



For more information contact the
Westmoreland Conservation District
724-837-5271
www.wcdpa.com



Stormwater Trail

Hold It!

*Do you know where that water's been
(or where it's going next?)*



Your body is about 60% water!

Right now, you probably have 5 or more gallons of water inside your body!
And guess what? It's all been used before. At least a *zillion* times.

Before it got into you, some of this water might have been snow on Chestnut Ridge. Or juice in an orange in Florida. Or a drop of sweat on your bald uncle's head.

And the water that's in you still has more places to go. After it leaves you, it might irrigate a corn field in Kansas. Float a boat down the Amazon River. Cool machines at an electric plant. Or fill the tub where you wash your dog.

You see, since about the beginning of time, there's always been about the same amount of water on the Earth. Not really any more. Not really any less. And so, our Earth keeps recycling it. Nature uses the same water over and over again, for homes and farms and businesses all around the world.

Scientists call the Earth's natural water recycling the hydrologic cycle ("hydro" means "water"). Here's how it works...

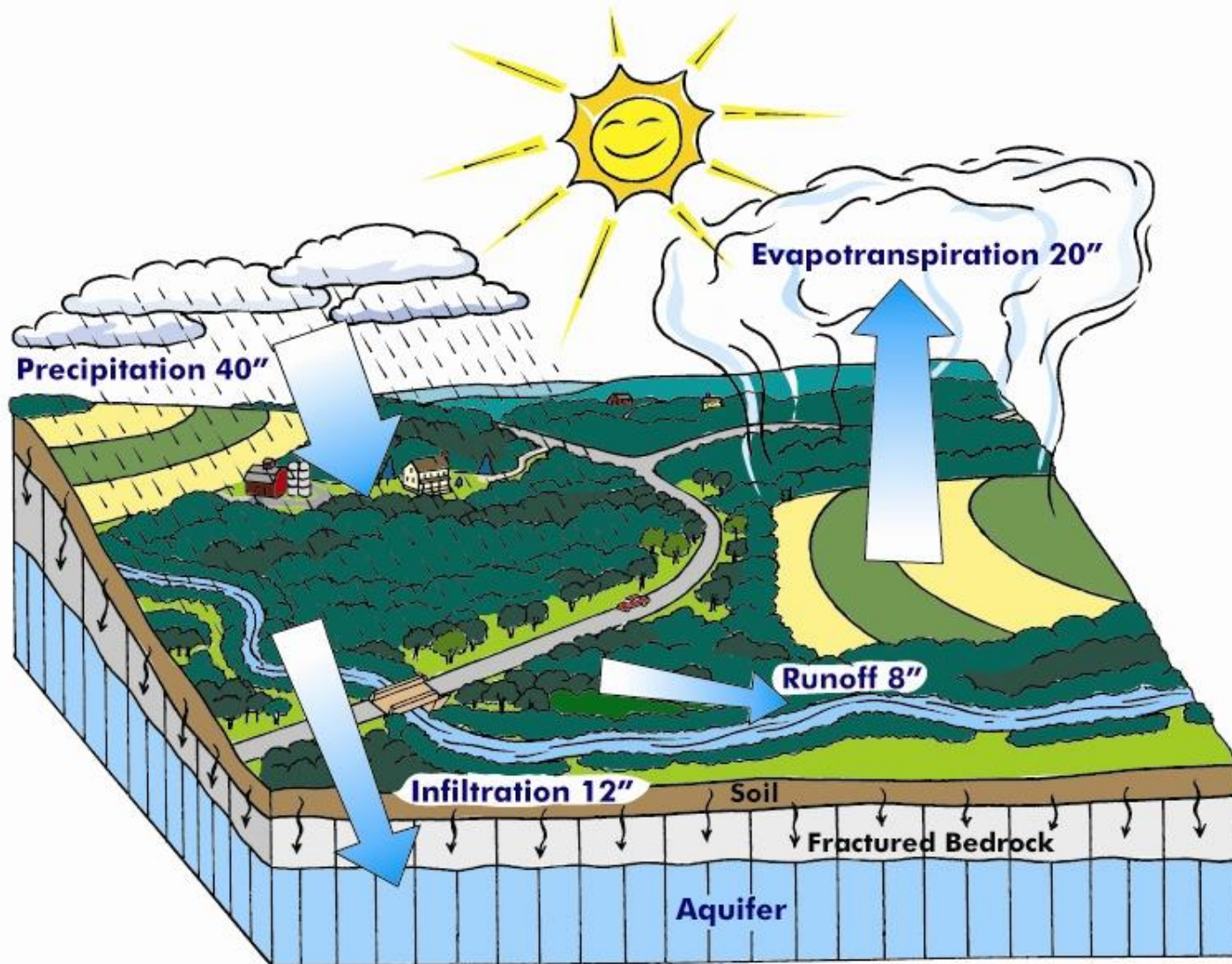


The Hydrologic Cycle

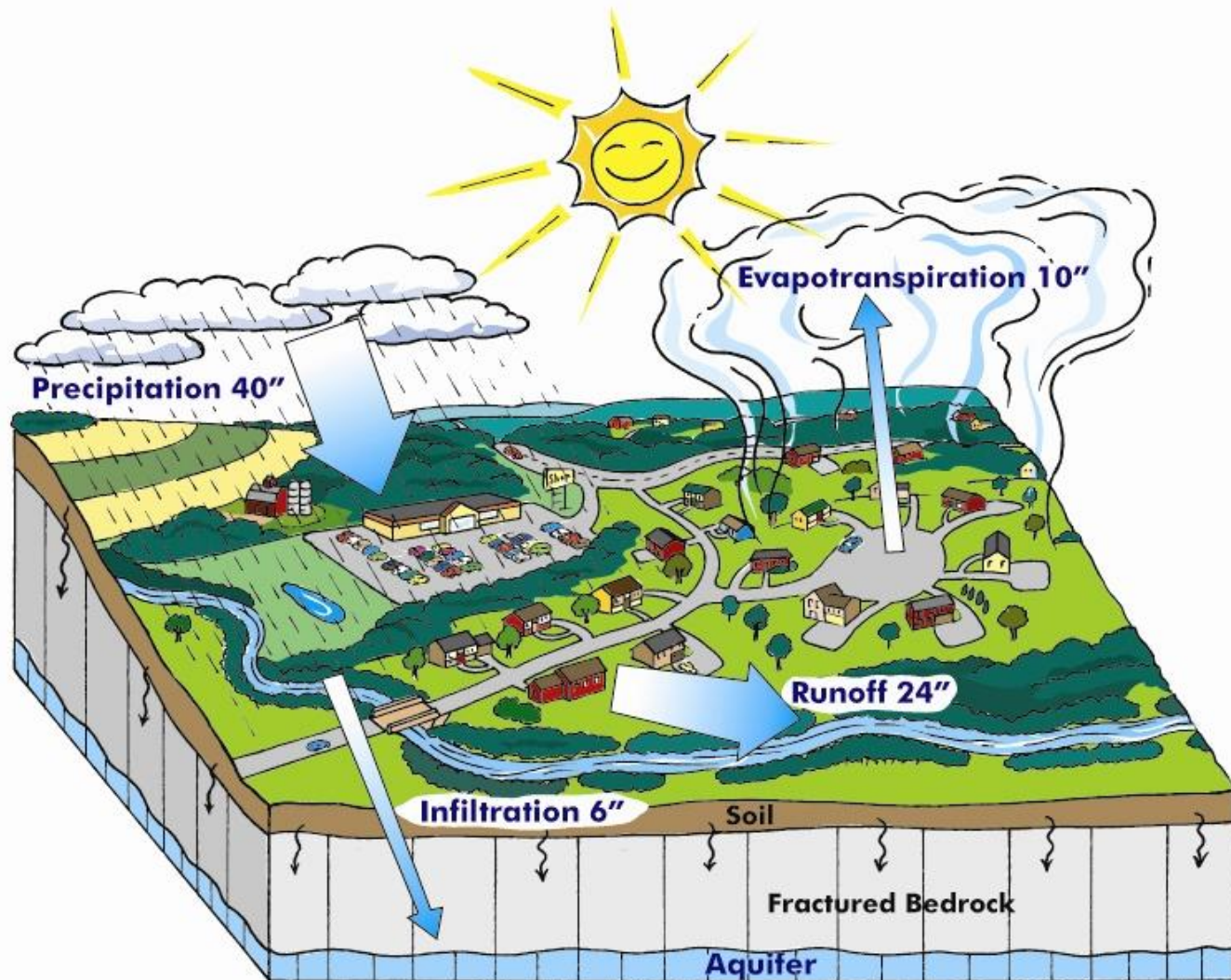
There is no "new" water. The same drops are recycled, in different ways. Sometimes as water vapor (steam or clouds)...sometimes as liquid (rain, a puddle, or a lake)...sometimes as a solid (snow, hail or ice).

In Westmoreland County, we receive about 40 inches of precipitation each year. In the natural hydrologic cycle, more than half is returned skyward by evapotranspiration – the process by which plants and the sun lift water vapor into the air. Under natural conditions, several inches of rain will run off of the land, and several will soak into (infiltrate) the soil.

How the Water Cycle Works in Natural Conditions



How the Water Cycle is Changed by Developed Conditions



Managing Water on Your Property

- Maintenance
- Grading
- Best Management Practices
 - Landscaping
 - Rain barrel / cistern
 - Rain garden
 - Porous paving
 - Green roof



Maintain Gutters, Downpouts, Pipes



Direct Water Away From Foundations and Window Wells



Use Landscaping to Manage Stormwater





Stormwater Trail

***Would you like to have a beautiful garden,
without very much work or expense?***

You can, if you choose the right plants – ones that grow naturally in conditions just like the ones on your property.

Our conditions here in front of the Education Center are dry. So we landscaped with plants that grow naturally in areas of Pennsylvania that don't get a lot of water.

All the plants you see are native to the dry east side of Pennsylvania's Allegheny Mountains. We used lots of different varieties (14 in all) to reduce the potential for diseases and pests and to give us a continuous succession of blooms from spring through October. Another plus: Because they're perennials, we only had to plant them once and they'll continue to grow and flower year after year.





When you put plants in conditions they like, you have happy plants. And happy plants are naturally more vigorous and healthy, which means you won't have to supplement their diet with a lot of fertilizer.



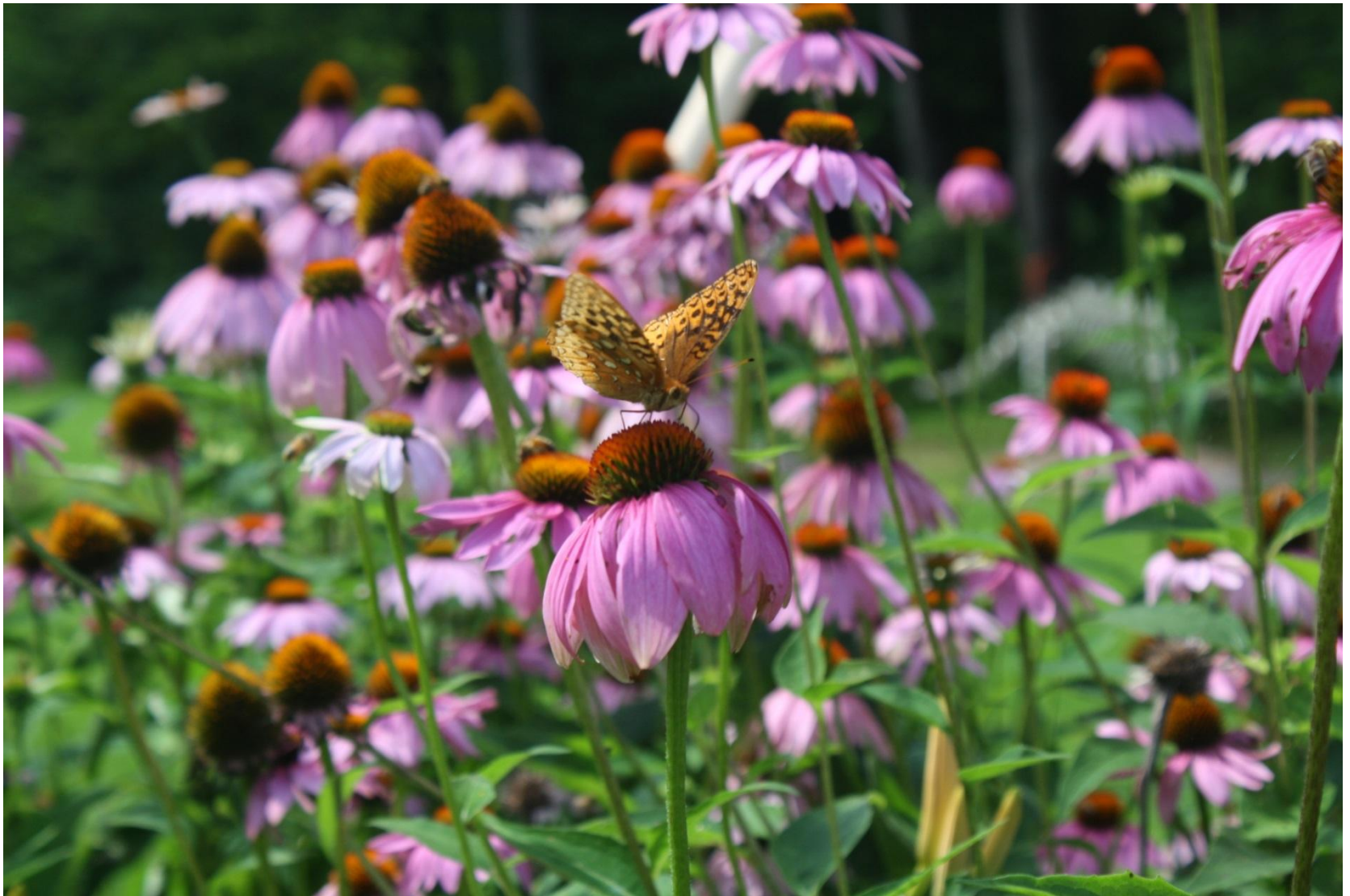
Pennsylvania has more than 2,100 native plants, for all kinds of conditions – everything from a prickly pear cactus to a pitcher plant.

Happy plants also are more naturally resistant to trouble, so you won't need a lot of pest controls. And happy plants – even the ones that like more moist conditions – won't need to be watered as often.

What You Can Do

-  Determine the kind of conditions that exist around your home. If you're not sure, a soil test and the Penn State Cooperative Extension Master Gardeners can help.
-  Take a fact sheet to learn which native plants like the conditions you have.
-  Buy and plant a variety of the appropriate native plants. You can purchase them from a local nursery or mail-order catalogs. You also might want to join a native plant society or participate in a plant exchange with people who already have native plants (The Westmoreland Botanical Society is a good place to start).
-  **NEVER** take plants from the wild.

Plant Native Plants to Manage Stormwater





Stormwater Trail

Did you know your backyard is a super sponge?

It is! Shrubs, trees, and ground covers all soak up the rain water that falls in your yard. So do the vines, flowers, vegetables, and herbs.

But the biggest sponge of all around most homes is the lawn.

And that's great because we need all the sponges we can get! Why? Well, for one thing, when water sinks into the ground it doesn't go into the storm sewer system. Plant roots and soil act as filters for pollution, keeping it out of our streams and rivers (remember how the soil trapped the oil from cars in our infiltration parking lot?)

Another great thing about sponges is that they add to the supply of water that's always under the ground (called "groundwater").

Groundwater is what fills most of our streams and lakes. It's also what supplies the water for people who have wells. And more people in Pennsylvania rely on wells than in just about any other state in the nation! So we need to keep groundwater levels high!

*To get the full effect, come back
and check it out on a rainy day!*



What You Can Do

-  Build a great, spongy lawn. Take a fact sheet to learn how.
-  When you mow your lawn, cut only about one-third of the grass blade, and leave the short clippings on your lawn. They are a natural fertilizer and will help your lawn retain more moisture (be a better sponge!).
-  Even with the spongiest of backyards, there still will be some rain that doesn't sink into the ground. It will run over the surface and pick up fine pieces of soil and anything else that's lying there. So be especially careful with fertilizers and pesticides. Be sure they're the environmentally friendly type, and don't use any more than you need.
-  You can also help by supporting other great sponges – the forests and farms in our region. The Westmoreland Conservation District can tell you how you can keep these important natural areas healthy and doing their part for groundwater.



07/24/2003

Set Mower High for a Healthier Lawn to Manage Stormwater





Buildings that blend with nature

Did you ever notice that birds are masters at low-impact building? A single house wren can build up to 12 nests in one season, and yet hardly leave any trace at all that it's been there.

Lately, human builders have been following the birds' example. They're doing things like designing buildings to fit the natural features of the ground they're built on, instead of the other way around. (The Conservation District's barn does this. Did you notice how the back of it snugs into the slope of the hillside?)

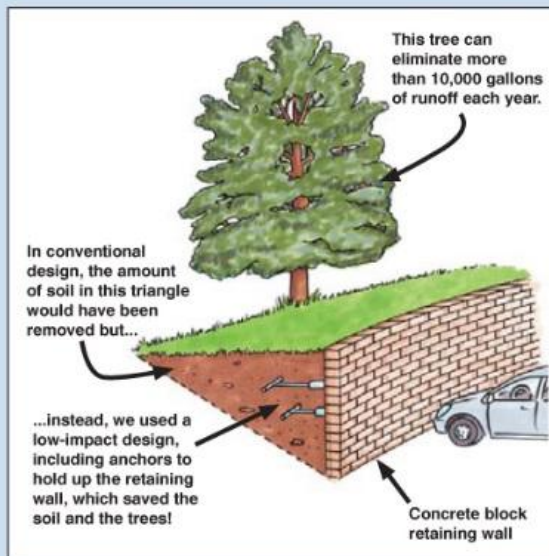
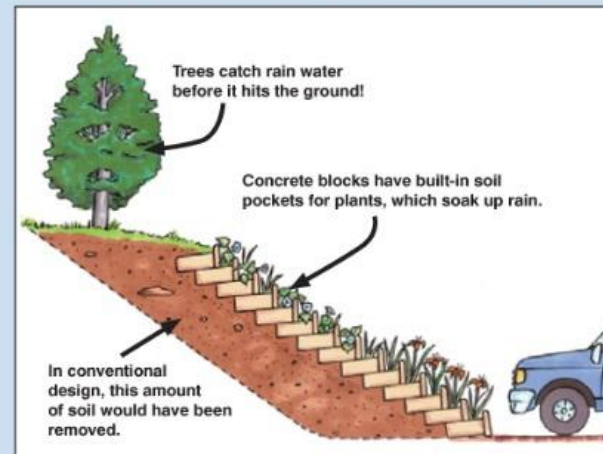
Here at this building – called GreenForge – we've included some low-impact building practices, too. A good example is the hillside in front of you and to your left, across from the building's main entrance.

When we added parking spaces here, the conventional (high-impact) way



right where it was. And then we made sure that the slope stayed in place by installing two different kinds of concrete block walls. The blocks closest to you include "planting pockets" – small areas of soil where stormwater can infiltrate and plants can be tucked in. (Take a fact sheet for more information.)

Another benefit of this low-impact approach was saving money! When we let the ground and trees and plants do the work of managing stormwater, we were able to reduce the amount of curbs, gutters, inlets and pipes that we had to install.



would have been to cut away almost all of the slope. About 300 cubic yards of soil – 30 dump trucks full – would have been dug out and hauled away, and all the beautiful specimen trees growing on top of it would be gone. Losing all that earth and all those trees would have meant losing a lot of 'sponge' area where stormwater could infiltrate into the ground.

So instead, we took the low-impact approach. We left most of the slope

What You Can Do

- Even before you design a building, take a walk on the land where it will be built. Look at how the ground rises and falls, how water flows naturally across the site, and what trees are growing there. Ask the question: How can I design my building so that it works with the natural features of this landscape?
- Reduce the amount of earth you move or remove. Even just having bulldozers and other heavy equipment sitting on your site compacts the soil and makes it less able to infiltrate stormwater.
- Keep in mind that not all "hardscape" has to be totally hard. Even concrete retaining walls can provide pockets of soil where you can add plants and let stormwater infiltrate.

Vegetated Wall Construction



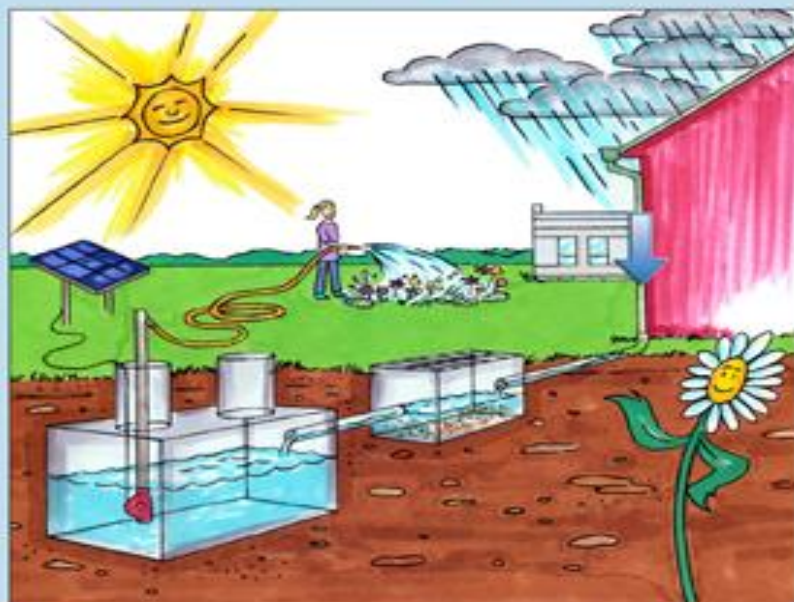






Stormwater Trail

There's a Titanic-size treasure buried here (and it's awfully wet....)



Buried under your feet is a giant concrete box, and inside there may be as many as 3,000 gallons of very valuable...water. Yup, just plain old (and very valuable) water. What's that you say? You don't think water's valuable? Well, picture this: It's the dog days of summer...high noon...the sun's beating down...you're hot, you're sweaty, you're thirsty....




Here in Pennsylvania we've often had drought emergencies — long periods when water was hard to come by. People couldn't wash their cars or water their lawns. In some parts of the state, they weren't allowed to fill their swimming pools or make a backyard

pond. So storing water — what you might call "saving for a sunny day" — really is a pretty smart thing to do.

Even in times of good rainfall, storing water still makes good sense because rainwater is free (you don't have to pay to have it treated and delivered to you). And it works great for watering your plants and your lawn (but people shouldn't drink it). Here, we use our stored water for the flower, herb, and vegetable gardens near Donohoe Center.

We got the water by taking the rain from the gutters and downspouts on this side of the Education Center and directing it underground, first to a catchbasin that "catches" any leaves or debris that may have gotten into the water (that's the square box that you see), and then into our concrete storage box (called a cistern). We get the water out of the cistern and to the garden by using a pump, powered by the sun.

What You Can Do

-  Build your own cistern. Take a fact sheet to learn how.
-  If an underground cistern is too ambitious of an undertaking, you still can store water by using a rain barrel. It's easy and inexpensive. A rain barrel stays above ground, on your back porch or patio, next to one of the downspouts from your roof. And it can hold 30 – 60 gallons of water.
-  Use water wisely. Leaving a hose running for one hour uses 375 gallons of water!

Install a Cistern to Capture Stormwater



Build and Install a Rain Barrel to Capture Stormwater





Stormwater Trail

Rooftop water makes a rain garden



Here's another way to enjoy the rain from your roof instead of sending it into the storm sewer system. Use it to fill a series of peaceful ponds, connected by gentle waterfalls.

That's what we did here. We took the rain from the gutters and downspouts on this side of the Education Center and directed it through underground pipes to this natural slope. Then we built a series of three ponds.

As the rain water fills the first pond, gravity causes it to overflow as a gentle waterfall into next lower pond. As the second pond fills up, it cascades into the bottom pond. A hidden pump in the third pond circulates the water back up to the first pond, where it repeats its journey.

Our rain garden adds a new dimension – gentle, relaxing sound – to our landscape. It also adds diversity. With free water from the roof, three man-made ponds, and some native plants that like to get their feet wet, we've created an entirely new habitat here (remember that the natural conditions around the Center are really dry!). The water-loving plants help to improve the water's quality. And our new habitat attracts even more types of birds, beneficial insects, and animals to our property.

To get the full effect, come back and check it out on a rainy day!

What You Can Do

-  Create your own rain garden. Take a fact sheet to learn how.
-  Contact the Penn State Cooperative Extension and the Pennsylvania Fish & Boat Commission for more information on aquatic habitat.





A flower bed that waters the ground



You won't have to fill up your watering can to care for this kind of flower bed, because it actually waters itself.

You see, it's really first and foremost a stormwater management practice called a bioinfiltration swale.

Like the hot-dog-shaped pond in Station #10, we created this bed by first

digging a trough in the ground (the "swale" part). This trough is both longer and deeper than the hot-dog-shaped pond because it is designed to hold a greater volume of stormwater – in this case, all the water that runs off the section of the GreenForge roof where the solar panels are.

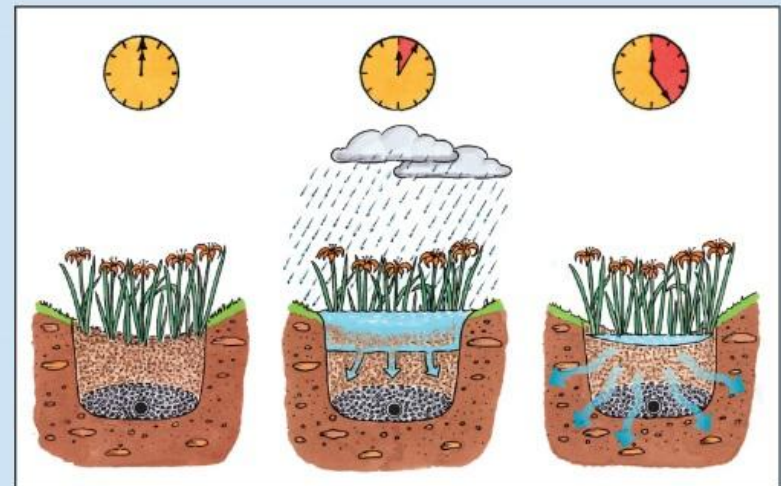
This swale also is different from the hot-dog one because we dug a channel down the middle of the trough lengthwise. The ground we removed to create this channel was a hard, silty clay soil that doesn't drain well (there's a lot of this kind of soil in our area). Then we added a pipe for overflow and filled the channel in with a special mixture of topsoil, sand, and compost that lets water soak into it easily.

With the hot-dog-shaped pond, we added only grass seed to the bottom of the trough and invited nature to do the rest. In this swale, we added a variety of native shrubs and flowers (the "bio" part) that are tolerant of both wet and dry conditions and mulched them in. So the look here is more 'manicured.'




But the biggest difference is in how well it works. This bioinfiltration swale allows water to infiltrate into the ground more effectively than

the hot-dog-shaped pond. And by now, you should have absolutely no doubt of why that's so important!

To get the full effect, come back and check it out on a rainy day!



What You Can Do

-  Check your soil to see what help it needs to do a good job of infiltrating.
-  Consider creating a flower bed that is really a bioinfiltration swale. Take a fact sheet to learn how.
-  Consider disconnecting your roof downspouts and directing them into a bioinfiltration swale.

Locate Utilities Before Digging a Rain Garden



Dig Deep Enough for Rainwater Storage



Fill in Permeable Layers and Landscape the Surface



Watch your Rain Garden Grow





Is there a way to park and not (really) pollute?

You bet. That's what we're showing with this parking lot. We built it with seven different kinds of pavers, all designed to let rain and melting snow sink into the ground (but to keep cars high and dry).

There are three kinds of concrete paving blocks (one looks like lattice, one like triangles and circles mixed together, and one like bricks). There are four kinds of plastic pavers – a flexible cellular web, a square grid, a hexagonal grid, and an arrangement of circles. All of the plastic pavers have the same function: to hold the stone surface in place so it can support the weight of vehicles, and to allow water to pass through. The concrete pavers work a little differently: they support the vehicles directly while allowing water to go down through their openings.

Hidden under the colorful geometric pavers are the workings of this parking lot. A foot-thick layer of clean crushed stone under the pavers acts like a reservoir to hold rainfall until it can soak into the original soil beneath the lot. (Our county's silty clay soils don't take in water very quickly.) And a geotextile, a heavy fabric blanket, keeps the crushed stone from sinking down into the soil.



In our infiltration parking lot, you'll never get caught in a dangerous flash flood. You'll never even get your ankles wet in a puddle. And nothing from here will pollute our streams and rivers. Because this lot gives rain water a chance to filter down into the ground. If a car leaks oil or antifreeze on this lot, it's still a problem. But it's not as bad for the environment or our health because those pollutants pass into the ground and are captured in the layers of soil instead of being washed into our streams and rivers.

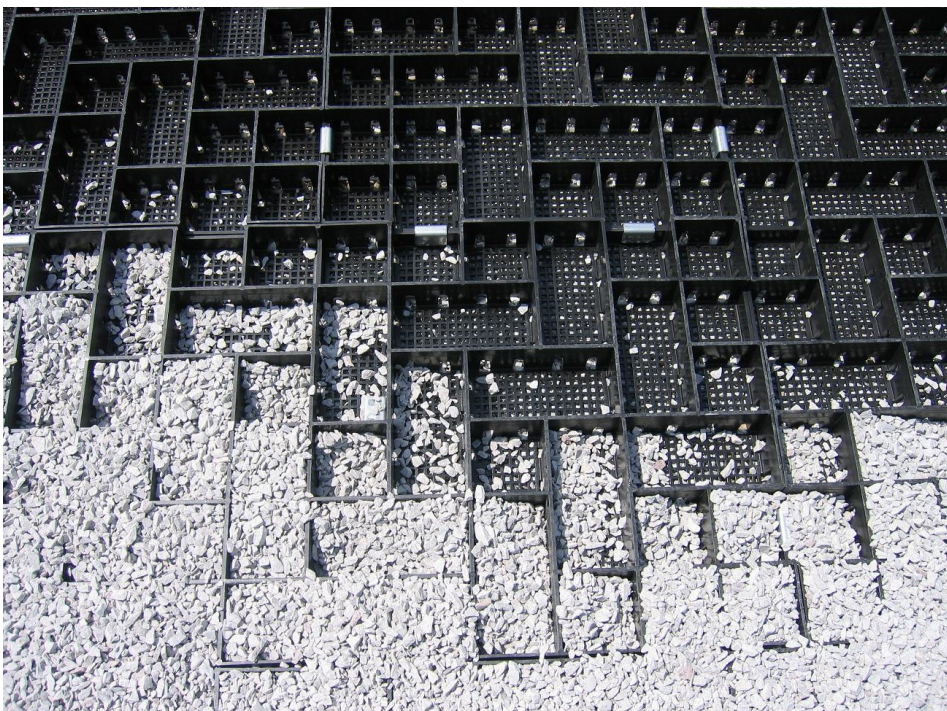
There are three infiltration parking lots on this property – one here, one behind the big red barn, and one at the main entrance to the Ann Rudd Saxman Nature Park.

To get the full effect, come back and check it out on a rainy day!



What You Can Do

-  Think: Infiltrate is great! Every chance you get, find a way to let water sink into the ground instead of going into the sewer system.
-  If you're building a driveway (or sidewalk or a backyard patio for that matter), consider using bricks or lattice blocks set loosley in sand, gravel, or chips. All of these materials give water a place to sink in. For more information on the pavers used in this parking lot, take a fact sheet.









Roof water also makes a roof garden

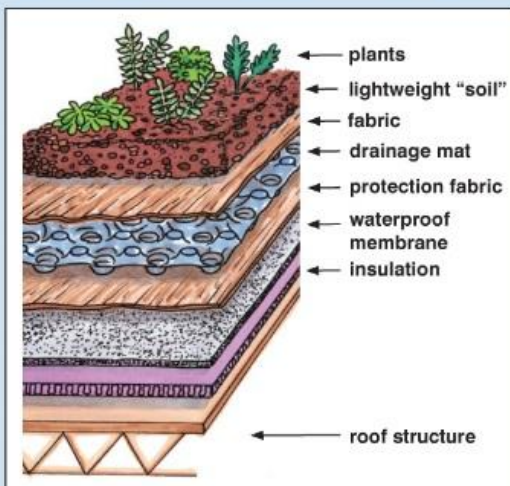


If you have a roof that's flat or sloped just a little, you can grow a garden right on top of it. You'll get lots of conservation benefits with almost no weeding at all!

The roof garden on this GreenForge building is the very first one in Westmoreland County. Our friends helped us make it in late 2006 by planting more than 6,000 living, green plants. (Before we started, contractors reinforced the roof...added a mat for drainage and fabric for protection...and topped it all with a soil-like material for the plants to grow in.)

The plants on the roof act just like sponges. They soak up rain water, use some of it to grow, and return the rest to the atmosphere (remember the "hydrologic cycle" on the sign at the beginning of the trail?).

What that means is that almost every single drop of rain that






falls on this green roof stays out of the storm sewer system. And, as you learned before, that's a good thing because it reduces pollution, lessens flooding, and saves taxpayers money.

A green roof does other great things for conservation, too. It acts just like a layer of insulation, so the building doesn't use as much energy for heating and cooling. The plants help improve the air quality by exchanging carbon dioxide for oxygen. And because there are no shingles or tar to reflect heat, a green roof helps keep everything around the building cooler in the summer.

Best of all, it looks really great, too. Be sure to come back in the late spring and fall when the plants are blooming. You'll see that our 'green' roof has become a wave of delicate flowers.

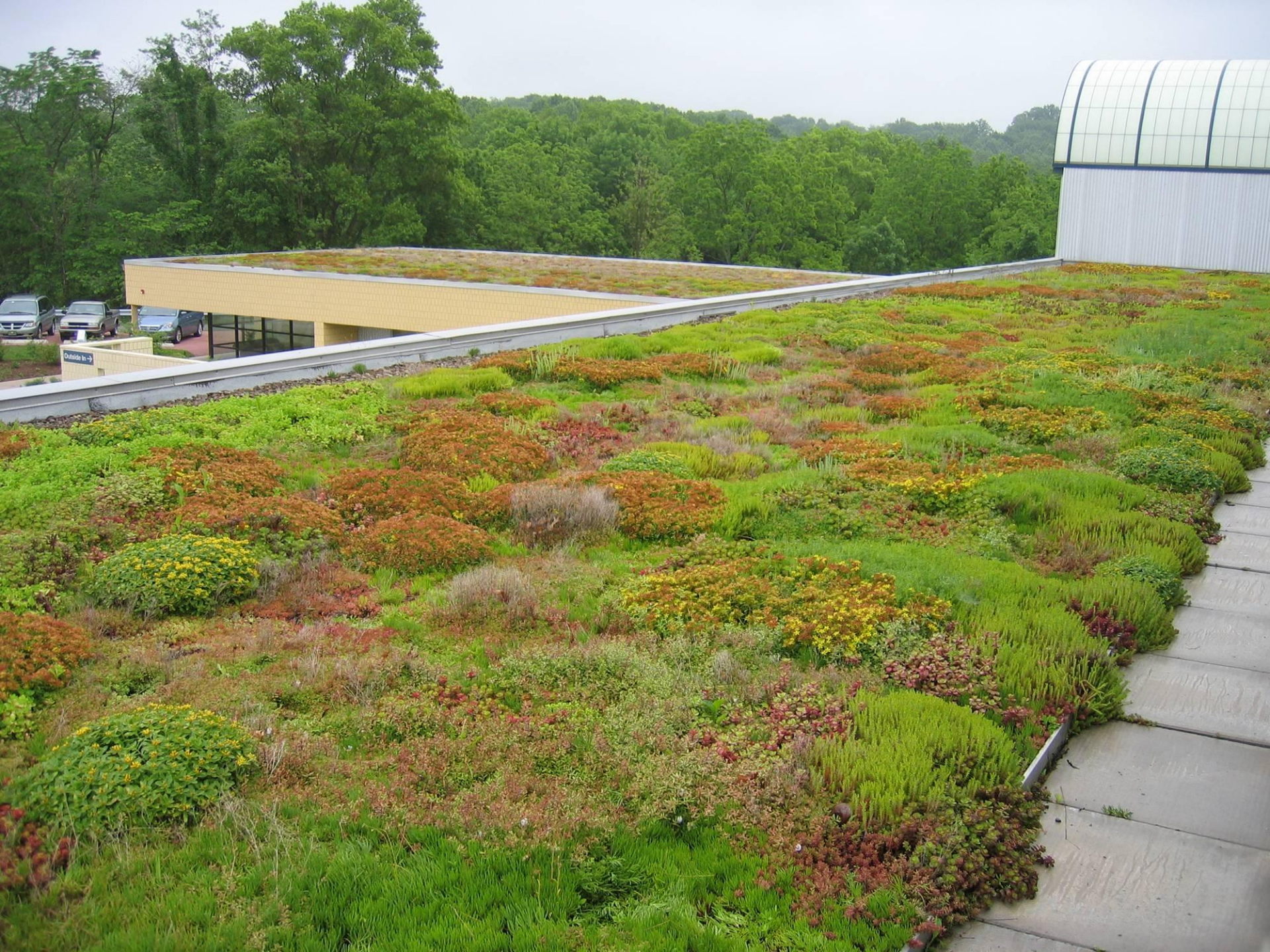
What You Can Do

-  When it's time to replace your roof, consider installing a green one! Even a carport, garage, porch, or small room addition can be more conservation-minded – and interesting – with a green roof. Take a fact sheet to learn more.
-  Tell everyone you know about all the cool things green roofs can do.
-  Bring them here to see and learn more about green roofs. For a closer look, go into the building and look out the window at the end of the lobby.

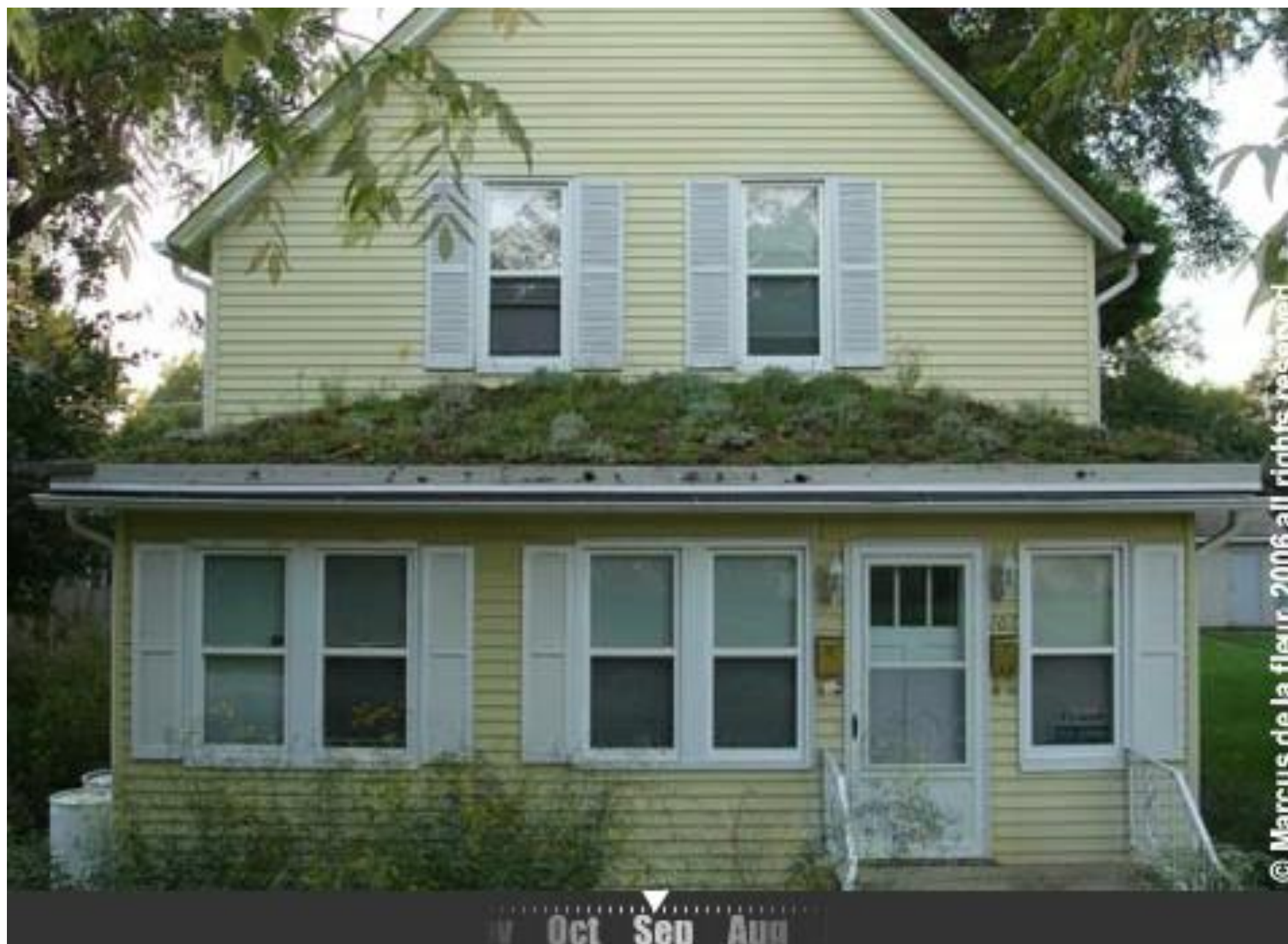
Green Roof Construction













Stormwater Trail

“Concrete” doesn’t always mean “Solid”

Jumbo shrimp. Vegetarian meatball. There are some words that just sound funny together. Like “porous” and “concrete.” But that’s just exactly what you see here.

This walkway and the nearby parking spaces are made with a special kind of concrete mix that is deliberately designed to have small ‘spaces’ in it. In fact, it looks a lot like those yummy treats where small crispy chunks of cereal are held together with marshmallow.

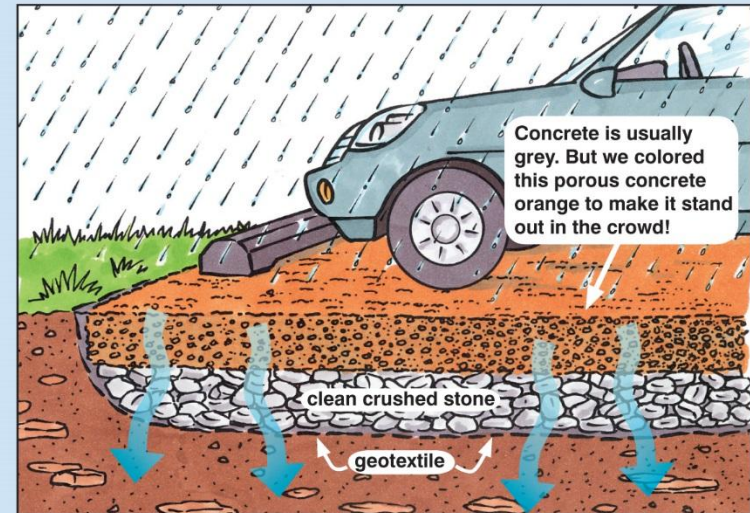


Just like in those treats, the spaces in this concrete aren’t very big. But there are enough of them so that when it rains, the sidewalk drains. Yup, water runs right through this concrete, into the layer of clean, crushed stone underneath it, and then into the ground.

You already know that to infiltrate is great – it recharges the groundwater that supplies wells and streams, keeps pollution out of our waterways, and saves taxpayers money because there’s less need to invest in storm sewer infrastructure.

But porous concrete has some other conservation benefits as well. Because it has ‘open pores,’ this kind of concrete doesn’t store as much heat as traditional, solid concrete does. So it helps to reduce the “heat island effect” often found around buildings.

And because water drains through porous concrete, there won’t be puddles, so there’s less likelihood that ice will build up on this sidewalk in the winter time. And that means we won’t need to use as much salt (a potential water pollutant) to keep the sidewalk clear



To get the full effect, come back and check it out on a rainy day!

What You Can Do



Consider using porous concrete for walkways, driveways, patios, paths, trails, or other places where you want a paved surface around your home or business. Even though it has ‘holes’ in it, porous concrete can be made strong enough to support the weight of a fire truck. Take a fact sheet to learn more.

Permeable Concrete Installation









