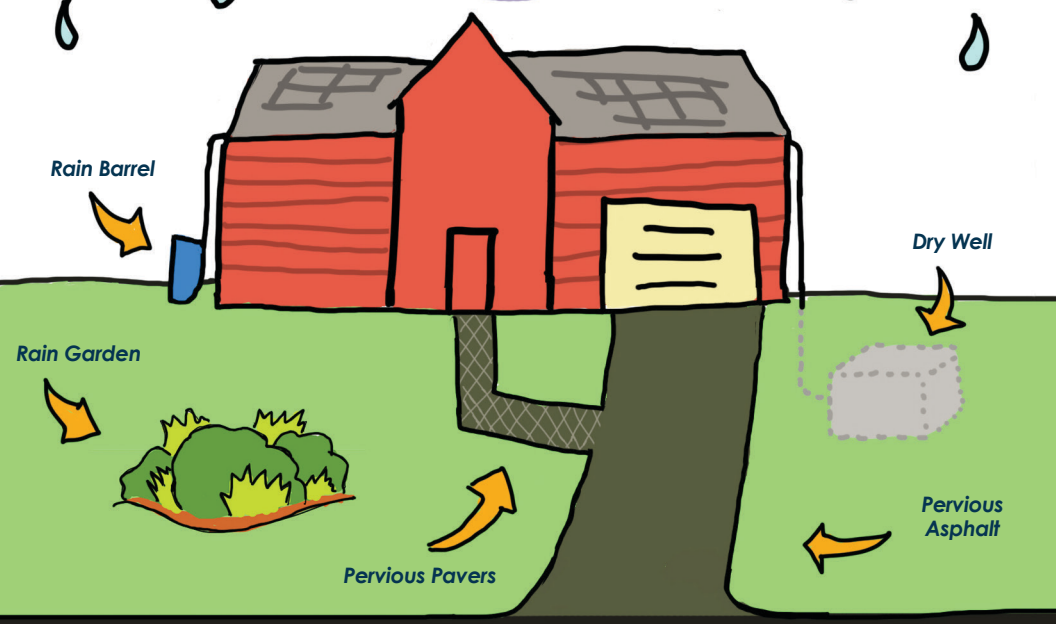
Homeowners Guide to Stormwater BMP Maintenance

What You Need to Know to Take Care of Your Property



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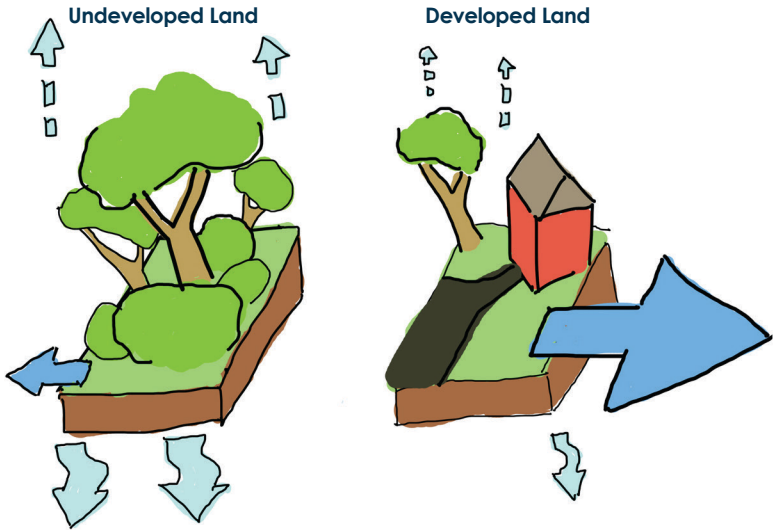
What is Stormwater?

Stormwater is the water that runs off the land after precipitation, either rain or snowmelt. Rain or snow can drain down into the soil (called infiltration), evaporate back into the atmosphere, be used by plants, or flow into streams or water bodies. The water that runs off the land to streams or lakes is referred to as stormwater runoff.

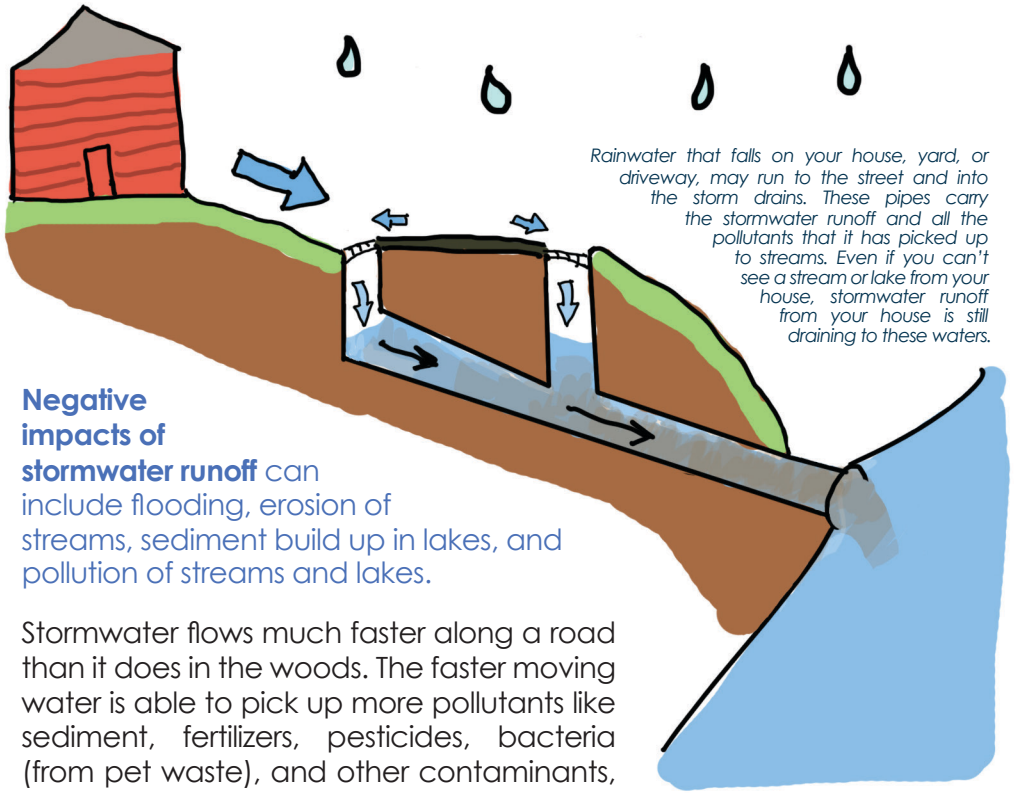
Stormwater runoff happens in natural, undeveloped areas, but typically only for larger storms. For most areas in Pennsylvania that are wooded or natural meadows, it takes about an inch or more of rain to produce runoff.

After development, the natural wooded or meadow areas are replaced with roofs, driveways, sidewalks, and streets. These hard surfaces are called impervious surfaces, and they do not allow water to drain through them, unlike how rain can drain into soil (which is called a pervious surface). When rain falls on impervious surfaces, it runs off rather than infiltrating into the soil or being taken up by vegetation.



When it rains on an undeveloped piece of property, much of the rainwater infiltrates into the soil or is evapotranspired back into the atmosphere. When vegetation is replaced with streets, driveways, sidewalks, houses, and lawns, less rainwater is able to infiltrate or return to the atmosphere, and more of the rain turns into runoff.

Why should you care about Stormwater Management?



Rainwater that falls on your house, yard, or driveway, may run to the street and into the storm drains. These pipes carry the stormwater runoff and all the pollutants that it has picked up to streams. Even if you can't see a stream or lake from your house, stormwater runoff from your house is still draining to these waters.

Negative impacts of stormwater runoff can include flooding, erosion of streams, sediment build up in lakes, and pollution of streams and lakes.

Stormwater flows much faster along a road than it does in the woods. The faster moving water is able to pick up more pollutants like sediment, fertilizers, pesticides, bacteria (from pet waste), and other contaminants, and carry the pollutants to streams and lakes.

An increase in the amount of water that runs off after development and how quickly it runs off can cause erosion and instability in streams. Stormwater runoff can cause streams to become wider, deeper, and straighter, losing their natural bends (or meanders) and decreasing habitat for fish and other animals that live in streams. Stormwater from developed areas can also be hotter than natural stream sources. Warmer water holds less dissolved oxygen so stormwater can be harmful to fish like trout that need more oxygen.

It's easy to notice the flooding impacts of large rain storms, but over time, smaller storms can have an impact on streams, too. Across the state, about 95% of the rainfall volume occurs in small events (less than 2.4 to 3.2 inches depending on your location.)

BMPs: what are they, & what do they do?

BMP stands for Best Management Practice, and includes designed "things" like detention basins, as well as non-engineered approaches like protecting open space to manage stormwater. SCMs are Stormwater Control Measures, which are engineered facilities that are designed and constructed to manage stormwater. For the most part, the terms BMP and SCM can be used interchangeably.

The goal of BMPs or SCMs is to reduce the impact of development on downstream streams and lakes by:

- **minimizing the amount of runoff,**
- **slowing down the runoff,**
- **infiltrating runoff,**
- **evapotranspiring runoff,** or
- **filtering runoff.**

Many BMPs or SCMs will use vegetation for their ability to use water, put water back into the atmosphere, or help it infiltrate into the ground, rather than allow it to become runoff.

If you've ever walked through a meadow or shaken a tree branch after a rain, you got wet with intercepted water. When it rains, some of the water is trapped on plants. This "intercepted" water never even makes it to the ground where it could be infiltrated. Plants also use water as part of the photosynthesis process where they use the sun's energy to create their own food. This water used by plants is called evapotranspiration. Larger plants with broader leaves and deeper roots like trees, shrubs, or decorative grasses will intercept and evapotranspire more water than a grass lawn.

All of the homes in your community drain to a stream or lake. All homeowners need to do their part to maintain stormwater BMPs in their own yard to protect streams and lakes for everyone.

Your whole community has been designed with stormwater management in mind. There are many different BMPs spread throughout the development. Stormwater flows downstream, and the homeowners must do their part on their own property to protect the streams for everyone. You and all of your neighbors each play an important role in the health of downstream waters.

Some BMPs/SCMs are landscaped and others are buried so you might not see anything at the surface. Even though it might just look like some plants or gravel, the BMP is still performing a very important function. Disturbing the vegetation or compacting the soil can ruin that BMP and have a negative impact downstream.

Native vegetation is the best choice for BMPs because they're naturally adapted to the soils and climate. They require less fertilizer, pesticides, watering, and overall less maintenance.

Stormwater Regulations

When a property is developed, the developer must incorporate stormwater management facilities. He/she must design **Erosion and Sediment Control (E&S) BMPs** that are used during construction to prevent soil from running off the site and polluting downstream waters. When the construction period is over, **Post-Construction Stormwater Management (PCSM) BMPs** will have been constructed, and the developer must provide a way for these BMPs to be properly maintained over time.

When the developer finished the project, they will have turned over the maintenance responsibilities for the BMPs to someone else, which could be the property owner, a nonprofit organization, the local municipality, an authority, a private corporation, or another person. The developer will also have produced a plan that must include drawings, which show the location and dimensions of each PCSM BMP. Accompanying this PCSM Plan will be a long-term operation and maintenance schedule, which provides for inspection of PCSM BMPs, including the repair, replacement, or other routine maintenance of the PCSM BMPs to ensure proper function and operation. This maintenance program must describe how access to the PCSM BMPs will be achieved.

The developer will be following the rules of **PA Code, Title 25, Chapter 102**, which defines rules for both Erosion and Sediment Control, and Post Construction Stormwater Management. These regulations can be found by going to PA Code online at www.pacode.com and then browsing to Title 25, Chapter 102.

What's the Homeowner's Legal Responsibility?

If your home was constructed after 2010, and your property contains any Post Construction Stormwater Management (PCSM) BMPs, the developer will have recorded details about them with your property's deed. State regulation requires that the information recorded with the deed identifies the PCSM BMP, provides for access to the BMPs for maintenance and inspection purposes, and provides notice that the responsibility for long-term operation and maintenance of the PCSM BMP is a legal requirement that runs with the property. You can view your property records at the Recorder of Deeds office at your county courthouse to determine if you are responsible for the maintenance of any BMPs.

If you are the person designated as the responsible-party for operation and maintenance, you must ensure that the BMPs continue to function properly and follow the maintenance schedule provided by the developer and recorded with your deed. The responsibility to maintain the BMPs includes the cost of plants or material for upkeep or replacement. You should have been provided a maintenance plan by the developer if you're the first owner of the home. If your home was constructed after 2010, you may need to check the property records for information if you're not the first owner and didn't receive the maintenance plan at the time of purchase.

If you're not doing the necessary maintenance and required documentation, you may be billed by your municipality for the cost of having someone else do the work, or you could face a summary offense and daily fine until the maintenance work is complete.

If responsibility has been transferred to someone else, you need to provide access for maintenance and inspection. You also must leave any BMPs in place. For example, you can't remove the vegetation of a rain garden, level it, and plant lawn grass.

Downspout Disconnection

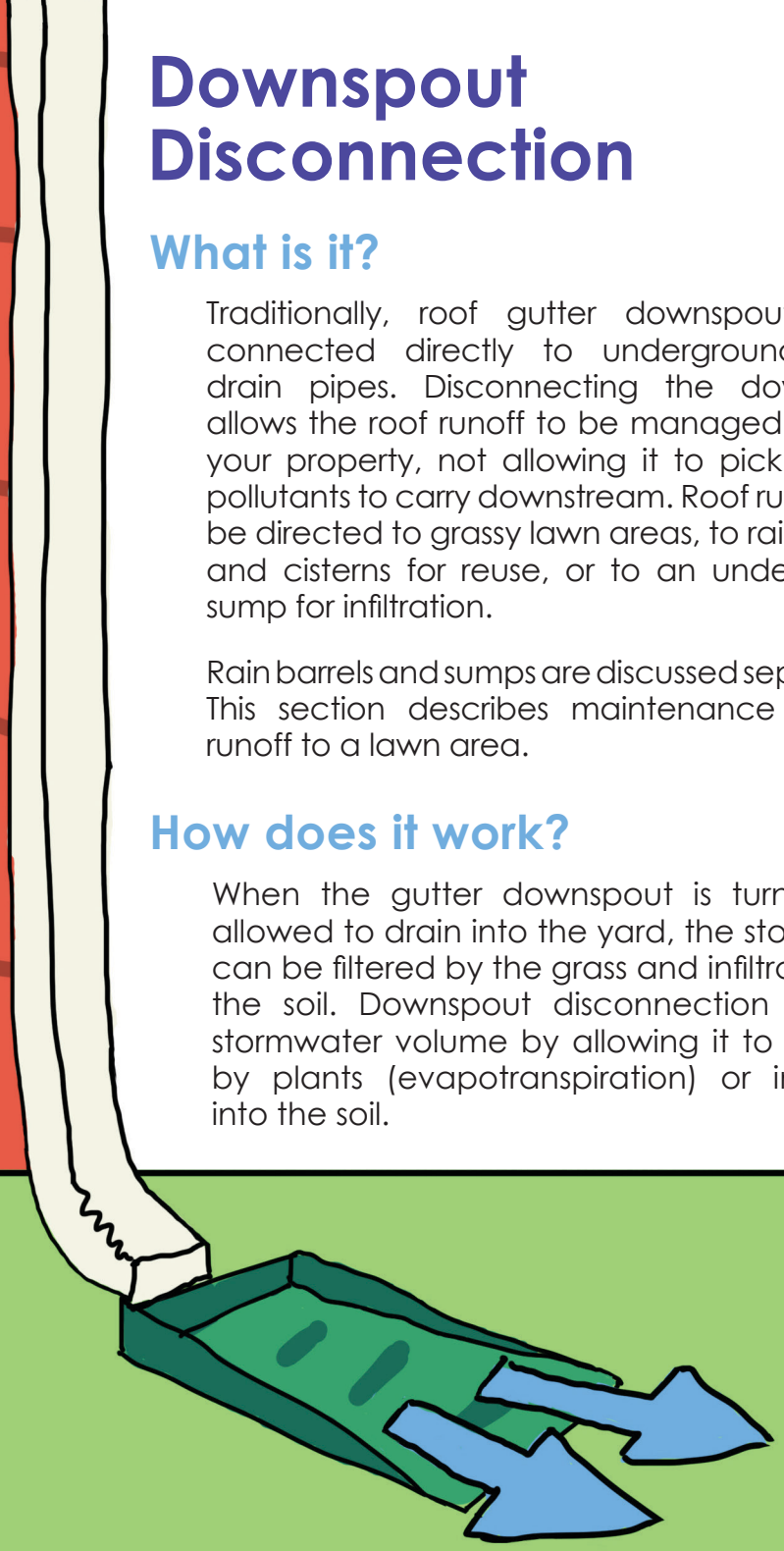
What is it?

Traditionally, roof gutter downspouts were connected directly to underground storm drain pipes. Disconnecting the downspout allows the roof runoff to be managed right on your property, not allowing it to pick up any pollutants to carry downstream. Roof runoff can be directed to grassy lawn areas, to rain barrels and cisterns for reuse, or to an underground sump for infiltration.

Rain barrels and sumps are discussed separately. This section describes maintenance of roof runoff to a lawn area.

How does it work?

When the gutter downspout is turned and allowed to drain into the yard, the stormwater can be filtered by the grass and infiltrated into the soil. Downspout disconnection reduces stormwater volume by allowing it to be used by plants (evapotranspiration) or infiltrated into the soil.



How does a Homeowner maintain it?

Regularly:

- Maintenance for a downspout draining to a lawn area is generally part of the typical yard maintenance.
- Mow the lawn in this area at the same time interval that the rest of the yard is mowed.
- Check for bare spots and reseed if needed.

Additional Information:

- A splash guard or small pile of rocks may be needed at the location where the water leaves the drain to slow the water down and prevent erosion.
- The downspout could be directed to a rain garden rather than the lawn, in which case the Rain Garden maintenance (page 9) should be followed.

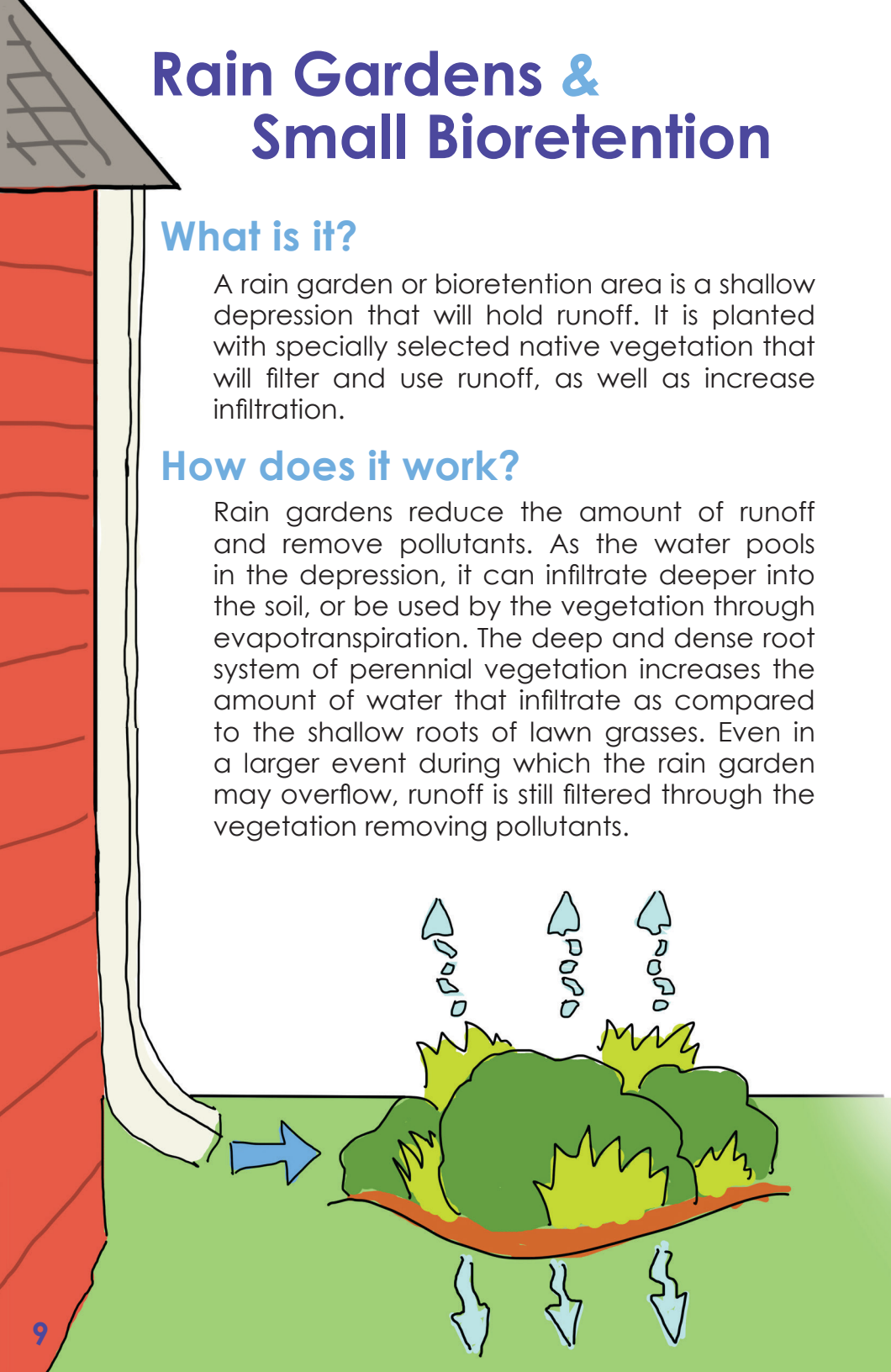
Rain Gardens & Small Bioretention

What is it?

A rain garden or bioretention area is a shallow depression that will hold runoff. It is planted with specially selected native vegetation that will filter and use runoff, as well as increase infiltration.

How does it work?

Rain gardens reduce the amount of runoff and remove pollutants. As the water pools in the depression, it can infiltrate deeper into the soil, or be used by the vegetation through evapotranspiration. The deep and dense root system of perennial vegetation increases the amount of water that infiltrate as compared to the shallow roots of lawn grasses. Even in a larger event during which the rain garden may overflow, runoff is still filtered through the vegetation removing pollutants.



How does a Homeowner maintain it?

Twice a year:

- Vegetation needs to be checked to make sure that it's healthy. Any bare spots need to be replanted.
- Check the inflow area to make sure that there isn't any sediment building up. Remove any accumulated sediment.
- Mulch should be re-spread when erosion is evident and be replenished as needed.

Annually:

- Perennial plants should be cut back if needed by species type and any dead vegetation should be removed at the end of the growing season.

Every Three Years:

- Apply mulch in the spring as needed to cover soil. Mulch should be 1-3 inches deep. Do not use mulch to "fill-in" the depression of the rain garden. That depression area is needed for stormwater management.

Additional Information:

- While vegetation is being established in the first few years, weeding may be required.
- If any plants die, they need to be replaced. Refer to the Post-Construction Stormwater Management Plan for what types of plants to use.
- During periods of extended drought, bioretention areas may require watering.
- Rain gardens should be checked after large rain storms to make sure that they are draining within 72 hours. If water remains in the rain garden longer than 72 hours, you could have mosquito problems, and should contact your county conservation district for guidance on fixing or replacing your rain garden.

Rain Barrels & Cisterns

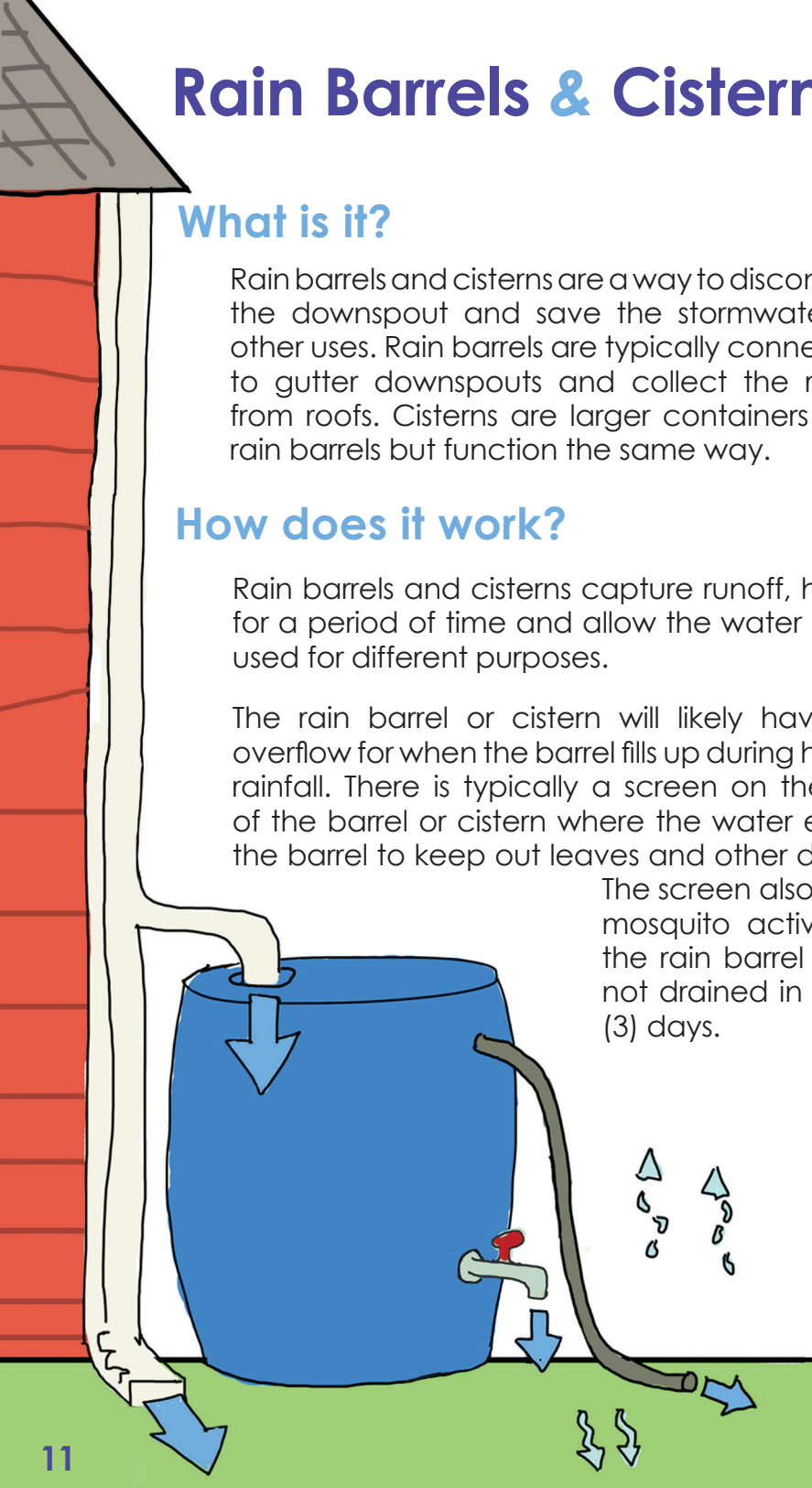
What is it?

Rain barrels and cisterns are a way to disconnect the downspout and save the stormwater for other uses. Rain barrels are typically connected to gutter downspouts and collect the runoff from roofs. Cisterns are larger containers than rain barrels but function the same way.

How does it work?

Rain barrels and cisterns capture runoff, hold it for a period of time and allow the water to be used for different purposes.

The rain barrel or cistern will likely have an overflow for when the barrel fills up during heavy rainfall. There is typically a screen on the top of the barrel or cistern where the water enters the barrel to keep out leaves and other debris. The screen also limits mosquito activity in the rain barrel if it is not drained in three (3) days.



How does a Homeowner maintain it?

After Rain Events:

- Clean the screen by removing any leaves that could block the flow of water into the barrel/cistern.
- Use the water in the barrel/cistern so that it's empty and ready to collect runoff from the next rain.

Annually:

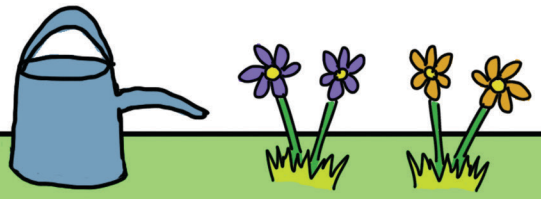
- Clean gutters to remove leaf debris that could clog the barrel/cistern.

❄ Special Winter Needs:

- In the fall, empty the rain barrel/cistern before the water could freeze.
- Rinse out the barrel/cistern to remove any accumulated sediment.
- Do not reconnect the barrel/cistern until spring. During the winter months, connect a piece of flexible gutter to the end of the downspout and direct the outlet to a grassy area of the yard.

Additional Information:

- **Rain barrels and cisterns are great (and economical!) water sources for watering plants.** The spigot can fill a watering can or be connected to a standard garden or irrigation hose.
- **Safety note!** The water in a rain barrel or cistern is **not safe for consumption** without prior treatment.



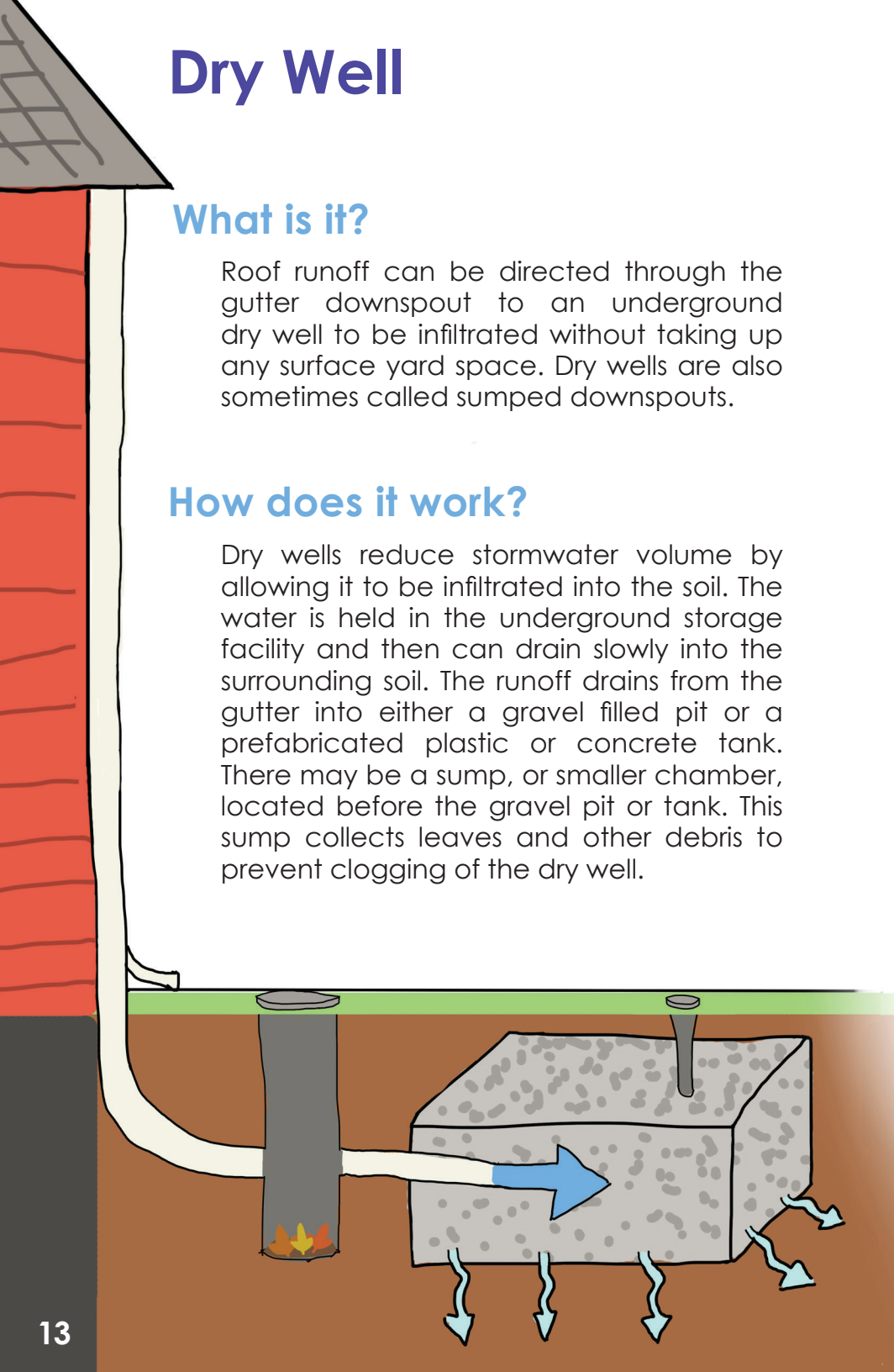
Dry Well

What is it?

Roof runoff can be directed through the gutter downspout to an underground dry well to be infiltrated without taking up any surface yard space. Dry wells are also sometimes called sumped downspouts.

How does it work?

Dry wells reduce stormwater volume by allowing it to be infiltrated into the soil. The water is held in the underground storage facility and then can drain slowly into the surrounding soil. The runoff drains from the gutter into either a gravel filled pit or a prefabricated plastic or concrete tank. There may be a sump, or smaller chamber, located before the gravel pit or tank. This sump collects leaves and other debris to prevent clogging of the dry well.



How does a Homeowner maintain it?

After storms with larger than 1 inch of rain:

- There is typically a screen where the downspout enters the dry well. Clean the screen by removing any leaves that could block the flow of water into the dry well.
- Inspect the sump for accumulation of sediment, trash, or any other material. Remove any material that is in the sump to prevent it from clogging the dry well.

Quarterly:

- There should be an above ground cap that allows access to the dry well. Four times a year, view down the access pipe to make sure that the dry well is not accumulating sediment, trash, or other material. Over time the accumulation of sediment or trash may be vacuumed or may require excavation. Contact your county conservation district for guidance on cleaning out your dry well.

Annually:

- Clean gutters to keep leave debris out of the sump and dry well.

Additional Information:

- After large rain events, check the access pipe to ensure that the dry well is draining within 72 hours. If the drain times are more than 72 hours, the dry well may need to be cleaned out or replaced. Contact your county conservation district for guidance on fixing or replacing your dry well.

Infiltration Trench

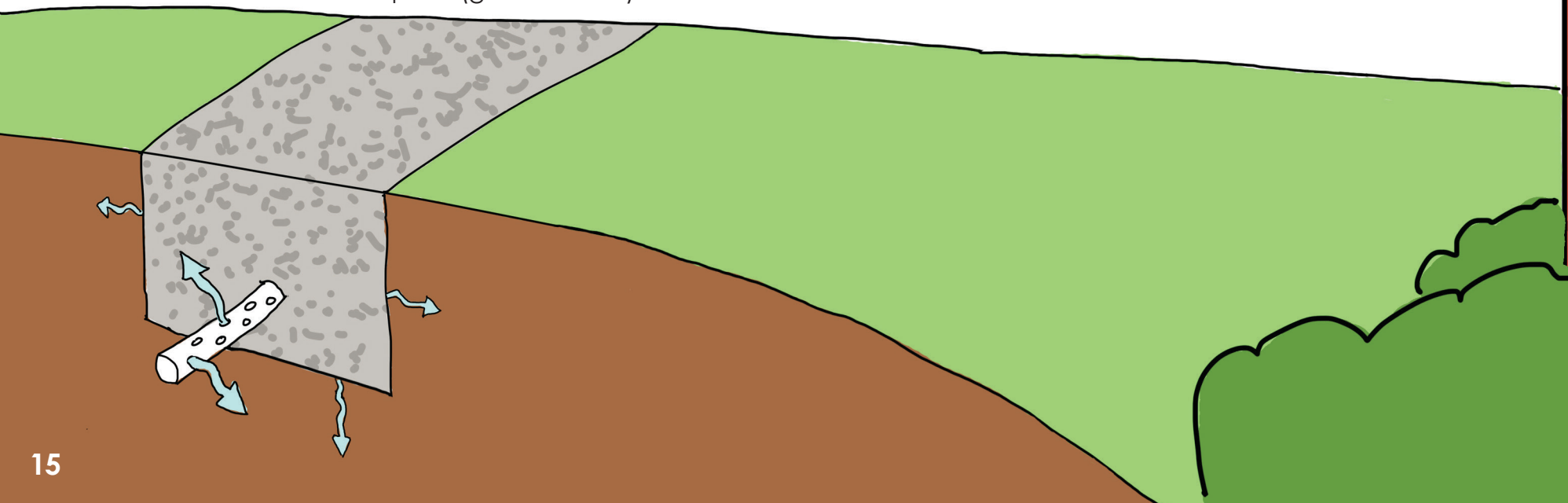
What is it?

Infiltration trenches are essentially leaky pipes in a stone-filled trench. Surface runoff or gutter downspouts can be directed to infiltration trenches.

How does it work?

An infiltration trench contains a perforated pipe in a stone trench. It can be thought of as the opposite of a French drain. In a French drain, water flows from the soil into a perforated pipe and away from the wet spot. For an infiltration trench, stormwater runoff is directed into a perforated pipe that is surrounded by gravel. The water then drains out of the perforated pipe into the trench.

During small rain events with a small amount of runoff, stormwater flows out of the pipe through the perforations into the gravel and then into the soil. During larger storms that produce more runoff, some stormwater will be stored in the stone trench, but water will also flow through the pipe to a larger BMP or SCM. Runoff that moves into the soil can help recharge aquifers (ground water) and wells.



How does a Homeowner maintain it?

Protection:

- You should be careful to not regularly drive over an infiltration trench so as to not cause compaction or crush the perforated pipe.

Annually:

- If the trench has an access pipe, it should be checked annually to make sure that the trench isn't clogged.

Additional Information:

- Ponding of water on the surface over the trench indicates that there is a problem with the trench and you should contact your county conservation district for guidance on fixing or replacing the infiltration trench.

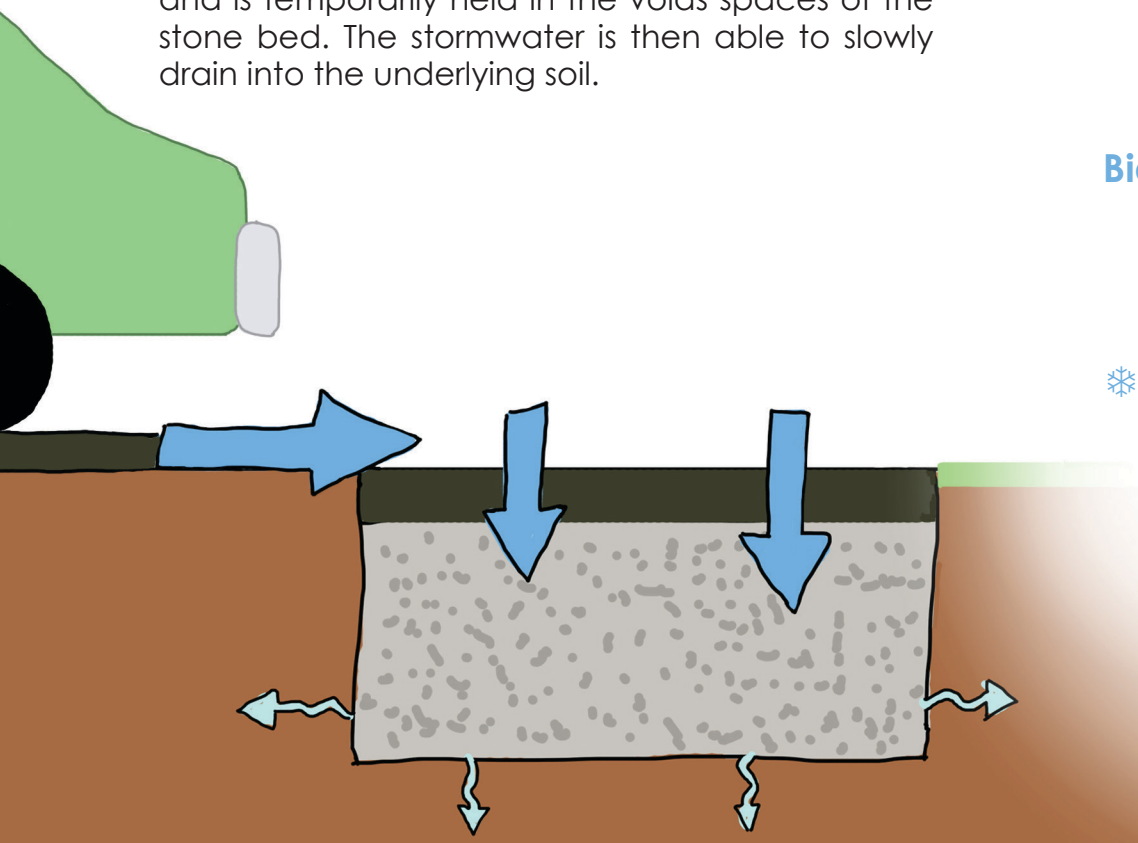
Pervious Pavements

What is it?

Pervious pavements are a modification to typical pavement that allow water to drain through the surface rather than run off it. Pervious pavements include porous asphalt or porous concrete which are poured over a gravel bed, or porous pavers on uncompacted soil.

How does it work?

Stormwater drains through the pervious surface and is temporarily held in the voids spaces of the stone bed. The stormwater is then able to slowly drain into the underlying soil.



How does a Homeowner maintain it?

Protection:

- The key to maintaining pervious pavements is to prevent the surface from getting clogged.
- Planted areas near the pervious pavement should be well maintained to prevent soil from washing into the pavement. If you see a bare spot or eroded area, it should be replanted to prevent soil wash off.
- If soil does wash onto the pavement, it should be immediately cleaned off before it gets ground into the surface.
- It is very important to never apply a sealing coat. A sealing coat over a pervious asphalt driveway or walkway will clog all the openings and prevent water from draining through it.

Biannually:

- The surface needs to be vacuumed twice a year with a commercial cleaning unit to remove fine particles from the surface.

❄ Special Winter Needs:

- Sand or cinders should not be used with pervious pavement because the small particles will clog the surface.
- Snow shoveling and plowing is fine, but be careful not to scrape the surface.
- Salt can be used on pervious pavements, but nontoxic, organic deicers or magnesium chloride-based products are better than sodium chloride.

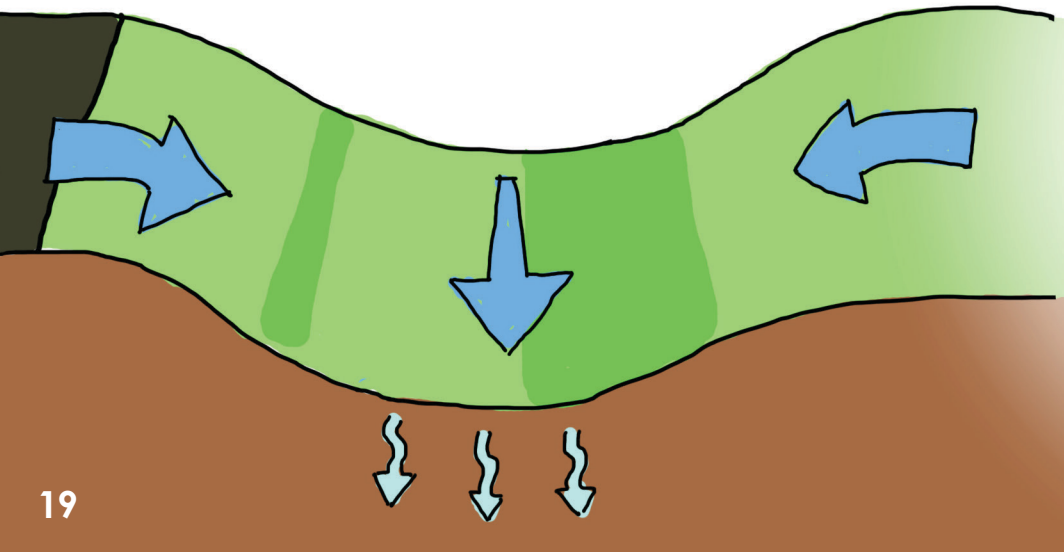
Vegetated Swale

What is it?

A vegetated swale is a wide, shallow channel, planted with grass or shrubs. A swale conveys runoff like a ditch, but a swale is much shallower and wider than a typical drainage ditch. If the swale is located on a steeper slope, rocks may be used to prevent erosion.

How does it work?

The wide, shallow design of swales allows runoff to flow more slowly than it would in a narrow, deep ditch or in a pipe. Vegetated swales slow runoff, promote infiltration, and filter pollutants and sediment in the process of conveying runoff. They can be used instead of conventional curb and gutter.



How does a Homeowner maintain it?

Regularly:

- If the vegetation in the swale is turf grass, mow the swale when mowing the rest of the yard. Mow only when swale is dry to avoid rutting.
- After rain events look for erosion, damage to vegetation, or sediment accumulation. Reseed bare areas and remove sediment.

Twice a Year:

- If the vegetation in the swale is larger perennial shrubs and bushes, check to make sure that it's healthy. Any bare spots need to be replanted.
- Look for any sediment build-up. Remove any accumulated sediment.

Annually:

- Perennial plants should be cut back if needed by species type, and any dead vegetation should be removed at the end of the growing season.

Additional Information:

- While vegetation is being established in the first few years, weeding may be required.
- Watering may be necessary during dry periods.

❄ Special Winter Needs:

- After the spring melt, remove any accumulated antiskid material like sand. Replace any damaged vegetation.
- If driveway or sidewalk runoff is directed to the swale, use nontoxic, organic deicing agents or magnesium chloride-based liquid products (rather than sodium chloride-based salts).

Amended Soils

What is it?

Much of the management of stormwater relies on soil that can infiltrate runoff. Disturbed soils that have been compacted through construction activities or soils with poor organic content can be restored and amended through loosening the soil and adding material like compost.

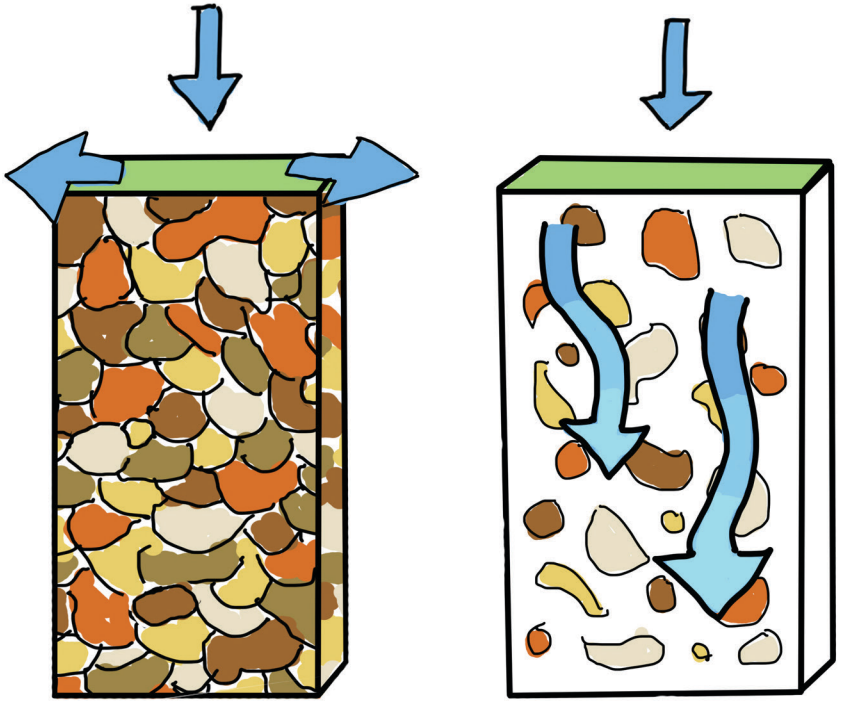
How does it work?

Little spaces between soil particles called pores or voids allow water to both be stored in the soil and move through the soil as infiltration. When the soil is compacted through the process of development, the pores or void spaces are reduced. Compaction of soil prevents water from infiltrating. Loosening the soil or tilling can reduce compaction and increase the soils ability to infiltrate runoff. Adding organic material like compost, sand, or manufactured soil media to the soil increases the pore spaces in the soil, which increases its ability to hold water.

How does a Homeowner maintain it?

Protection:

- The key to maintaining amended soils is to protect and preserve them.
- Compaction of the soil should be avoided. Don't use as an extra parking area or storage for a recreational vehicle.
- Amended soils that are a BMP can't be removed. For example, the area cannot to be converted to a patio or other use that would prevent stormwater infiltration.



There needs to be air spaces in between soil particles for water to be infiltrated. Amended soils have increased air space, but these air spaces are lost if the soil is compacted by heavy equipment or vehicle parking.

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Southwest Regional Office
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24 Hour Emergency Number: (412) 442-4000

Additional Resources

- **Landscaping with Native Plants.**
  www.dcnr.state.pa.us/forestry/plants/nativeplants/
- **PA Stormwater Best Practices Manual (2006).**
  www.elibrary.dep.state.pa.us/dsweb/View/Collection-8305