WORKING TOGETHER FOR FRESH FOOD, CLEAN WATER & A STRONG FUTURE

A FARMER'S GUIDE FOR HEALTHY COMMUNITIES

An Introduction to Agricultural Stormwater Best Management Practices (BMPs)

INTRODUCTION

Every time it rains, rainwater carries loose soil, animal waste, litter, etc., into nearby streams.

As farmers, you are more in touch with nature and our waterways than most people. That connection between land and water is and always has been vital to the production of healthy and abundant food.

Since passage of the Clean Water Act in 1972, Americans have made tremendous progress in cleaning up waterways by controlling pollution from industries and sewage treatment plants. Today our biggest challenge is controlling pollution from the smaller, more spread out pollution sources coming from our homes, yards, parking lots, commercial properties, roadways, farms, and anywhere rainwater flows over developed land. Imagine the path taken by a drop of rain from the time it hits the ground to when it reaches a pond, river, lake, bay or the ocean. Any pollutant it picks up (like leaky motor fluids and dog waste) along the journey can become part of the problem. Scientists call this *stormwater runoff pollution*.

Many of our waterways have become much healthier over the past 4 decades. However, approximately 40 percent of our surveyed rivers and lakes are still not clean enough for fishing or swimming. In order to achieve the goal of clean water, schools, businesses, farmers, local residents, and municipalities must manage stormwater in a manner that will restore our waterways. This guide, specifically for farmers, provides steps and actions you can take to improve stormwater management on your property. These storm-water management projects can help you save money, protect our critical drinking water sources, and prevent future problems from occurring. Clean water is everyone's responsibility. Check out this guide to see what you can do to help.

Similar guides to this one have been created for commercial properties, homeowners and school campuses. They can be downloaded at *www.DelawareEstuary.org*.

MAP DEL E

Since passage of the Clean Water Act, the Delaware Estuary, the tidal portion of the Delaware River, has become much healthier.

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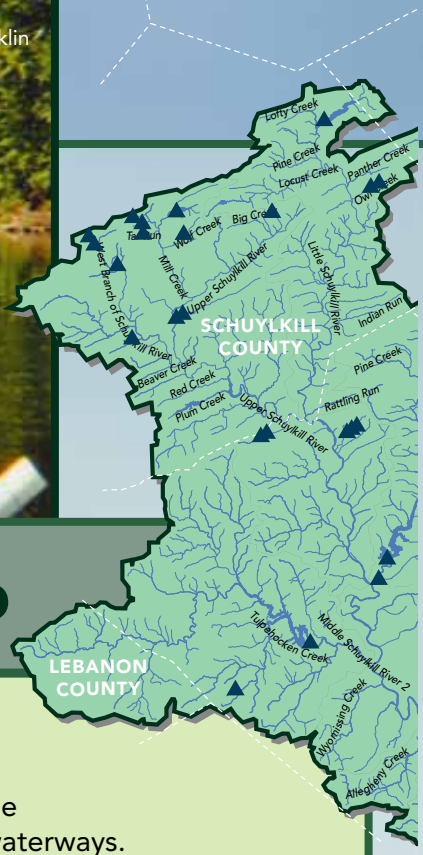
OF THE
AWARE
STUARY

Just like us, fish need oxygen to breathe. Soil and pollution in the water can choke fish.

Photo credit: Cindy Conklin



KEEPING SOIL & NUTRIENTS ON THE LAND

As rain or melting snow drains off the land, it can pick up loose soil, animal waste, excess fertilizers, herbicides, and pesticides. Keeping these materials on the land saves money and stops them from polluting local waterways.

Most developed properties have buildings that are designed to quickly direct water away from the site, causing many of our local waterways to suffer from flash flooding on rainy days. Many communities are trying to reduce the impacts of this stormwater runoff by changing parks, roadways, schools, homes, and even commercial properties so they can absorb, slowly filter, and cleanse as much polluted rainwater as possible. The goal is to handle rainwater more naturally, and in the process, assure clean and reliable water for fishing, swimming, drinking, and growing crops!

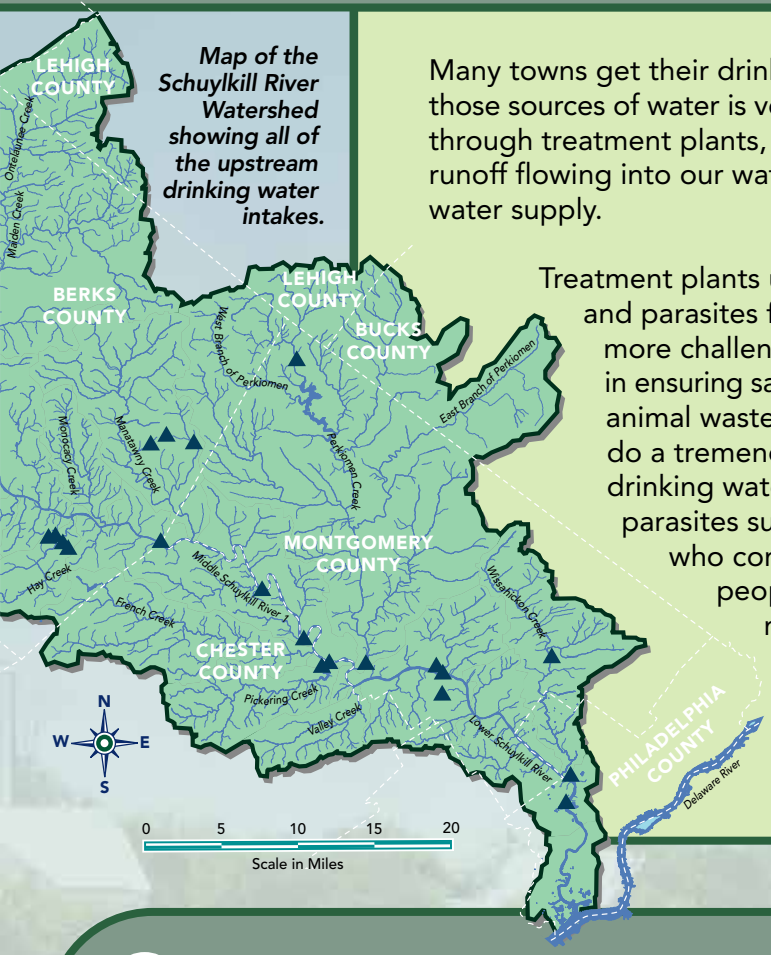
On farm properties, crop fields and pastures can do a great job at preventing flooding, acting like sponges when it rains. However, during certain times, without a good cover crop, a lot of valuable soil can get washed away into local creeks.

Pollutants Found in Stormwater Runoff:

- Dog Waste
- Engine Fluids
- Fertilizers
- Herbicides
- Loose Dirt
- Motor Oil
- Pesticides
- Road Grit
- Litter
- Road Salt

Rotational grazing and fencing can go a long way toward reducing soil erosion.

WHY IS THIS IMPORTANT TO DRINKING WATER?



Map of the Schuylkill River Watershed showing all of the upstream drinking water intakes.

Many towns get their drinking water from local rivers and creeks, so protecting those sources of water is very important. Water is pulled directly from streams, runs through treatment plants, and is distributed to customers. Polluted stormwater runoff flowing into our waterways threatens the purity and affordability of our water supply.

Treatment plants usually do a terrific job at removing harmful bacteria and parasites from the stream source, but some parasites can be more challenging to treat. Livestock owners can play a crucial role in ensuring safe drinking water for downstream neighbors by keeping animal waste out of streams. Even though water utility companies do a tremendous job supplying their customers with clean safe drinking water, sometimes very small amounts of bacteria and parasites such as *Cryptosporidium* can remain. A healthy person who contracts the parasite will recover in a week or two, but people with weakened immune systems are at risk for a more dangerous infection. In the Delaware Valley millions of people rely on their upstream neighbors to help keep the waterways clean.

GETTING YOUR FEET WET

Learning how your property handles rain will guide you to various options to manage your runoff in the best ways possible. With this in mind you may find it helpful to look around outside while it is raining. Take a few minutes to watch how the water flows across your property.

Many property owners are initially concerned that changing the way they handle rainwater can cause flooding or mosquito problems. A good design, proper construction, and regular maintenance can do the opposite. Make sure your design professional and contractor are experienced with stormwater management design and installation. Most conservation districts and agencies like Natural Resources Conservation Service (NRCS) have access to engineers who can design these projects. This guide contains a wide variety of improvements (agricultural stormwater best management practices or BMPs) owners can make to their farms to help reduce stormwater runoff, as well as an example farm on pages 12-13.

Approximately 15 million people get their drinking water from the Schuylkill and Delaware Rivers. Everything we do on the land can end up in the water.

Photo credit: Shaun Bailey

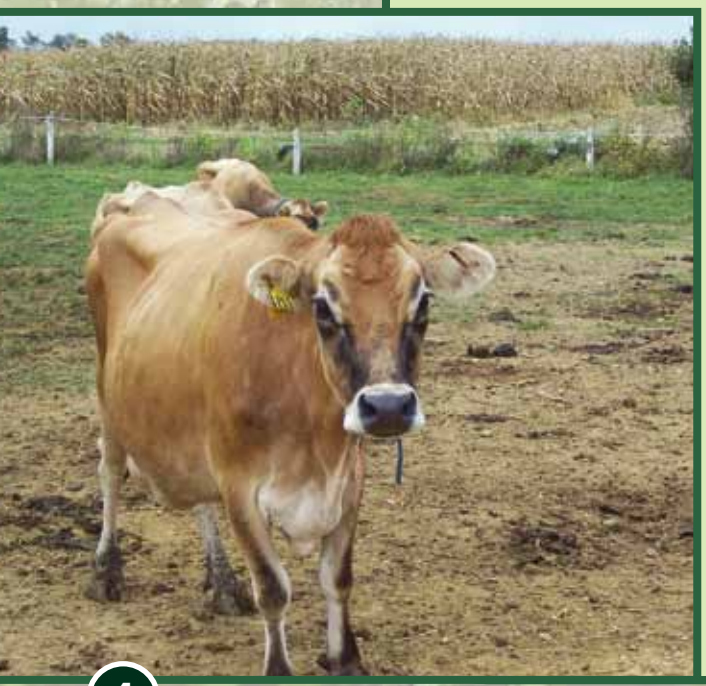
SAMPLE STORMWATER PROJECTS

Developing a conservation plan is a great way to learn about potential resources available to offset costly upgrades.

A Conservation Plans

A conservation plan (aka farm plan) is a combination of land uses and farming practices that protect and improve soil productivity and water quality. The purpose of a conservation plan is to prevent deterioration of natural resources on the farm. The plans are designed to be both technically and economically feasible for the farmer. Conservation plans are usually voluntary. Check with your local conservation specialist to see if there are any planning requirements in your county. The landowner helps identify resource issues, makes all of the decisions, and implements projects when it best fits.

Conservation plans also improve animal health and productivity.



There are many benefits to working with the United States Department of Agriculture (USDA), your local Conservation District and/or Conservancy professionals (see page 22 for local conservation contacts) to develop a conservation plan that will:

- Improve animal health and productivity
- Increase crop growth and yield
- Assist in meeting regulatory requirements
- Save money over the long term
- Increase property value
- Improve the farm for future generations

A side benefit of developing a conservation plan is that your local conservation partners will be familiar with potential projects for your property and can keep a look out for funding sources that may be able to offset some of the costs.

Nutrient management plans improve the farm and safeguard nature for future generations.

B Nutrient Management Plans

A nutrient management plan is designed to help farmers use fertilizers and/or manure effectively and efficiently. The purpose is to supply crops with the optimum amount of nutrients at the right time, while preventing runoff pollution into local streams and contamination of groundwater. In addition to being good for the environment, smart fertilizer application and management is good for business and will help you save money.

The law requires manure management plans for all farming operations that generate or apply manure. The livestock operation owner is responsible for development, implementation and maintenance of the plan. However, assistance with developing and implementing the plan is readily available from local conservation partners, such as the County Conservation District, NRCS, local nonprofits, and private engineering firms.

There are four required components to a nutrient management plan:

1. Proper manure handling, transfer and storage
2. Correct spreading of manure on cropland
3. Appropriate land management that protects water quality and prevents soil erosion
4. Good record keeping that documents land practices

A nutrient management plan is especially important for farms with livestock. Animal waste contains parasites, bacteria, phosphates and nitrogen. While animal waste is beneficial on the fields, when handled improperly, these substances are known to cause disease and even death among humans and livestock. Phosphates and nitrogen also promote algae growth which can clog irrigation filters and cause fish kills in local streams.

Farmers completing a nutrient management plan will:

- Increase crop growth and yields
- Reduce need and cost of chemical fertilizers
- Prepare for expansion
- Assess risks and reduce liability
- Look favorable to lending institutions and insurance companies
- Decrease polluted runoff into local waterways for current and future generations.

Nutrient management plans can help farms increase yields and reduce fertilizer costs.

Animal waste can carry disease-causing parasites.

SAMPLE STORMWATER PROJECTS

C Making the Most of Manure

With growing numbers of people interested in small-scale organic farming, a market has been created for selling cow, chicken, horse, and even llama manure.

Like making lemons into lemonade, animal "waste" when handled properly can be an incredible asset to the farm. When handled incorrectly, animal waste becomes a liability and can cause illness in livestock, humans and wildlife and fish in nearby streams.

Storage is the key to reusing manure and saving on chemical fertilizers. There are mainly two types of storage, depending on the physical consistency (solid or liquid) of the manure, and the future plans for using it. Dry or solid manure storage is usually a concrete pad with three walls and a roof where the manure can be piled up. The concrete pad, walls, and roof are designed to prevent rainwater from washing away any of the manure into local streams. Liquid manure should be stored in either a tank, lined pit or lined pond to help prevent contamination of well water. Other holding structures should be designed to store contaminated rainwater runoff, used bedding, wastewater from animal production units, dairy wash water, and other diluted wastes.

Ideally, a storage structure should be able to hold at least 6 months of manure. This amount of storage ensures that the manure can be spread on the fields at the proper time to increase crop yields and reduce storm water runoff pollution.

Rotational grazing is another way farmers can reduce stormwater runoff pollution, reduce soil erosion, and improve herd health. Recent studies have found that although confined cows produce more milk, rotational grazing is more profitable due to reduced feed, labor, fuel and veterinary expenses.

Penn State offers a Precision Dairy Technology program which shows how to meet livestock nutrient requirements more accurately, therefore reducing excess nutrients in the manure. This not only saves feed costs but also helps reduce potential pollution. For more information visit *http://extension.psu.edu/animals/dairy/courses.*

This new structure is designed to store manure for several months.

This farm has a liquid manure storage tank on the left and a dry manure storage facility on the right.

D Working the Land

Soil is such a valuable asset on the farm that it is vital we keep it in the fields and out of our waterways. There are a variety of improvements that can be made to do so.

Switching to no-till or less tillage can help keep soil in place while saving money on labor, fuel, irrigation, and machinery costs. However when switching over, gullies may form that usually would be smoothed over each year by tilling. These gullies will erode and get deeper each year unless a more stable and permanent drain-way is created.

Cover crops can also be helpful. With no-till, cover crops can be used to keep the weeds down, increase the nutrients in the soil, and prevent soil loss.

On sloped areas, terraces can be designed to allow the field to be grazed or farmed. These terraces look like long, wide steps across a hillside and can help prevent erosion, gullies and polluted runoff.

Depending on the layout of the farm, no-till farming, cover crops, and terraces or a combination of all three can be used to save you money, make the most of your farmland, and keep the local streams and lakes clean and thriving.

A pipe outlet terrace allows water to flow into the pipe rather than creating gullies.

For technical expertise on what might work best on your land see page 22 to find the Agricultural Specialist in your county.

Two cisterns at the Schuylkill Center for Environmental Education in Philadelphia, PA capture runoff from the education building roof.

E Rainwater Capture & Reuse

Cisterns, tanks and other large containers are designed to capture and store rainwater from rooftops. They temporarily hold the rain, helping local streams and sewer systems to be less overwhelmed on rainy days. These containers may be above or below ground, and they may drain by gravity or a pumping system.

Stored water can be used to irrigate crops, slowly released to a natural area where it can soak into the ground, or be reused in some other manner on the farm. Reusing rainwater can help reduce a water bill for those on a public system or conserve well water when the weather gets dry. A cistern can be directly connected to the plumbing. However, plumbing for non-potable (not drinkable) rainwater reuse should be separate from potable (drinkable) plumbing. Some examples are for washing clothes, taking showers, flushing toilets, or various other needs based on the property.

To reduce flooding in local waterways, full cisterns should be slowly emptied prior to rain. This allows them to hold the greatest volume of water when the streams will be at their highest. For more information on reusing rainwater, visit the Delaware Valley Green Building Council's website ***www.DVGBC.org***.

Photo credit: Temple University Center for Sustainable Communities School of the Future

A rainwater catchment system.

SAMPLE STORMWATER PROJECTS

F Protecting the Streams

Many farmlands were selected because of their rich soil and easy access to fresh water. However, when livestock are given unlimited access to streams, the quality of the water can quickly degrade. There are a couple of simple projects that can be done to protect streams.

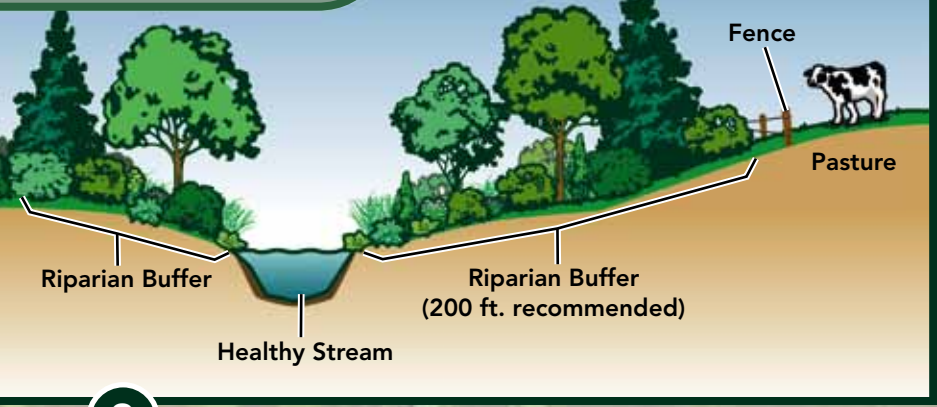
A cattle stream crossing with a healthy buffer.

People in the environmental field frequently use the term "riparian buffer." They are referring to a strip of land with native grasses, shrubs, and trees along a stream. The plants slow down, soak in, and filter fertilizers, pesticides, herbicides, loose soil, engine fluids and any other materials running off the land when it rains. Forested buffers provide more benefits to the stream than grass buffers. Trees help shade the waterway, keeping it cooler in the summer. This reduces the excessive growth of bacteria and algae that can harm fish and wildlife, as well as contaminate drinking water. These plants with their strong roots help slow down the flow of water, stabilize the banks, reduce erosion, and decrease flash flooding while improving habitat for fish and wildlife.

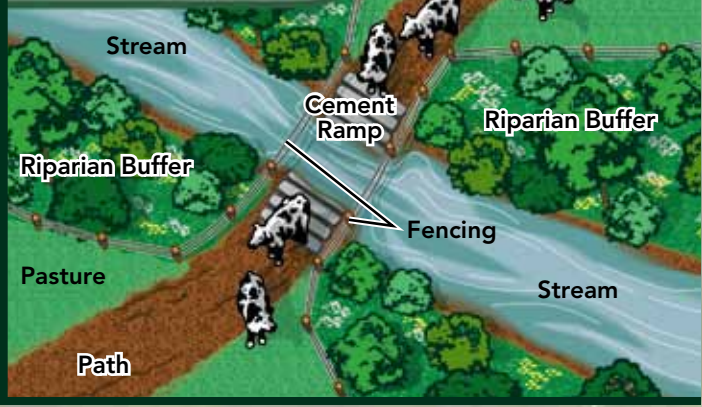
A good buffer won't be good for very long without fencing to keep livestock out. Buffer fencing also benefits the farmer through potential income from a conservation buffer contract, improved herd health, better pasture management and cleaner drinking water for livestock. During the development of the Conservation Plan, new or different watering systems will offset stream access for animal watering. Depending on the layout of the farm, stream crossings for livestock may still be necessary. Specially engineered cattle crossings have many benefits:

- Reducing streambed and stream bank erosion
- Preventing cattle and equipment from getting stuck
- Improving water quality
- Allowing for more uniform grazing of fields

Riparian Buffer



Cattle Crossing

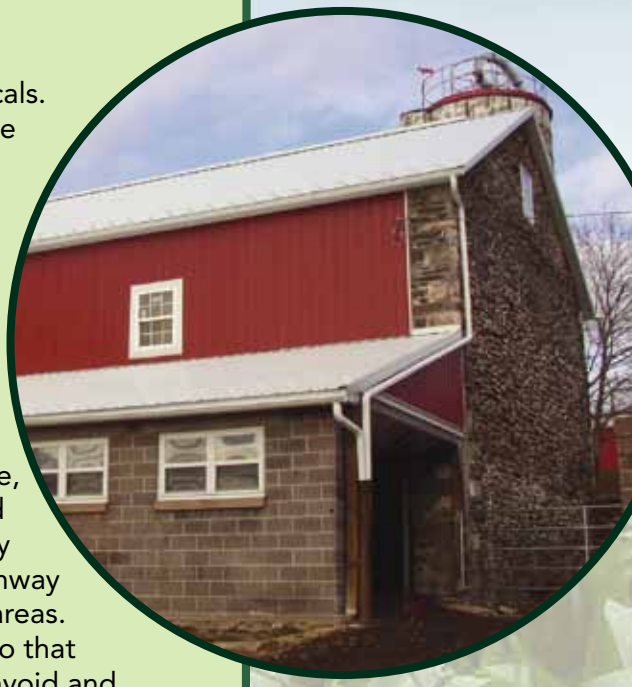


G Around the Barnyard

Loose soil and animal waste pollute local streams when they run off during rainy days.

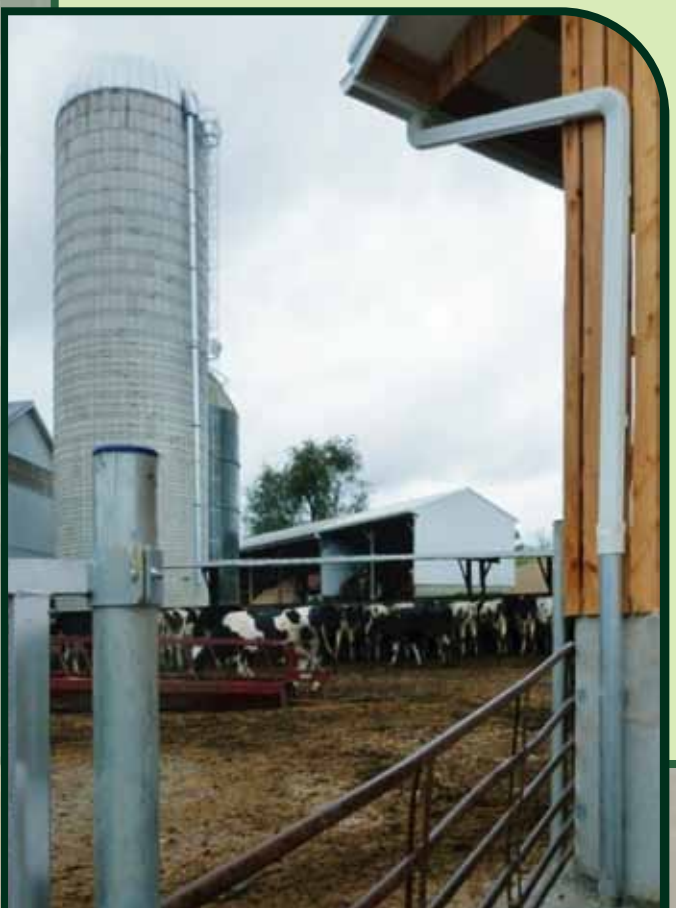
There just seems no way around the fact that hooves, the ground and rain always make mud. Barns, shelters or anywhere livestock spend the bulk of their time, especially during the non-growing season, should have rainwater diverted around them. Gutters, downspouts, splash blocks and other types of drainage systems are tools used to control the direction that rainwater travels. The goal is to keep the rainwater away from mud and animal waste, so it can flow free of pollution into nearby ponds or streams. Gutters and other effective drainage systems can also help preserve the life of wood building supports and concrete foundations.

Milking facility wash water also needs to be managed properly. This water contains animal waste, milk, mud, and cleaning chemicals. Ideally, wash water should be drained into a liquid manure storage tank and applied as fertilizer. Liquid manure storage tanks need to be designed to contain enough material so that they don't need to be emptied until the crops are ready to uptake the most nutrients, rather than spread because the tanks are full. If the material is spread during the non-growing season, rain and melting snow will just carry it into local waterways.



Downspouts should convey water to the downhill corner of the livestock area so the water bypasses areas with waste.

All fertilizers, pesticides, herbicides, cleaning fluids, gasoline, motor fluids, etc., need to be kept in a safe, dry location out of the pathway of rain or flood prone areas. Hold annual trainings so that workers know how to avoid and properly clean up a spill if one happens. Transferring any of these substances should be done in an area that can contain a spill, far away from streams, wells, storm drains or drainage paths. Any hazardous materials should be disposed of correctly at a collection center.



Focus on keeping clean water clean — don't allow rainwater to run through barnlots or areas where animals gather.

SAMPLE STORMWATER PROJECTS

H Around the House

There are many improvements we can all make in and around our homes to help protect our local natural areas and waterways.

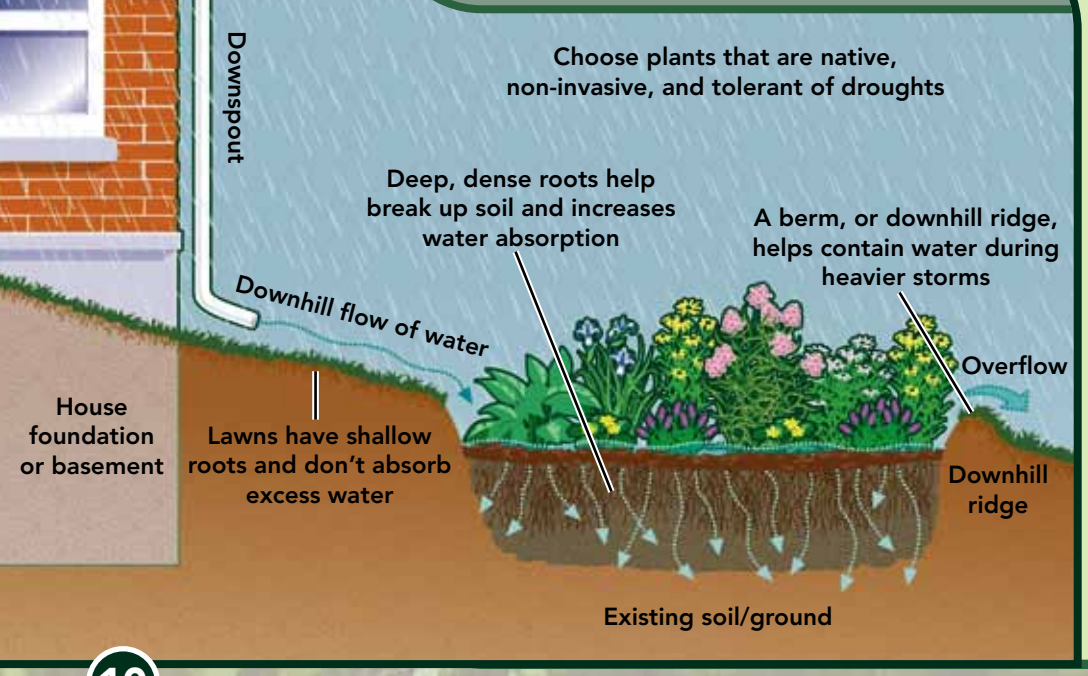
Service your car and machinery regularly to prevent oils and other fluids from leaking onto the ground so they don't wash away into local waterways or make their way into your well. Recycle motor oil and antifreeze at participating service stations.

Choose water based paints and wash brushes in your sink with water. Reuse and recycle paint thinner, which is a hazardous material. Do not pour it down your drain or into a storm drain.

Minimize the use of toxic substances such as mothballs, drain and oven cleaners, and many other products. Substitute with products that use non-toxic ingredients whenever possible. Consider implementing Integrated Pest Management (IPM) practices to minimize the use of toxic and/or chemical-based cleaning products, pesticides, fertilizers, and herbicides, thus reducing the release of harmful chemicals into the waterways. For more information, visit PA IPM Program at ***http://extension.psu.edu/pests/ipm***.

Plant more native trees. Roots not only provide an anchor to stop soil erosion but also increase the amount soil absorbs rainwater. Trees also clean the air, regulate temperature, reduce carbon dioxide, and can increase your property value.

Features of a Rain Garden



Plant a rain garden. A rain garden contains specially chosen plants designed to help collect rainwater from hard surfaces, such as roofs and driveways. The garden should be in an excavated or naturally low spot. The bottom layer is filled with stone to provide an area for the water to pool. The land around the rain garden is sloped so that the rainwater will naturally flow in from the nearby hard surfaces. Water-loving native plants are used in the garden to help slow down, soak up and filter the rainwater while the plant roots help it percolate deep into the ground.

I Farmland Preservation

Compared to more developed properties with a lot of paved areas, farmland allows rainwater to soak into the ground. This can reduce flash flooding in nearby streams and help replenish ground water. Many counties have funding available to reduce the loss of farmland to development and preserve the natural and historical character of an area.

Depending on the soil condition, location and value of the land, your property may be eligible for your county's farmland preservation program. One such way is through an agricultural conservation easement. This varies from county to county, but in many cases the landowner is financially compensated for some or all of the development rights of the property or the difference between the market value and the agricultural value of the property. The farmer retains full rights and ownership of the land. The conservation easement legally restricts the property to be used for agricultural purposes only. Future owners are also legally bound to the conservation agreement.

Consider creating a farmland preservation easement to protect your farm for future generations.

Agricultural conservations easements are beneficial in many ways:

- Ensuring that a family's farmland will be protected for future generations
- Compensating farmers so that farming remains profitable
- Protecting natural resources such as water, air, and good soil
- Preserving the historic character as well as scenic vistas of an area
- Decreasing the farmers tax burden
- Reducing the potential flooding that could be created through development

AN EXAMPLE FARM

This farm shows many of the stormwater projects listed in the previous pages:

1. Liquid Manure Storage
2. Dry Manure Storage
3. Down Spouts & Gutters on Buildings
4. Buffered Stream with Trees & Fencing
5. Stream Crossing
6. Cisterns & Rain Barrels

3 Downspouts & Gutters on Buildings

See "Around the Barnyard" on page 9 for more information.

4 Buffered Stream with Trees & Fencing

See "Protecting the Streams" on page 8 for more information.

5 Stream Crossing

See "Protecting the Streams" on page 8 for more information.

Illustration by Frank McShane

SPOTLIGHT FARM

Davis Farm

Good for the Farm:

- Reduced chemical fertilizers cost
- Healthy livestock
- Safer well water

The Davis farm is located in Berks County, PA. It has been said that Berks County has some of the finest soil in the world. Teresa and Luther Davis's farm borders a small unnamed stream that flows into the Maiden Creek. The Maiden flows into the Schuylkill, just upstream of Reading. This water serves as the source of drinking water for not only Reading but also downstream for the City of Philadelphia. It's not hard to imagine that the water in these rural streams can have a big impact on many people downstream.

If this was a TV show, it would be called "Extreme Stormwater Makeover." The Davises, in collaboration with the Berks County Conservancy, Philadelphia Water Department, Schuylkill Action Network, Schuylkill River Heritage Area, Maiden Creek Watershed Association, Berks Watershed Restoration Fund, Reading Area Water Authority, and Natural Resources Conservation Service have taken on a variety of large and small projects to help keep the waterways clean and their farm productive.

On the other side of this gate is where all the liquid manure is stored.

The round concrete structure holds manure until it is needed to fertilize the crops, which reduces the amount of treatment the Philadelphia Water Department may have to do to provide clean and safe drinking water downstream.

The projects consisted of:

1. Construction of a liquid manure storage tank, as well as a dry manure storage facility. These structures allow the optimum amounts of nutrients to be supplied to crops at the right time, while preventing runoff pollution into local streams as well as contamination of groundwater.
2. Installation of fencing, which allows the plants along the stream to grow, creating a buffer. These plants and their strong roots will help slow down, soak in, and filter any rainwater runoff coming off the farm while helping to prevent erosion along the stream bank.
3. Installation of downspouts and culverts around the buildings. This results in steering away the rainwater from areas containing manure so that the water is clean as it runs off into the stream.
4. Lastly, creation of a path and cattle crossing as well as regrading a very steep slope. These changes will help prevent erosion and loss of fine Berks soil!

Good for the Community:

- Clean drinking water for Pennsylvania residents, from Reading to Philadelphia
- Healthy wildlife and fish in local streams
- Viable local farms

Cattle crossings help reduce soil loss, protects water quality and prevents cattle and equipment from getting stuck.

SPOTLIGHT FARM

Henry Got Crops Urban CSA

Urban farms help bring fresh vegetables to the City.

HENRY GOT CROPS
CSA Farm Partnership
W. B. Saul High School Weavers Way Farm
Fairmount Park

Weavers Way Co-op, Weavers Way Community Programs and W.B. Saul Agricultural High School collaborate in an urban Community Supported Agriculture (CSA) farm. The farm is on the grounds of Saul High School on Henry Avenue in the Roxborough neighborhood of Philadelphia, on Fairmount Park owned land. Weavers Way Co-op Farm is responsible for the production aspects of the CSA, and Weavers Way Community Programs work in conjunction with Saul's twelve agricultural teachers to provide a complete Career and Technical Education Program.

Good for the Farm:

- Strong community participation
- Students help promote and work the farm
- Dependable customer base

Good for the Community:

- Locally available fresh organic food
- Hands on educational opportunity for students
- Clean safe drinking water

"Henry Got Crops" was started in 2009 and is run in collaboration with teachers at Saul. The project not only serves as an educational and career-building opportunity for students, but also brings food to the community. The farm is located right on campus, and students learn about and participate in small-scale, organic vegetable growing. This is one of the first high school-based CSAs in the country. There are many opportunities for student involvement. These opportunities range from hands-on work in the fields to helping with community outreach and newsletter-writing, to conducting applied research, budgeting and planning. In addition more than 100 families now participate in the Henry Got Crops CSA.

The Philadelphia Water Department worked with all these partners to complete several projects to reduce polluted runoff from the farm. This was an important project because the Wissahickon Creek runs along the farm. The Wissahickon then empties into the Schuylkill just upstream of where the City pumps out water to provide drinking water for over a million people.

To help keep the waterways free of harmful pathogens and pollution, a combination of agricultural and urban stormwater projects were constructed. Wetland swales connect a series of long pools, which capture polluted runoff from the school roofs and parking lots as well as runoff from the livestock and farming areas. These pools slow down the water and allow it to soak in, settle out and filter before it flows into the sewer or directly into the Wissahickon Creek. The Philadelphia Water Department is excited to do more projects like these that benefit the farm and benefit the community.

SPOTLIGHT FARM

Weaver Organic Valley Farm

The Weaver Homestead is a 109-acre dairy farm in Berks County, Pennsylvania. The farm milks about 25 Jersey cows. The Weavers both grew up on farms and started out with a conventional confinement dairy. They became concerned about the chemicals being used and how they could affect their family, the cows, the land, and their waterways.

Many farmers switch to organic farming for financial reasons, but the Weavers changed because they saw how the chemicals applied to the land were so closely connected to the food they ate and sold. Now that the cows are less confined and able to graze, the local veterinarian rarely visits the Weaver Homestead.

Not only has the Weaver Homestead gone organic, they have also completed several projects to reduce polluted runoff into the nearby Maiden Creek. An in-ground manure storage tank was constructed. This allows them to store large quantities of manure to use later as fertilizer in the fields. Having plenty of storage space ensures that the manure can be spread on the fields at the proper time to increase yields and reduce storm water runoff pollution. They have also installed several barnyard stormwater controls to divert rainwater away from areas with mud and animal waste. These projects were constructed through support from Berks County Conservancy, the Schuylkill River Restoration Fund, NRCS, Berks Watershed Restoration Fund, Reading Area Water Authority, Borough of Kutztown, Schuylkill Action Network, and the Philadelphia Water Department.

Good for the Farm:

- Healthy livestock and lower veterinary bills
- More flexibility to use manure as fertilizer when needed
- Protected farm and water for future generations

Good for the Community:

- Fresh, tasty organic milk
- Clean drinking water sources
- Healthy wildlife and fish in local streams

An in-ground liquid manure tank during construction.

FARM TO TABLE MOVEMENT

In recent years, a whole host of terms have been created, all geared toward creating a balance between society's food needs and the natural environment. This "sustainable agriculture" is really about good, long-term planning since farming relies so heavily on the natural environment for good soil, healthy pollinators and clean water.

One aspect of sustainable agriculture is the "Farm to Table Movement" which encourages people to buy their food and other agricultural products from places that produce them locally.

There are many benefits such as:

- Supports local economies. Locally-owned companies tend to give back a higher percentage to causes in their communities as well.
- Reduces the amount of air pollution created through transportation and refrigeration.
- Increases the freshness of the food.
- Decreases the likelihood of severe water and air pollution issues due to overcrowded factory farming.
- Keeps all the jobs related to the food supply chain in your community.

Good agricultural practices mean good local seafood too. Next time you're eating out ask for Delaware Bay Oysters!

FARM TO PINT MOVEMENT

Many scientists use the presence of insects and other creatures in our waterways to determine the health of the water in the stream. A water sample just takes a snapshot of the water at that moment in time, but looking at the creatures that are able to survive in the stream shows us how the stream has been doing for months and even years.

The stonefly larvae (young) can only survive in streams with the purest water. Even a small amount of polluted runoff will make the area unlivable for the stonefly. In honor of this clean water creature, the Saucony Creek Brewing Company created Stonefly IPA.
The beer was a collaborative effort with the Schuylkill Action Network, a group of organizations, agencies, and environmental professionals with the goal of a clean and healthy Schuylkill River. A portion of the proceeds is donated to the Berks Watershed Fund. This Fund has helped pay for several agricultural pollution prevention projects. Since beer is over 90% water, many local breweries want to do their part to help keep our waterways clean.

Saucony Creek Brewing Company currently has a "Berks only" beer in the works which will be made from hops, water, grains and all other ingredients grown only in Berks County, Pennsylvania.

Members of the Schuylkill Action Network with the owner of Saucony Creek Brewing Company after receiving the SAN MVP Award for clean water.

Protecting clean water one gulp at a time!

Stoneflies can only survive in the purest waterways.

COST SHARE & ASSISTANCE PROGRAMS

There is an array of local, state and federal funding as well as technical expertise available. A good starting point to finding out about these resources is to contact your local Agricultural Specialist at your county's Conservation District (see page 22). Most conservation districts provide funding through conservation cost-share programs for projects involving the management of nutrients on a farm. This can include manure storage structures, gutters on barns, stream fencing for pastures, and other practices included in this guidebook. These specialists will be able to assist you in determining which type of project would be best suited for your farm and what resources are available to get you started.

GETTING STARTED

As you know, every farm is different and has its own specific needs. However, over the years, our local conservation partners have become very good at working together with farms to find creative solutions to help farmers protect the environment while maintaining a productive and profitable farm. Below are some typical steps that you may go through to start this process.

STEP 1 Start with a Plan

Most of the projects described above start with a conservation or nutrient management plan. If you don't have one or if they're old or outdated, they will work with you to find the resources, expertise, and even the funding to develop these plans for your farm.

STEP 2 Designing the Projects

The conservation or nutrient management plans will most likely suggest some different projects and practices that will help to keep the farm productive while protecting our waterways. Some of the projects can be simple changes to the way that you do things while others may be pretty big construction projects which will require engineer certified designs. Luckily, there are some great services available to provide these. If this is too daunting for you to handle or pay for on your own, which is the case for many farmers, your local Agricultural Specialist will typically get the NRCS involved in the process. Not only can they provide free engineering and design assistance, they have many programs available that will help cover some of the installation expenses.

STEP 3 Installing the Projects

While some of the projects outlined in your plan may be simple and inexpensive, others can be quite the opposite and may be a pretty big capital expense for the farm. Some good news is that most of these projects are investments for your business and will help you become more efficient and profitable. Additionally, there are many public and private programs that can be used to cover some or even all of the expenses of these projects. If partnering with NRCS, various programs offer cost-share options for installing conservation projects, such as manure storage structures, grazing and feeding pads, barnyard controls, stream bank fencing, and other practices. While the NRCS programs may cover half or even more of the project expenses, what remains may still be a really big price tag for many farmers. This is where local nonprofit partners step in. Realizing that we all have to work together for clean water, many different public and private groups offer grants to help farmers install these projects.

To get started and learn more:

Call:

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Stormwater Farm Projects	Typical Cost Ranges
Conservation & Nutrient Management Plan (Includes soil testing and fertilizer rates recommendations)	**$4,000 - $5,000 per farm**
Cattle Crossing (Costs vary depending on length and width of crossing and presence and condition of floodplain)	**$3.70 - $6.50 per square foot**
Gutters & Downspouts (Dependent on fascia presence and condition)	**$2.25 - $4.50 per foot**
Stream Bank High Tensile Fencing (Dependent on number of strands and corners)	**$0.80 - $1.93 per foot**
Buffer Plants (100 plants per acre depending on size, availability, and type of plants. Labor, shipping, and handling are extra)	**$3,000 per acre**
Stabilization Seeds (Dependent on species of seed and diversity desired)	**$50 - $500 per acre**
Liquid Manure Storage Tank (Based on site conditions, excavation, footer drain, safety fence, waste transfer pipe size and length, scrape alley, milk house waste, etc.)	**$60,000- $175,000***
Dry Storage Structure (Based on a roofed dry storage, $18 - $40 per square foot with contingency dependent on existing site conditions and excavation. Estimate does not include animal housing structure associated with need for storage)	**$10,000 - $50,000***
Rainwater Harvesting	**$50 per 50 gallon barrel or $550 - $2300+ per 1,000 gallon cistern**
Barnyard Controls (Dependent on existing conditions, size, and amount of curbing; assuming no roofing)	**$3.50 - $12 per square foot**

The sample costs include materials, permitting, engineering, design and installation, but can vary depending on site constraints or any unforeseen issues.

COUNTY CONSERVATION DISTRICTS

DELAWARE CONSERVATION DISTRICTS

New Castle Conservation District
www.newcastleconservationdistrict.org
302-832-3100

Kent Conservation District
www.kentcd.org
302-741-2600

Sussex Conservation District
www.sussexconservation.org
302-856-3990 x 3

NEW JERSEY CONSERVATION DISTRICTS

Burlington County Soil Conservation District
www.bscd.org
609-267-7410

Camden County Soil Conservation District
www.camdenscd.org
856-767-6299

Cape Atlantic Conservation District
www.capeatlantic.org
609-625-3144

Cumberland-Salem Conservation District
www.cumberlandsalemsoil.com
856-451-2422

Gloucester County Soil Conservation District
www.gloucesterscd.org
856-589-5250

Mercer County Soil Conservation District
609-586-9603
www.mercerscd.org

PENNSYLVANIA CONSERVATION DISTRICTS

Berks County Conservation District
www.berkscd.com
610-372-4657

Bucks County Conservation District
www.bucksccd.org
215-345-7577

Chester County Conservation District
www.chesco.org
610-925-4920

Delaware County Conservation District
www.delcocd.org
610-892-9484

Montgomery County Conservation District
www.montgomeryconservation.org
610-489-4506

Schuylkill County Conservation District
www.schuylkillcd.org
570-622-3742 x 5

STATE PROGRAMS

Delaware Dept. of Agriculture – Nutrient Management Program
www.dda.delaware.gov
302-698-4556

New Jersey Dept. of Agriculture – Animal Waste Management
www.state.nj.us/agriculture
609-292-8856

Pennsylvania Dept. of Agriculture – Nutrient Management Program
www.agriculture.state.pa.us
717-705-3895

Delaware
State Office 302-678-4250

New Jersey
State Office 609-587-0904

Pennsylvania
State Office 717-237-2117

- Berks County 610-372-4655
- Bucks/Montgomery/Philadelphia Counties 215-453-9527
- Chester/Delaware Counties 610-696-8750
- Schuylkill County 570-622-1555

FEDERAL PROGRAMS

United States Department of Agriculture (USDA) Conservation Reserve Enhancement Program (CREP) is an offshoot of the Conservation Reserve Program (CRP), the country's largest private-land conservation program. Administered by the Farm Service Agency (FSA), CREP targets high-priority conservation issues identified by local, state, or tribal governments or non-governmental organizations. In exchange for removing environmentally sensitive land from production and introducing conservation practices, land owners are paid an annual rental rate. Participation is voluntary, and the contract period is typically 10–15 years, along with other federal and state incentives as applicable per each CREP agreement. For further information about the program visit www.fsa.usda.gov. Additionally the USDA Natural Resources Conservation Service (NRCS) offers many conservation programs through the Farm Bill. For a complete description of offered programs visit www.nrcs.usda.gov

OTHER RESOURCES

Berks County Conservancy initiated the **Berks Watershed Restoration Fund** to link businesses and individuals who benefit from a safe reliable water supply with farmers and landowners who are looking to incorporate BMPs into their operations. For more information visit ***www.berks-conservancy.org*** or call **610-372-4992**.

Penn State Extension provides a holistic approach to educating people on the various issues surrounding nutrient management. For more information visit ***www.extension.psu.edu***.

Pennsylvania Infrastructure Investment Authority (PENNVEST) Nonpoint Source Program provides low interest loans and grants for agricultural runoff, urban stormwater, abandoned mine drainage and brownfield stormwater projects across the state. Construction costs, engineering, legal and administration costs for a project are all eligible for PENNVEST NPS funding. For more information about the NPS Program visit ***www.pacd.org*** or call **717-238-7223 ext. 11**.

Rutgers New Jersey Agricultural Experiment Station delivers wide-ranging educational programs in the areas of agriculture, fisheries, urban and community outreach, youth development, food, nutrition and health, and related areas of economic and workforce development across New Jersey. For more information visit ***www.njaes.rutgers.edu***.

Schuylkill River Restoration Fund provides grants to government agencies and non-profit organizations for projects that improve the quality of water in the watershed. The grants focus on three major sources of pollution: stormwater run-off, agricultural pollution and abandoned mine drainage. For more information visit ***www.schuylkillriver.org/restoration_fund.aspx***.

Stroud Water Research Center enables businesses, policymakers, landowners and individuals to make informed decisions that affect water quality and availability around the world through freshwater research, education and watershed restoration programs. For landowner assistance call **610-268-2153 ext. 310**.

University of Delaware Cooperative Extension connects the public with university knowledge, research and resources to address youth, family, community and agricultural needs. For more information visit ***www.extension.udel.edu*** or call **302-831-2501**.

NOTES

SUPPORT PROVIDED BY:

Schuylkill Action Network – Protecting Schuylkill Waters
Members of the Schuylkill Action Network share information, expertise, and technology to help each other achieve a shared vision of clean water and a healthy environment for the Schuylkill River and its tributaries.
www.SchuylkillWaters.org

Philadelphia Water Department (PWD) supplies drinking water, wastewater and stormwater treatment services to the City and many suburban communities. The Department actively promotes good stewardship for the Delaware Estuary through its day-to-day water and wastewater operations, its nationally recognized Office of Watersheds programs, and its award winning Public Education programs. In addition, PWD's Source Water Protection Program takes a holistic watershed approach to drinking water protection, coordinating source water protection efforts throughout the Schuylkill and Delaware River watersheds.
www.phila.gov/water
1-215-685-6300

Partnership for the Delaware Estuary — A National Estuary Program is a non-profit organization established in 1996 with a mission to lead science-based and collaborative efforts to improve the tidal Delaware River and Bay. The Estuary, where fresh water and salt water mix, is also known as the tidal portion of the Delaware River and its tributaries, including parts of Pennsylvania, New Jersey and Delaware. It is one of twenty-eight congressionally designated National Estuary Programs in the country working to improve the environmental health of the nation's estuaries.
www.DelawareEstuary.org
1-800-445-4935

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Teresa and Luther Davis,
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Saul High School,
and Henry Got Crops CSA

To get started and learn more:

Call:

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