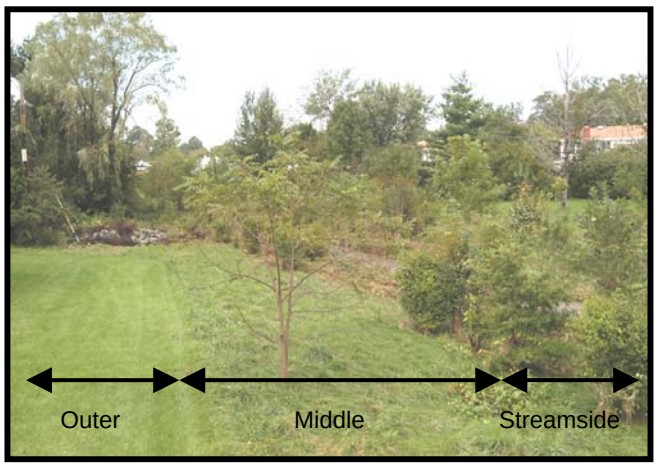


Source: Welsch (1991)

Zone 1: Streamside zone – this zone is closest to stream and should be a relatively undisturbed forest buffer that provides stream shading and stabilizes banks. No removal of vegetation is allowed.

Zone 2: Middle Zone – this zone should also be forested but some limited clearing may be allowed for passive recreational uses or stream access.

Zone 3: Outer Zone – this zone provides a buffer between the forested zones and any adjacent landuse and is typically turf or meadow. This zone provides initial removal of pollutants before they enter the forested buffer.



3-zone stream buffer design

How Can I Protect My Stream Buffer?

- **Plant native trees and shrubs** to expand it where possible. Check out Alliance for the Chesapeake Bay website for a list of PA native plants http://www.acb-online.org/project.cfm?vid=85
- Protect buffer during both **construction and post-construction** phases of development.
- Conduct regular **buffer walks** to check for encroachment.
- Create a **"no mow" zone** and allow the area to naturally re-vegetate.
- Put up **boundary signs** to educate surrounding landowners of the benefits of protecting stream buffers
- Protect your buffer from **invasive plants**
- Encourage your local municipality to **adopt a stream buffer ordinance**.
- **Encourage your neighbor** to plant a buffer!

For More Information

- Center for Watershed Protection. The Architecture of Urban Stream Buffers. Article 39 in The Practice of Watershed Protection. www.cwp.org
- Chesapeake Bay Riparian Handbook: A Guide for Establishing and Maintaining Riparian Forest Buffers http://www.chesapeakebay.net/pubs/subcommittee/nsc/forest/riphbk.pdf
- Pennsylvania Native Plant Society website includes a list of companies and organizations that can provide native plants. http://www.pawildflower.org/.
- Welsch, D. 1991. Riparian Forest Buffers – Function and Design for Protection and Enhancement of Water Resources. 28 pp. USDA Forest Service NA-PR-07-91. Radnor, PA.

Why Should I Protect My Outdoor Storage Areas?

Many businesses, construction sites and municipal maintenance facilities store materials or products outdoors. Proper storage techniques are necessary to prevent materials being stored outdoors from being washed away in stormwater runoff, spilled, or inadvertently discharged to the storm drain system. Unprotected outdoor storage areas can generate a wide range of storm water pollutants, such as sediment, nutrients, toxic materials, and oil and grease.

An Ounce of Prevention…is Worth a Pound of Cure

Use of pollution prevention techniques can save time and money by avoiding costly spill cleanups. Protecting outdoor storage areas is a simple and effective pollution prevention practice for many commercial, industrial, institutional, municipal, and transport-related operations.

What Types Of Operations Are At Greatest Risk?

Sites with large quantities of liquids or bulk materials at sites that are connected to the storm drain system are at greatest risk, including:

- Nurseries and garden centers
- Auto recyclers/body shops
- Building supply outlets
- Boat building/repair/ports
- Landfills and recycling centers
- Solid waste and composting facilities
- Highway maintenance depots
- Power plants

Auto repair/maintenance operations may have spills of oil, gasoline and other fluids stored outdoors

Nurseries and garden centers store potential pollutants such as fertilizers outdoors

Employee Education

Employee training on outdoor storage should focus on the activities and site areas with the potential to pollute storm water, as well as the proper techniques to manage material storage areas to prevent runoff contamination.

Training can be conducted through safety meetings and the posting of on-site informational signs.

Training materials are available from EPA's National Compliance Assistance Centers www.assistancecenters.net

How Do I Protect My Outdoor Storage Areas?

Materials can be protected by installing **covers**, and by using **secondary containment** measures to prevent accidental release of pollutants. Outdoor storage areas can be protected on a temporary basis with tarps or plastic sheeting, or permanently through structural containment measures, such as roofs, buildings, or concrete berms. Other helpful tips include:

- Emphasize **employee education** regarding storage area maintenance
- Keep an up-to-date **inventory** of materials stored outdoors
- Regularly **inspect** the condition of outdoor storage containers
- **Reduce exposure** of materials to rainwater and storm water by using covers
- Store liquids in designated areas on an impervious surface using **secondary containment** to contain spills
- Have an adequate **spill response plan** and cleanup equipment

OUTDOOR STORAGE

Covers

The use of impermeable covers is an effective pollution prevention practice for non-hazardous materials. Covers can be as simple as plastic sheeting or tarps, or more elaborate roofs and canopies. Site layout, available space, affordability, and compatibility with the covered material all dictate the type of cover needed for a site. In addition, the cover should be compatible with local fire and building codes and OSHA workplace safety standards. Care should be taken to ensure that the cover fully protects the storage site and is firmly anchored into place to avoid material exposure in windy conditions.

Inadequate cover allows pollutants to enter storm drain

Materials are covered to prevent pollution of stormwater

Secondary Containment

Secondary containment is designed to contain possible spills of liquids and prevent storm water from entering outdoor storage area. The lack of adequate secondary containment can potentially lead to runoff contamination. Secondary containment structures vary in design, ranging from berms and drum holding areas to specially designed solvent storage rooms.

Restaurant waste barrels with no secondary containment can be a source of pollution

Motor oil storage containers with secondary containment berm

Secondary containment can be constructed from a variety of materials, such as concrete curbs, earthen berms, plastic tubs, or fiberglass or metal containers. The type of material used depends on the substance contained and its resistance to weathering. In general, secondary containment areas should be sized to hold 110% of the volume of the storage tank or container unless other containment sizing regulations apply (e.g., fire codes).

Cost

Many outdoor storage practices are relatively inexpensive to install (Table 1). Actual costs depend on the size of the storage area, materials used, and the nature of the pollution prevention practices.

Table 1. Sample Costs for Outdoor Storage

Storage Device	Cost
Concrete Slab (6")	$3.50 - $5.00 per ft^2
Containment Pallets	$50 - $350 based on size and # of barrels
Storage buildings	$6 to $11 per ft^2
Tarps & Canopies	$25 to $500 depending on area

Sources: Costs derived from a review of Ferguson et al., 1997 and numerous proprietary spill control/hazmat product websites

For More Information

- Ferguson, T., R. Gigac, M. Stoffan, A. Ibrahim, and H. Aldrich. 1997. *Rouge River National Wet Weather Demonstration Project*. Wayne County, MI. www.rougeriver.com/geninfo/rougeproj.html
- United States Environmental Protection Agency. 1999. *Storm Water Management Fact Sheet: Coverings*. Office of Water, Washington, D.C. EPA 832–F-99-009 http://www.epa.gov/owm/mtb/covs.pdf.
- EPA Office of Wastewater Management Storm Water Management Fact Sheet: Coverings http://www.epa.gov/owm/mtb/covs.pdf
- Center for Watershed Protection. 2004. Pollution Source Control Practices. Urban Subwatershed Restoration Manual Series Manual 8.

How Can Dumpsters Impact Water Quality?

Businesses, construction sites, and municipal operations generate waste as a part of their daily operations, and temporarily store it pending disposal by an independent contractor in dumpsters and other storage containers. Dumpsters can be a significant source of pollution to local streams if not managed properly. Many dumpsters do not have covers, which allows rainfall to mix with the wastes, creating a potent brew affectionately known as "dumpster juice." This, combined with the occasional spill or overflow, makes dumpsters a potential source of trash, oil and grease, metals, bacteria, organic material, nutrients, and sediments to local surface waters. These pollutants can be washed into the stormdrain system through runoff and end up in Paxton Creek. Dumpsters with poor management practices are also unsightly, create unpleasant odors and attract rodents.

Typical signs of poor dumpster management: trash accumulation and uncovered dumpster near storm drain

"Dumpster juice" stains reveal that the dumpster runoff flows to a stormdrain inlet.

Leaking oil and grease containers at a restaurant are a source of stormwater pollution

Top Ten Indicators That Your Dumpster Might Be A Pollution Source

1. **Runoff from the dumpster flows into the storm drain system**. Look for liquid leaking from the container and/or signs of previous leakage, which are often indicated by stains or deposits on the ground or storm drain inlets.
2. **The lid is missing or poorly functioning** so that it cannot be closed or secured.
3. **There is no secondary containment measure to contain spills**. (See Fact Sheet on Outdoor Storage)
4. **The dumpster waste has a high moisture content**. This includes food, yard waste, or other waste material that may leak out of the dumpster.
5. **The dumpster is frequently emptied or not emptied frequently enough**. Frequently emptied dumpsters usually have more spillage and are uncovered and exposed to rainfall more often. Dumpsters that are overflowing and do not allow the lid to close properly can also expose the waste to rainfall.
6. **The waste includes toxic or hazardous materials** or other unacceptable substances in the container.
7. **There are cracks or dents in the dumpster** that may permit leakage from the dumpster or allow rainfall to enter the dumpster.
8. **Presence of hydraulic hoses with cracks or leaks** (if applicable).
9. **There is no routine inspection or maintenance plan** for the dumpster.
10. **Dumpster does not contain clear signage** indicating what kind of waste can be accepted.

What Types of Dumpsters Are Likely to be a Problem?

- **Foodservice businesses**
- **Vehicle service** areas such as fueling stations, repair facilities
- **Industrial and municipal facilities** that produce high volume and variety of wastes
- **Dumpsters with multiple contributors**, such as multi-family units, and institutional facilities
- **Temporary dumpster locations** at construction sites and demolition projects
- **Solid waste collection (transfer) areas and waste haulers**

DUMPSTER MANAGEMENT

Dumpster Management Practices

- ☐ **Locate dumpsters away from storm drain inlets.**
- ☐ **Routinely train staff** on why good dumpster management is important and what their responsibilities are regarding proper disposal techniques. Topics include: what should and should not go into the dumpster, how to close and secure the lid, and how to report dumpster management concerns.
- ☐ **Clean up trash and litter** around the dumpster on a regular basis. Trash attracts more trash.
- ☐ **Keep it covered.** Make sure the lid is closed and secured after depositing waste.
- ☐ **Prevent spills.** Use secondary containment measures to keep spills from entering the storm drain system (see Fact Sheet on Outdoor Storage for more information).
- ☐ **Inspect dumpster condition regularly** to ensure no cracks are present that would allow leakage.
- ☐ **Provide alternative disposal locations for unacceptable substances**. For instance, hazardous waste, oil and grease and other liquids should never be thrown into a dumpster. To encourage proper disposal of these materials, appropriate disposal containers and/or information on alternative disposal locations should be provided.
- ☐ **Use storage methods appropriate for the type of waste being stored**. An oil/grease separator or sump pit should be installed for dumpsters that receive waste with high moisture content, such as oil and grease, yard waste or food.
- ☐ **Post clear signage** indicating what types of waste are acceptable.

What if I Work with a Disposal Contractor?

Do not assume your contractor is routinely inspecting the dumpster to prevent pollution discharge. Choosing a reliable and well-trained waste disposal contractor is important to prevent storm water contamination.

The solid waste disposal contractor should perform routine maintenance in addition to regularly emptying the dumpster. Report any concerns about the condition of the dumpster or collection process to the service immediately (e.g., dumpster put in wrong location, dented corners, leaks, infrequent dumping, etc.).

How Can I Reduce Illegal Dumping?

Unfortunately, even with proper dumpster management, illegal dumping (i.e. “midnight dumping”) may occur around your dumpster, which may increase the likelihood that your dumpster becomes a pollution source. To minimize illegal dumping in or around your dumpster, consider the following:

- ☐ Keep the area clean
- ☐ Ensure that the area is well-lit
- ☐ Keep the dumpster lid or gate locked after hours (if possible)
- ☐ Post signs indicating penalties for illegal dumping and a phone number for reporting incidents
- ☐ Keep a record of dumping incidences (time of day, day of week, etc) to determine if a pattern exists
- ☐ Report illegal dumping to the proper authorities

Recyclable kitchen grease container with clear signage

For More Information

- ☐ Dauphin County Refuse and Recycling Opportunities, includes information on recycling locations, composting, newsletters, curbside recycling, household hazardous waste, municipal waste and non-traditional waste (e.g. computers). www.DauphinCounty.org

- ☐ U.S. Environmental Protection Agency (EPA) Waste Management Website, includes information on recycling, cleanup, waste programs, voluntary partnership programs, pollution prevention and treatment/ control opportunities. http://www.epa.gov/epaoswer/osw/index.htm

What is Better Site Design?

Better Site Design (BSD) refers to a series of techniques that can be used when designing new developments to make them more environmentally friendly. These techniques are sometimes referred to as Open Space Design, Environmentally Sensitive Site Design, or Low-Impact Development. BSD helps to protect water quality by **reducing impervious cover**, **conserving natural areas** and **treating stormwater runoff**.

Why Use Better Site Design?

BSD techniques are not only better for water quality, but they also can save developers money in the form of reduced costs of clearing and grading, paving, and construction of associated infrastructure and stormwater treatment practices. In addition, BSD communities have been shown to be desirable places to live and can earn developers greater profits on home sales.

- Reduced costs associated with clearing and grading range up to $5,000/acre (CWP, 1997).
- The cost of treating stormwater runoff ranges from $2,000 to $50,000/impervious acre; therefore, reducing impervious cover can greatly reduce development costs (CWP, 1997).
- Developers can save $1,100 for each parking space that is eliminated in a commercial parking lot, and $25 to $50 per foot of roadway shortened (Schueler, 1995).
- Homes in developments with open space sell for 5 to 32% more than similar homes with no open space (CWP, 1997).

Better Site Design Techniques

Conventional | **Better Site Design**

- **Reduce clearing and grading** - only clear what is necessary to build, allow access and fire prevention.

Typical site is mass cleared

Site with minimal clearing and native vegetation preserved

- **Preserve native vegetation** - conserve existing native vegetation at the site and plant additional trees where possible.
- **Protect stream buffers** - maintain a buffer of native vegetation along both sides of streams and protect this area throughout the construction process (see Stream Buffers fact sheet).

Typical excessively wide road

Narrow street is just wide enough for travel lanes

- **Reduce impervious cover associated with streets** – reduce street and right-of-way width and street length.
- **Reduce impervious cover associated with turnarounds** – reduce size and number of cul-de-sacs, use alternative turnarounds.

Typical 100-ft diameter cul-de-sac

Cul-de-sac with vegetated island

- **Use vegetated open channels –** these channels will convey and treat stormwater runoff from roads.

Typical curb and gutter street

Vegetated open channel

BETTER SITE DESIGN

- **Reduce impervious cover associated with parking lots** – construct the minimum number of necessary spaces, use efficient designs and parking stalls, and use porous pavement in overflow areas.

Excessive paving in parking lot

Efficient parking lot

- **Treat stormwater runoff from parking lots** – use porous pavement, bioretention, filter strips and other stormwater treatment practices.

Parking lot runoff goes to storm sewer

Runoff treated with bioretention

- **Use Open Space Design** – cluster homes to preserve open space and natural areas through use of reduced setbacks and lot sizes.

Typical design promotes sprawl
(Source: Harford County DPW, 2003)

Clustered homes conserve trees
(Source: Randall Arendt)

- **Reduce impervious cover associated with sidewalks** – use sidewalks only where necessary and reduce their width.

- **Reduce impervious cover associated with driveways** – use pervious paving materials or shared driveways.

Sidewalks on both sides unnecessary

Sidewalk on one side only

- **Direct rooftop runoff to pervious areas** – allow roof leaders to drain to yards, open channels or other pervious areas instead of impervious surfaces (see Downspout Disconnection fact sheet for more information).

Typical driveway is fully paved

Two-track driveway design

For More Information

- The Paxton Creek Roundtable adopted 23 Better Site Design principles in 2003. The recommendations are summarized in: *Recommended Model Development Principles for Lower Paxton Township and Susquehanna Township: Paxton Creek Watershed. A Consensus of the Local Site Planning Roundtable*. www.buildersforthebay.net

- Center for Watershed Protection (CWP). 2000. *Watershed Protection Techniques: Special Issue Better Site Design*. Vol 3 (2). Available online at: www.stormwatercenter.net/

- Center for Watershed Protection (CWP). 1998. *Better Site Design: A Handbook for Changing Development Rules in Your Community*. Center for Watershed Protection. Ellicott City, MD.

- Center for Watershed Protection (CWP). 1997. The Economics of Watershed Protection. *Watershed Protection Techniques* 2(4): pp 469-482.

- Schueler, T. R. 1995. *Site Planning for Urban Stream Protection*. Center for Watershed Protection.

Why is Erosion and Sediment Control Important?

Erosion and sediment control (ESC) seeks to **reduce soil erosion** at construction sites and **prevent sediment from leaving the site** when erosion does occur. Active construction sites can be a significant source of sediment to Paxton Creek (in addition to eroding stream banks) as soil washes off the site during rainstorms and makes its way into storm drains and local streams.

Construction sites can be significant sources of sediment to streams if proper ESC controls are not used

Sediment has impacts on stream health as well as the local economics and community. These impacts include:

- Destroys habitat for fish and aquatic insects
- Fills in stream channels and waterbodies such as Wildwood Lake
- Reduces capacity of drainage pipes which increases flooding
- Reduces scenic and recreational value of local waterways
- Increases stream temperatures which affects fish populations
- Transports pollutants such as nutrients and metals into waterways
- Depletes dissolved oxygen in streams

How Is Erosion and Sediment Control Practiced?

Developers can reduce their construction site impacts on Paxton Creek by including the following **"10 Critical Elements to an Effective ESC plan**" in their projects:

1. Phase construction to limit soil exposure
2. Minimize needless clearing and grading
3. Protect waterways and stabilize drainage ways
4. Immediately stabilize exposed soils
5. Protect steep slopes and cuts
6. Install perimeter controls to filter sediments
7. Employ advanced sediment settling controls
8. Certify contractors on ESC plan implementation
9. Adjust practices for construction site conditions
10. Inspect ESC practices after storms

ESC practices need to be periodically inspected and adjusted for effectiveness.

Drainage channel stabilized with riprap to prevent erosion

Hay applied to newly cleared area for immediate stabilization of soil

Perimeter control silt fence filters sediment from runoff leaving the site

Sediment basins detain runoff, allowing fine sediments to settle out before discharging into the stream

Asphalt barrier protects storm drain inlet from inputs of sediment

Cleaning up sediment from construction sites at the end of each day helps prevent sediment from leaving the site

EROSION AND SEDIMENT CONTROL

How Are ESC Practices Regulated In Pennsylvania?

Pennsylvania has responded to the many impacts caused by construction site erosion by enacting Erosion Control Regulations. These regulations require developers that disturb **5 or more acres** of land to submit and implement an ESC plan (Chapter 102 PA Codes). The Pennsylvania Department of Environmental Protection (DEP) sets Erosion Control Regulations to meet State Code and reviews ESC plans. The County Conservation Districts enforce the regulations through reviewing and processing ESC plans, issuance of permits, complaint investigations, site inspections and compliance enforcement.

What Is The Role Of The Local Municipality?

In many communities across the county, ESC programs are mandated by law but there is limited funding to support local implementation. Below are **10 ESC Management Tips** to get more results with fewer resources (see CWP, 2000 for more information):

1. Demonstrate committed local leadership in ESC planning
2. Re-deploy existing staff from the office to assist in field inspections or training
3. Cross-train local development review and inspection staff in stream protection
4. Require submittal of erosion prevention elements of ESC plan during preliminary plan review
5. Prioritize inspections based on erosion risks
6. Require ESC plan designer to certify initial installation of ESC practices
7. Invest in contractor certification and private inspector programs
8. Use public-sector construction projects to demonstrate effective ESC controls
9. Enlist talents of developers and engineering consultants in the ESC programs
10. "Reinvent" the local ESC manual

How Can Local Residents Help?

Be an ESC watchdog in your neighborhood. Learn what signs indicate that ESC practices are or are not functioning properly. The best time to tell if ESC practices are functioning properly is during or immediately after a rainstorm. If sediment or muddy water is being released from the construction site, the ESC practices may not be installed or maintained properly. Some examples are shown below.

A muddy stream can indicate failing ESC practices upstream

This failing silt fence allows muddy runoff to flow from the site

Poor inlet protection allows sediment to enter the storm drain

For More Information

- ☐ Center for Watershed Protection (CWP). 2000. *Muddy Water In, Muddy Water Out?* Article 52 in The Practice of Watershed Protection. www.stormwatercenter.net
- ☐ Pennsylvania Code. Chapter 102. Erosion and Sediment Control. http://www.pacode.com/secure/data/025/chapter102/chap102toc.html
- ☐ Erosion and Sediment Control Program Slideshow. http://www.greenworks.tv/waterquality/erosion.htm
- ☐ Pennsylvania Conservation District Fact Sheet "Citizens Guide to Soil Erosion Control." www.paced.org
- ☐ Report suspected ESC problems to:

Dauphin County Conservation District
717-921-8100
dauphinccd@pa.net

PA DEP Complaint Hotline.
717-705-4709
http://www.dep.state.pa.us/how_problem.htm

Who to Call if You Have a Water Pollution Question or Problem

Pennsylvania State Agencies

Pennsylvania Department of Environmental Protection

Erosion and Sediment Control	717-772-5975
Stormwater Quality and Management	717-772-5661
Stream ReLeaf Program (stream buffers)	717-772-5647
Watershed Protection	717-772-5807
Complaint Hotline	717-705-4709

County Contacts

Dauphin County	717-780-6300
Household hazardous waste pickup	1-800-449-7587
Recycling hotline	717-780-6351
Conservation District (watershed management, stormwater, erosion and sediment control)	717-921-8100
Penn State Cooperative Extension Office (composting)	717-921-8803

City, Township and Borough Contacts

City of Harrisburg Department of Public Works (stormwater, sewers, recycling)	717-236-5274
Lower Paxton Township	717-657-5600
Pennbrook Borough	717-232-3733
Susquehanna Township	717-909-9222

Other Organizations

Alliance for the Chesapeake Bay	717-737-8622
Chesapeake Bay Foundation	717-234-5550
Paxton Creek Watershed and Education Association	717-545-1336
Pennsylvania Environmental Council	717-230-8044
Pennsylvania Organization for Watersheds and Rivers	717-234-7910
Susquehanna River Basin Commission	717-238-0423

About This Brochure

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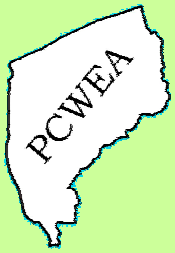
Paxton Creek Watershed
And Education Association
P.O. Box 61674
Harrisburg, PA 17106
717-545-1336
pcwea@paxtoncreek.org
www.paxtoncreek.org



Center for Watershed Protection
8390 Main Street, Second Floor
Ellicott City, MD 21043
410-461-8323
center@cwp.org
www.cwp.org