

STORMWATER MANAGEMENT 101

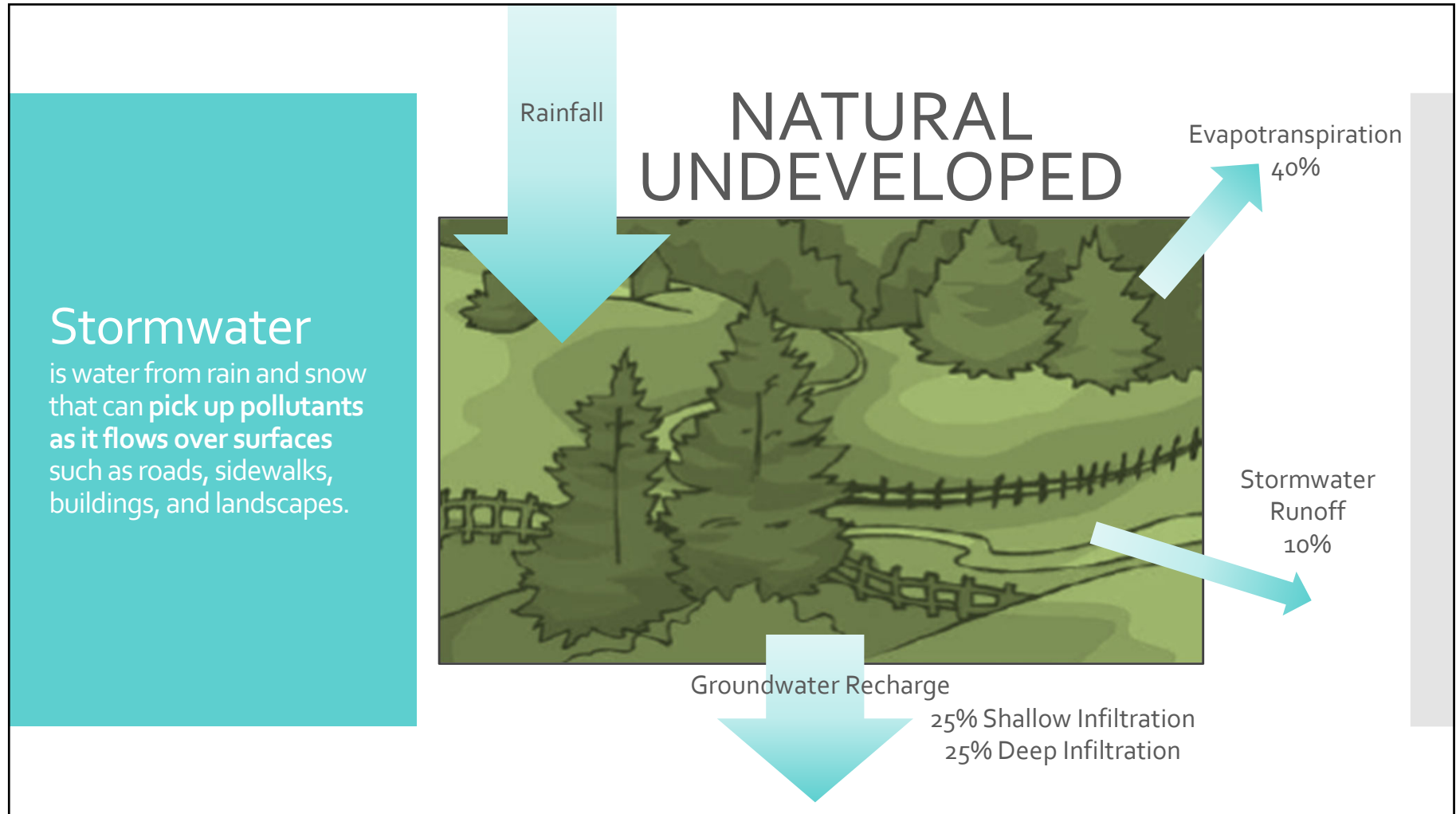


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Regional Planning
Commission

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Stormwater Management

is the control of runoff to ensure that precipitation is **absorbed or retained on site** rather than allowing it to flow into off-site drainage systems.

COSTS

of ineffective stormwater management

- Flooding
- Erosion
- Pollution

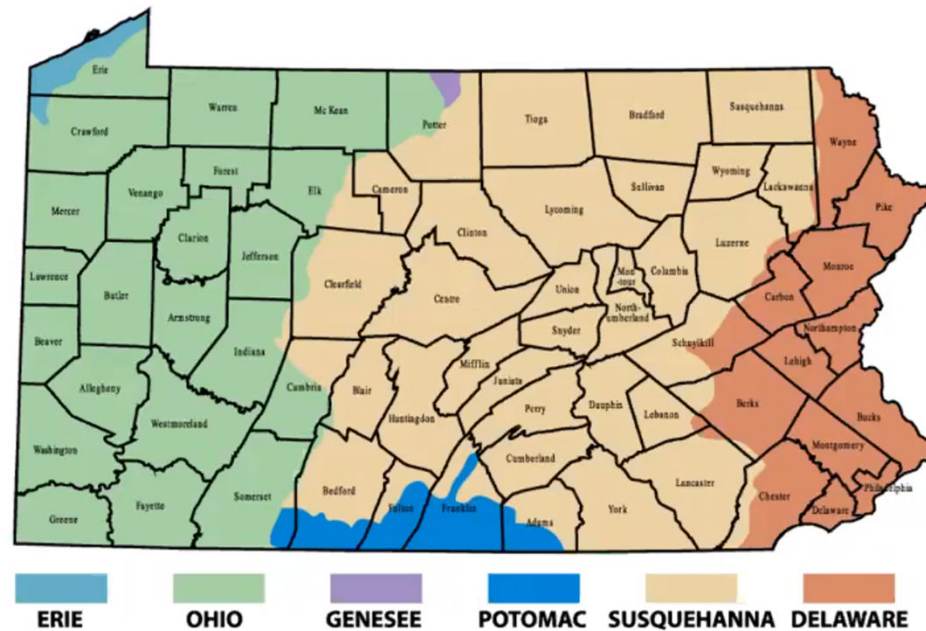
BENEFITS

of effective stormwater management

- Minimizes flooding
- Reduces erosion
- Prevents pollution
- Improves aesthetics
- Recharges groundwater
- Protects natural habitats
- Preserves green spaces

Watershed

is the land area that contributes runoff to a particular point along a waterway.



Best Management Practices

BMPs include both **engineered** controls and **preventative** measures, which can be **physical** devices or **behavioral** changes. Together, these are known as Stormwater Control Measures (SCMs).

- Amended Soils
- Downspout Disconnection
- Rain Collection
- Infiltration Trenches
- Dry Wells
- Green Roofs
- Pervious Pavements
- Planting Native Trees
- Vegetated Swales
- Rain Gardens
- Behavior-Based

GOAL

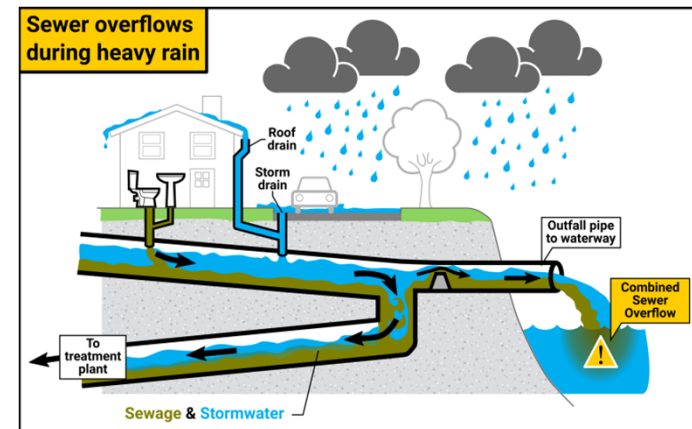
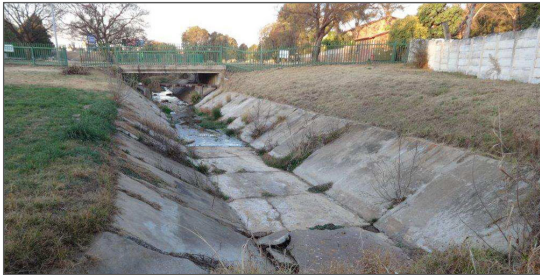
to **reduce** the impact of development on downstream bodies of water by **controlling** runoff...

VOLUME

RATE

&

QUALITY



Act 167: PA Stormwater Management Act

1978

STORM WATER MANAGEMENT ACT
Act of Oct. 4, 1978, P.S. 664, No. 167 CS. 32
AN ACT

Providing for the regulation of land and water use for flood control and storm water management purposes, assigning duties and conferring powers on the Department of Environmental Protection, municipalities and counties, providing for enforcement, and having appropriations.

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The General Assembly of the Commonwealth of Pennsylvania hereby enacts as follows:

Section 1. Short title.
This act shall be known and may be cited as the "Storm Water Management Act."

Section 2. Statement of legislative findings.
The General Assembly finds that:

(1) The comprehensive management of accelerated runoff of storm water resulting from development throughout a watershed increases flood flows and velocities, contributes to erosion and sedimentation, overtaxes the carrying capacity of streams and storm sewers, greatly increases the cost of public facilities to carry and control storm water, subjects flood plain management and flood control efforts to downstream communities, reduces ground-water recharge, and threatens public health and safety.

(2) A comprehensive program of storm water management, including predevelopment regulation of development and activities causing accelerated runoff, is fundamental to the public health, safety and welfare and the protection of the people of the Commonwealth, their resources and the environment.



2010 Venango County adopts stormwater management plan

Municipalities were
required to adopt
stormwater
management
ordinances that
supported the goals
set forth in the plan.

2011

STORMWATER MANAGEMENT MODEL ORDINANCE

Implementing the Requirements of the
Venango County Stormwater Management Plan

ORDINANCE NO. _____ OF _____

_____ VENANGO COUNTY, PENNSYLVANIA

Adopted at a Public Meeting Held on _____ 2010

24/31 municipalities in
agreement with Venango
County to administer

Small Project SWM Plan Worksheet

Based upon the information you have provided a Stormwater Plan is required for this development activity. The Stormwater Management Ordinance, as amended through Venango County's Act 167 County-Use Stormwater Management Plan, requires compliance with the following:

Development activities that will result in a new building or structure will require a Stormwater Management Plan.

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Credit 1: TREE PLANTING

These provide many stormwater benefits such as intercepting rainfall, increasing evapotranspiration and increasing time of concentration. The total volume of stormwater to be managed can be further reduced by planting new trees. Provided the criteria below are met, the total tree credit is:

• Trees must be native.

• Trees must be at least 10 years old.

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Section 3

Credits

Credit 1: DISCONNECTION

When a lot is disconnected from the sewer system, the lot owner must provide a stormwater management plan that meets the following criteria:

• Flow path of the lot must be documented.

• Lot of discharge is documented.

• Roofing area is documented.

• Paved area is documented.

• Flow path of paved area is documented.

• A great dip or off is documented.

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Small Project Application for Stormwater Management

If the total impervious surface area is 1,000 sq. ft. or less, complete Section 1, 2, 3 and sign below.
If the total impervious surface area is BETWEEN 1,000 sq. ft. and 4,999 sq. ft., complete Section 1, 2, 3 and sign below.
If the total impervious surface area is BETWEEN 5,000 sq. ft. and 9,999 sq. ft., complete Section 1, 2, 3 and sign below.
If the total impervious surface area EXCEEDS 10,000 sq. ft., please contact your stormwater reviewing agency.

Section 1

Project Name: _____

Project Address: _____

Project Phone: _____

Project E-mail: _____

Project Fax: _____

Project Website: _____

Project Other: _____

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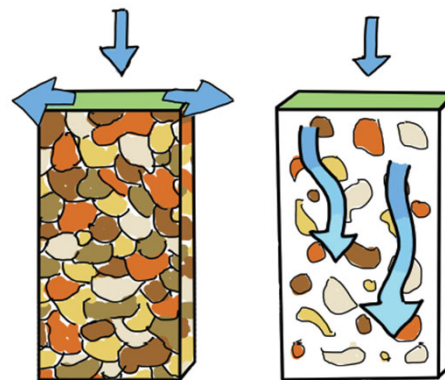
Project Other: _____

Project Other: _____

Project Other: _____

Amended Soils

can help runoff to infiltrate more effectively by **restoring** site conditions through loosening the soil and adding material.



Organic Soil Amendments



Compost



Shredded tree bark



Sphagnum peat moss



Manure (cow/sheep/horse/rabbit)



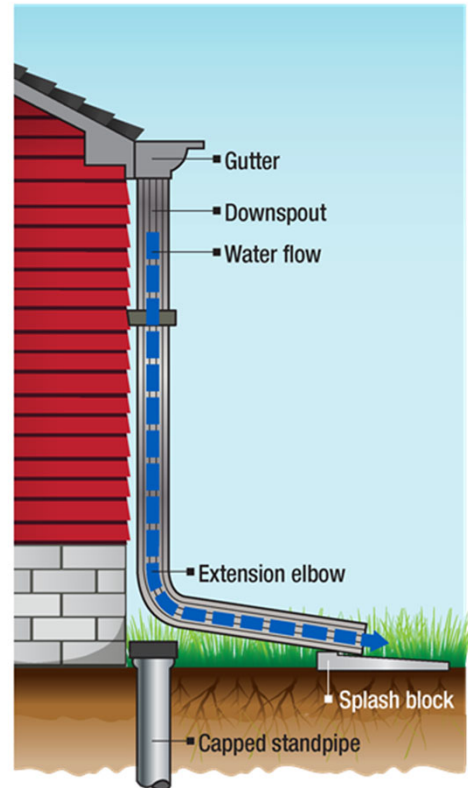
Leaf mold



Wood ash

Downspout Disconnection

allows the roof runoff to be managed **on site** rather than flowing through the local sewer system.



Downspout disconnected from the sewer system



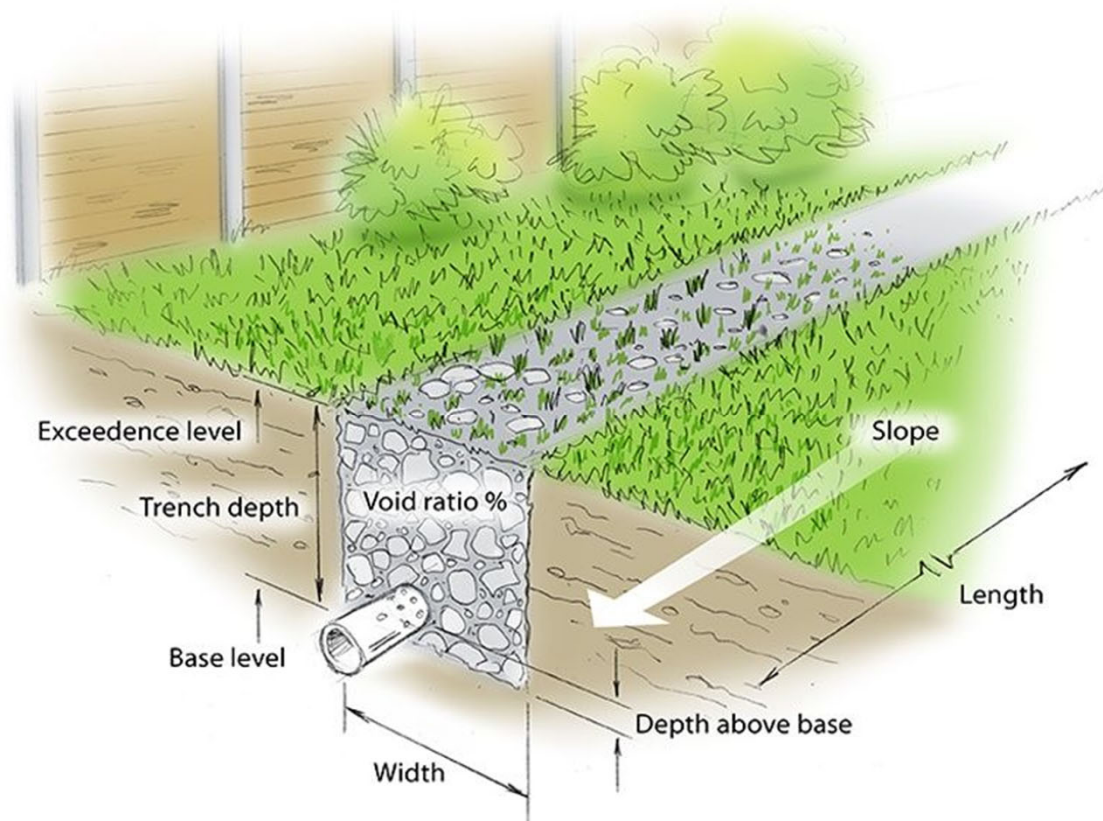
Rain Collection

using barrels or cisterns to **hold runoff** for a period of time and allow the water to be used for **other purposes**.



Infiltration Trenches

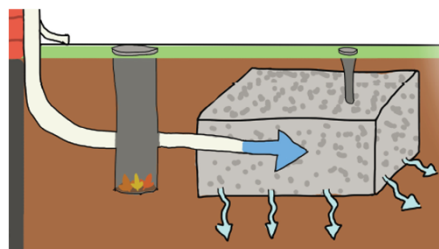
collect stormwater into **perforated pipes** which infiltrate **gradually** into a bed of gravel.



More info: <https://www.mapc.org/resource-library/trenches-drywells/>

Dry Wells

reduce stormwater volume by collecting it in an **underground** storage facility and allowing it to be **slowly infiltrated** into the surrounding soil.



Green Infrastructure

reduces and treats stormwater **before** it discharges pollutants to surface waters.



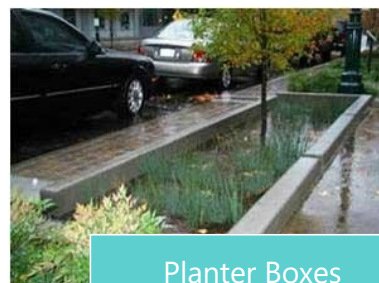
Green Roofs



Bioretention Areas



Permeable Pavement



Planter Boxes

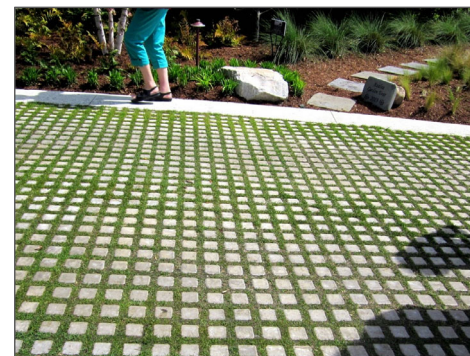
Green Roofs

are covered with trees, plants, and groundcover — they **reduce the water that flows off roofs** after a storm.



Pervious Pavements

are a modification of typical pavement that allow water to drain through it rather than running over it, which helps to **treat** and **store** stormwater where rain or snow falls.

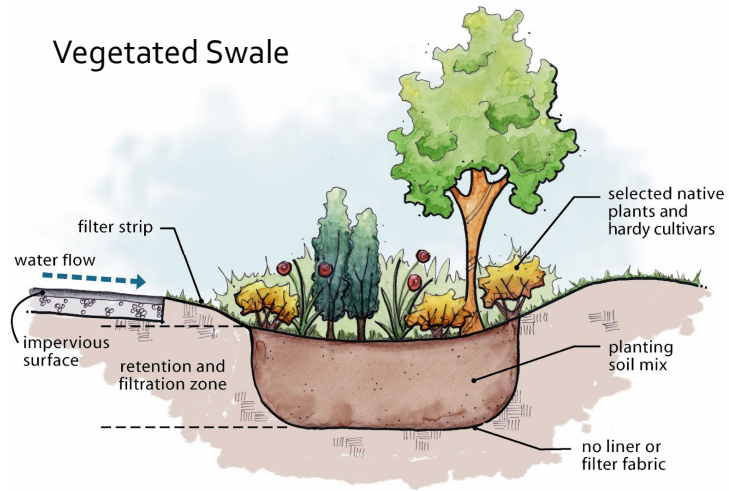


Bioretention Areas

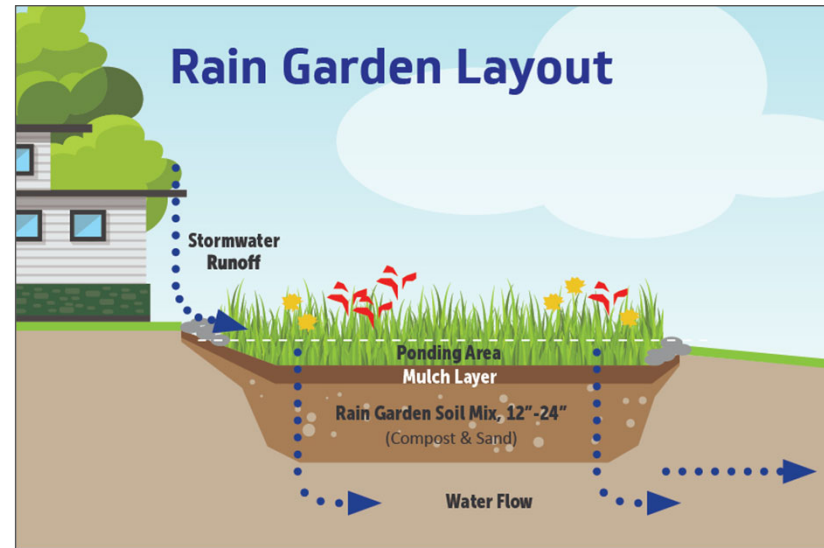
are engineered green areas **mimic the natural movement of water** and can be installed in almost any unpaved space to collect runoff.



Vegetated Swale

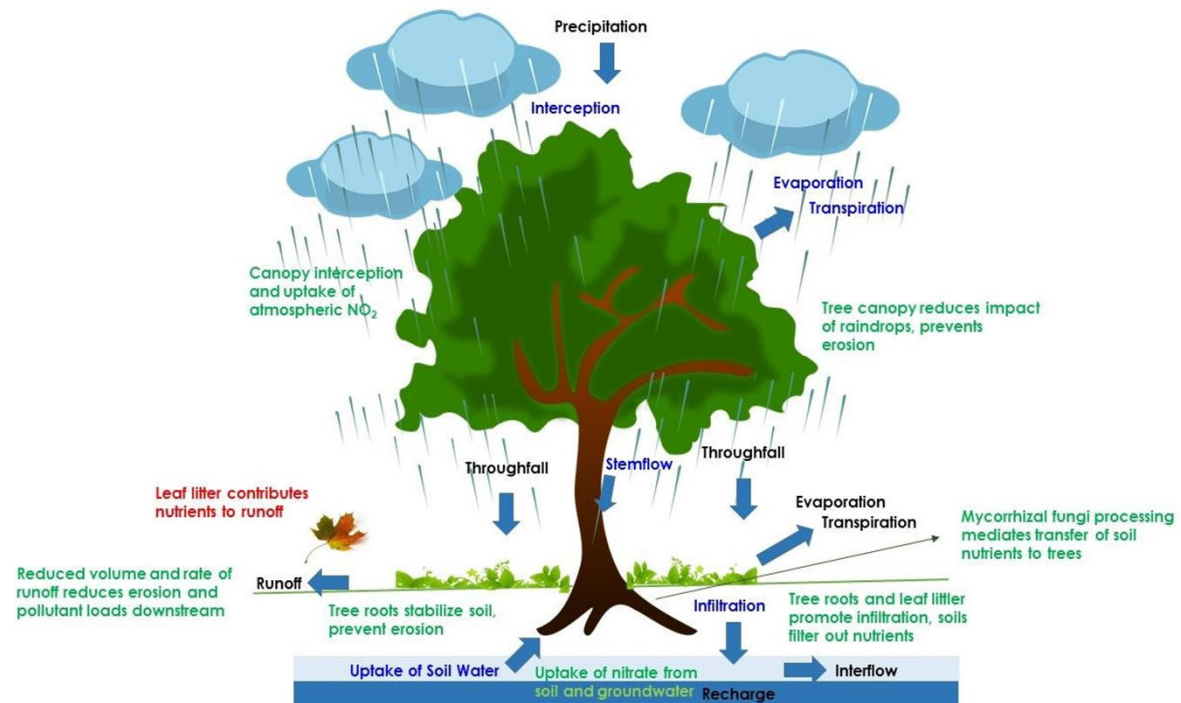


Rain Garden Layout



Planting Native Plants

helps to encourage natural **infiltration** and **interception** of water. Native is best because they are **naturally adapted** to the soils and climate, requiring less fertilizer, pesticides, watering, and overall less maintenance.





Native PA Species Shrubs and Trees Eligible for Stormwater Credits in Venango County.

Compiled by:

Judy Acker, French Creek Outreach Coordinator,
Audubon Pennsylvania



Amelanchier arborea Common Serviceberry

1

Source: <https://tinyurl.com/VenangoCountyNativeSpecies>

Red Chokeberry-- *Aronia arbutifolia* / *Photinia pyrifolia*—E, J

Native habitat: swamps, bogs, moist woods. A colonial shrub species, grows from 3' to 15' tall, prefers full sun, low drought tolerance, blooms from April to July, white flowers, produces pear shaped red fruit that persists into winter. Moist rich acidic soils. Fall foliage red to red orange. A source of wildlife cover and fall food.



Mountain Laurel—*Kalmia latifolia*—BF

PA State flower. Found in southern part of the watershed on dry to moist acidic woods and slopes. A broadleaf evergreen, many-stemmed, thicket-forming shrub or sometimes a small tree with short, crooked trunk; stout, spreading branches; a compact, rounded crown; and beautiful, large, bell-shaped, white to pink flowers with deep rose spots inside that occur in flat-topped clusters. The leaves are oval, leathery, and glossy, and change from light-green to dark-green to purple throughout the year. Prefers part shade and cool, moist acidic rocky or sandy soils. All parts are highly toxic. Attract birds and larval host for Laurel Sphinx moth.



Red-osier Dogwood—*Cornus sericea*—E, J

Native Habitat: swamps, stream banks, moist fields, thickets. Prefers part shade and moist, well drained soils but is adaptable to a wide range of soil and climatic conditions. A multiple stemmed shrub grows to 10' tall, moderate shade tolerance, moderate drought tolerance, blooms from June to August, attractive clusters of white flowers produce white fruit. Very conspicuous red branches in winter. The thick low vegetation provides excellent habitat for a variety of wildlife, produces abundant fruit that provides fall and winter food for a variety of birds.



Eastern White Pine-- *Pinus strobus*—BF, J, SY

Found in moist to dry woodlands and forested slopes. A stately canopy tree, 75-100 ft. tall. Sun, part shade, shade. Prefers fertile well drained dry to moist soils. Gracefully plume-like in outline, white pine is very distinctive when compared to other conifers. Tufts of light- to bluish-green long needles form feathery clusters of five only toward the ends of the twigs. Cones are 6-8 in. long. The largest northeastern conifer, it is a magnificent evergreen tree with straight trunk and crown of horizontal branches, one row is added a year, becoming broad and irregular. Formerly the most valuable tree of the Northeast, Eastern White Pine is used for construction, millwork, trim, and pulpwood. Attracts birds and mammals for food and shelter.



Sugar Maple—*Acer saccharum*—J, E, SY

Often found in moist woods, wooded slopes, ravines, alluvial soils. A single stemmed large tree, with rounded, dense crown and striking, multicolored foliage in autumn. Grows from 80' to 100' tall, prefers sun but is shade tolerant, moderate drought tolerance, prefers rich, moist, well-drained soils, susceptible to salt, excessive heat, and leaf scorch in drought. Blooms from February to June, yellow flowers, seeds mature in fall. Excellent source for maple syrup and timber, provides food and nesting sites for wildlife. Valuable to honey bees.



Northern White Oak—*Quercus alba*—E

A large tree with an irregular shaped, wide spreading crown, with light gray bark that has shallow furrows forming scaly ridges. Twigs are gray to reddish-green; buds are reddish-brown and broadly oval and hairless. Catkins appear just before or with the appearance of new leaves which are 4 - 8 inches long with 5 - 9 lobes that are widest beyond middle with deep sinuses and broadly rounded lobes; dull or shiny grayish green above, light green beneath. Grows to 100' tall, prefers sun but has moderate shade tolerance, moderate drought tolerance, blooms in mid spring. Can grow in dry to moist sites but prefers well drained deep loam or sandy, acid based soils. The wood is used for furniture, flooring, and specialty items such as wine and whiskey barrels. The annual acorns provide food for many animals and birds. Attracts butterflies. Larval host to Edwards Hairstreak butterfly.



Northern Red Oak—*Quercus rubra*—E, SY

A lowland forest tree, found in dry to moist sites. A single stemmed deciduous tree, grows to 100' tall, moderate shade tolerance, moderate drought tolerance, blooms in mid spring, large acorns mature and drop in early fall. Its straight trunk is clear of branches for some distance above the ground and supports a wide canopy. The dark bark is striped with long, smooth plates separated by deep furrows. Leaf lobes are bristle-tipped. Fall color is can be crimson, golden-orange, or russet. Prefers sun to part shade in well drained loamy sand. The northernmost eastern oak, it is the most important lumber species of red oak—used for flooring, furniture, millwork, railroad cross-ties, mine timbers, fence posts, plings, and pulpwood. A popular shade and street tree, with good form and dense foliage. One of the most rapid-growing oaks, it transplants easily, is hardy in city conditions, and endures cold. Provides food and nesting sites for birds and woodland wildlife.



Black Willow—*Salix nigra*—E

Found in swamps, wet meadows, and along streams in rich alluvial soils. A multiple stemmed, open crowned, tree, grows to 65' tall, prefers full sun, in clay loam or sandy soils. Blooms from February to June with inconspicuous flowers arranged in elongate clusters; male and female flowers on separate trees. A fast-growing tree, with leaf blades up to 5 inches long, narrow and tapering to an elongate tip, margins finely serrate. Bright yellow-green twigs bear yellow-green catkins. Seeds wind-borne on silky hairs. The bark is deeply furrowed. Live stakes have excellent roading ability and produce fibrous roots. Leaf drops replenish organic life in streams and it provides wildlife habitat and shade. This is the largest and most important willow with one of the most extensive ranges across the country.



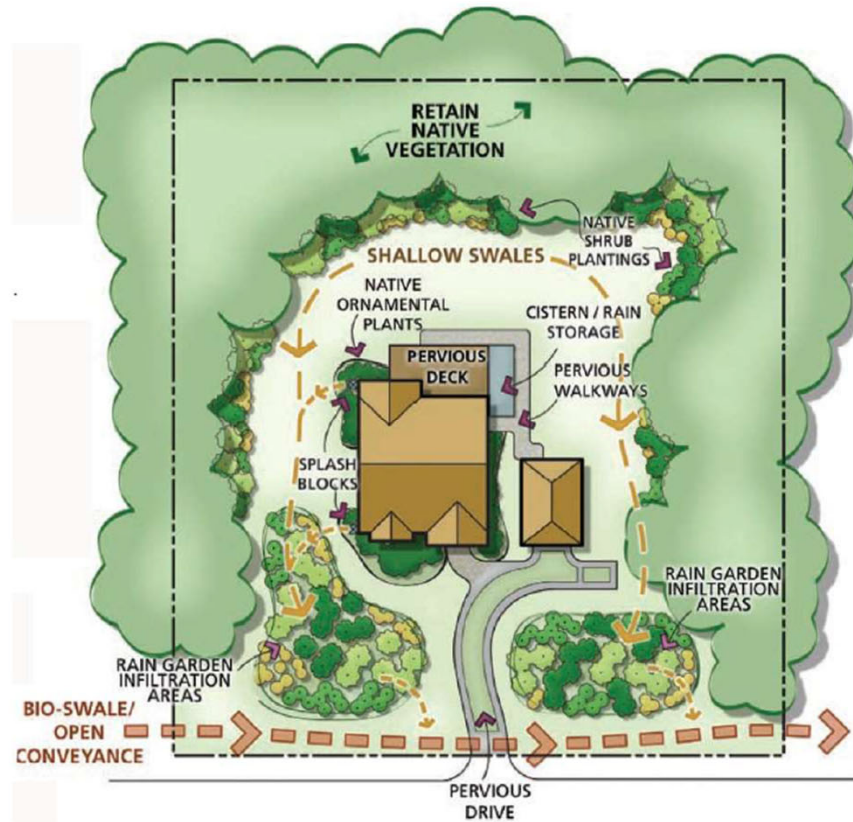
Wild Black Cherry-- *Prunus serotina*—E

Found in woods, thickets, floodplains and fencerows. A multiple stemmed, easy and fast growing tree, it reaches heights to 80' tall. When open-grown it becomes oval-headed with spreading, pendulous limbs and arching branches. Crowded trees grow tall and slender. Drooping white flowers appear after the glossy leaves have emerged. Prefers full sun to part shade and neutral to acidic soils. Moderate drought tolerance, blooms in May, white flowers produce purplish black fruit in the fall. While the fruit is edible and used in beverages and cooking, the rest of the plant contains amygdalin and can be toxic if consumed. One of North America's most valuable hardwoods. Provides food, and nesting sites for wildlife. Fruit consumed by 33 species of birds and many mammals. Also attracts bees and butterflies.



Low Impact Development

plans encourage the infiltration of water on site by mimicking the natural conditions present. They use a variety of design practices and technologies to simultaneously protect, preserve, and reduce costs.





Source: <https://nc-cleanwater.com/stormwater-pollution/why-is-stormwater-a-problem/>

STORMWATER MANAGEMENT 101

Any questions?

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Visit our website for more information: www.venangocountypa.gov/Planning