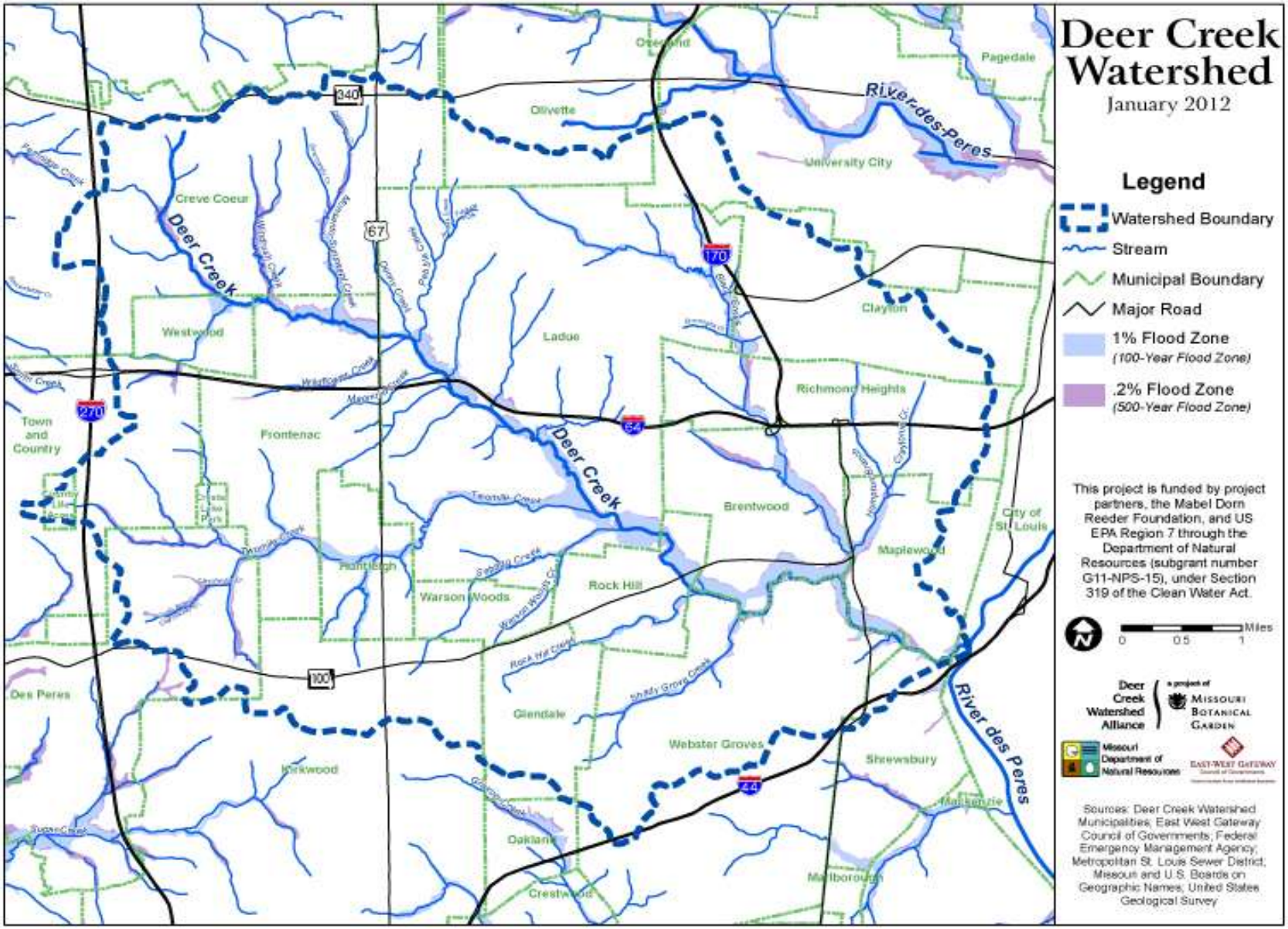
RainScape Rebates

Stormwater Solutions
January 23, 2013

Karla Wilson
Manager
Deer Creek
Watershed Alliance

Deer Creek Watershed Alliance | a project of Missouri Botanical Garden


Deer Creek Watershed
January 2012
Legend
Watershed Boundary
Stream
Municipal Boundary
Major Road
1% Flood Zone
(100-Year Flood Zone)
.2% Flood Zone
(500-Year Flood Zone)
This project is funded by project partners, the Mabel Dorn Reeder Foundation, and US EPA Region 7 through the Department of Natural Resources (subgrant number G11-NPS-15), under Section 319 of the Clean Water Act.
Miles
0
0.5
1
Deer Creek Watershed Alliance
a project of
Missouri Botanical Garden
Missouri Department of Natural Resources
East-West Gateway Council of Governments
Sources: Deer Creek Watershed Municipalities; East West Gateway Council of Governments; Federal Emergency Management Agency; Metropolitan St. Louis Sewer District; Missouri and U.S. Boards on Geographic Names; United States Geological Survey
Creve Coeur
Olivette
University City
Pagedale
Clayton
Ladue
Richmond Heights
Westwood
Town and Country
Frontenac
Brentwood
City of St. Louis
Maplewood
Rock Hill
Warson Woods
Huntleigh
Des Peres
Glendale
Webster Groves
Shrewsbury
Kirkwood
Oakland
Marlborough
Creve Coeur Creek
Deer Creek
Riverdes Peres
River des Peres
340
67
170
270
64
44
100

Rebates Timelines Pilot Round

- Pilot Round
  - February 6 contractor workshop – required
  - March 1, 2013 – Applications Due
  - March 18, 2013 – Award acceptance notified
  - Spring or Fall - RainScape Installation
  - After installation: Receipts turned in
  - Within 2.5 months: installation reviewed and rebate checks issued

Rebates Timelines Future Rounds

- Round Two
  - May 15, 2013 Applications available
  - June 2013 Contractor and Residential workshops
  - July 15 Application Deadline
  - August 15 Award Notification
- Round Three
  - November 15, 2013 Applications available
  - January 2014 Workshops
  - February 15 Application Deadline
  - March 15 Award Notification

Application Forms

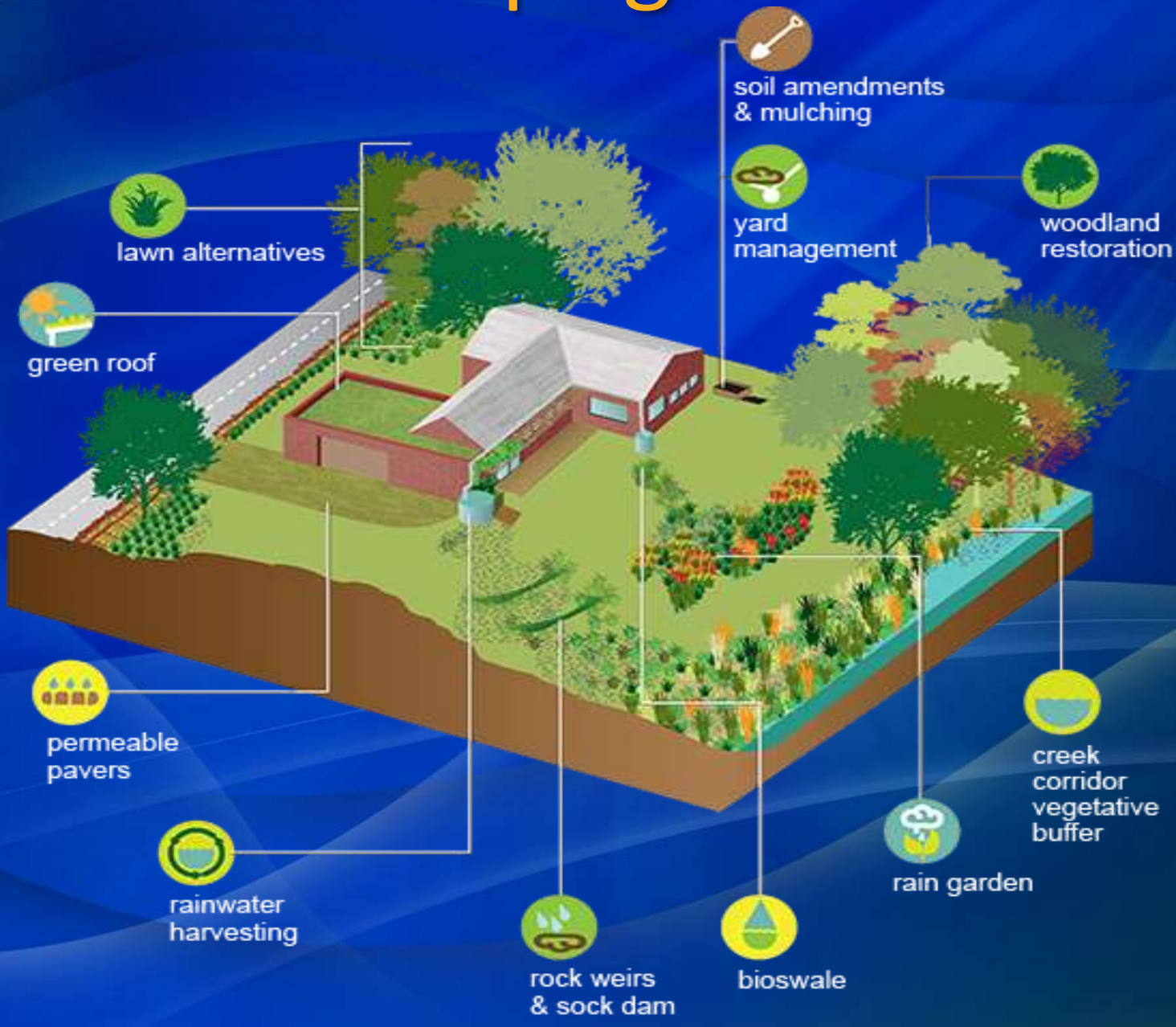
www.deercreekalliance.org

RainScaping Guide

www.mobot.org/rainscaping

1. What is RainScaping?
2. Why RainScape?
3. How to RainScape?

What is RainScaping?



RainScaping Guide: Rain Gardens

A rain garden slows the flow of rainwater runoff by using elements similar to those that occur in nature: plants, stone, shallow swales and depressions that catch and hold rainwater rather than let it run off unhindered. Plants that offer a diversity of both deep and fibrous root systems help make the soil more permeable, sponge-like and able to absorb a large amount of rainfall. Native plants are typically preferred due to their hardy nature. Water gathers temporarily in shallow depressions and is absorbed by the soil and plants as well as being filtered as it percolates through the soil horizon.

There are two major categories of rain garden design:

1. **Native Soil Rain Garden**
   A homeowner who plans to install a rain garden where no development or redevelopment is taking place may prefer this low cost option. Soil pore space is gradually improved over time through the combined interactions of added well-aged compost, mulch, microbes, and deep rooted plants. Plants that are able to tolerate primarily moist (and sometimes dry) soils thrive best in these environments. A rain garden is not necessarily the right solution for your site. For detailed guidance on where and how to install a native soil rain garden, as well as recommended alternatives to rain gardens under certain conditions, see How to RainScape. For a comprehensive overview of rain garden design using an intuitive visual interface, check out this interactive graphic from the University of Nebraska–Extension.

2. **Engineered Bioretention System**
   Where development or redevelopment is occurring engineered bioretention may be specified. The commercially designed rain garden requires the removal of existing soil and replacement with a 60–80 percent sandy soil mix, typically along with a piped underdrain. Plants that are able to tolerate primarily dry (and sometimes wet) soils thrive best in these environments. For more information on how to design an engineered bioretention system download the MSD Landscape Guide for Stormwater Best Management Practices [pdf].

RainScaping Quick Links

What is RainScaping?

Why RainScape?
- *Benefits & Goals*

How to RainScape
- *What Do You Know About Your Site?*
- *Is a Rain Garden Right for Your Site?*
- *Design & Build a Rain Garden*
- *Select Other RainScaping Options*
- *Select Plants*

Landscaping Options:
- *Lawn Alternatives*
- *Soil Amendments & Mulching*
- *Yard Management*
- *Woodland Restoration*
- *Creek Corridor Vegetative Buffers*
- *Rain Gardens*
- *Vegetated Bioswales*
- *Rock Weirs & Sock Dams*
- *Rainwater Harvesting*
- *Permeable Pavement*
- *Green Roofs*

Resources

The Missouri Botanical Garden RainScaping Guide is partially funded by the Mabel Dorn Reeder Foundation and US EPA Region 7 through the Department of Natural Resources (subgrant number G11-NPS-15), under Section 319 of the Clean Water Act.

Native Soil Rain Garden

Bioretention System

RainScaping Guide: Lawn Alternatives

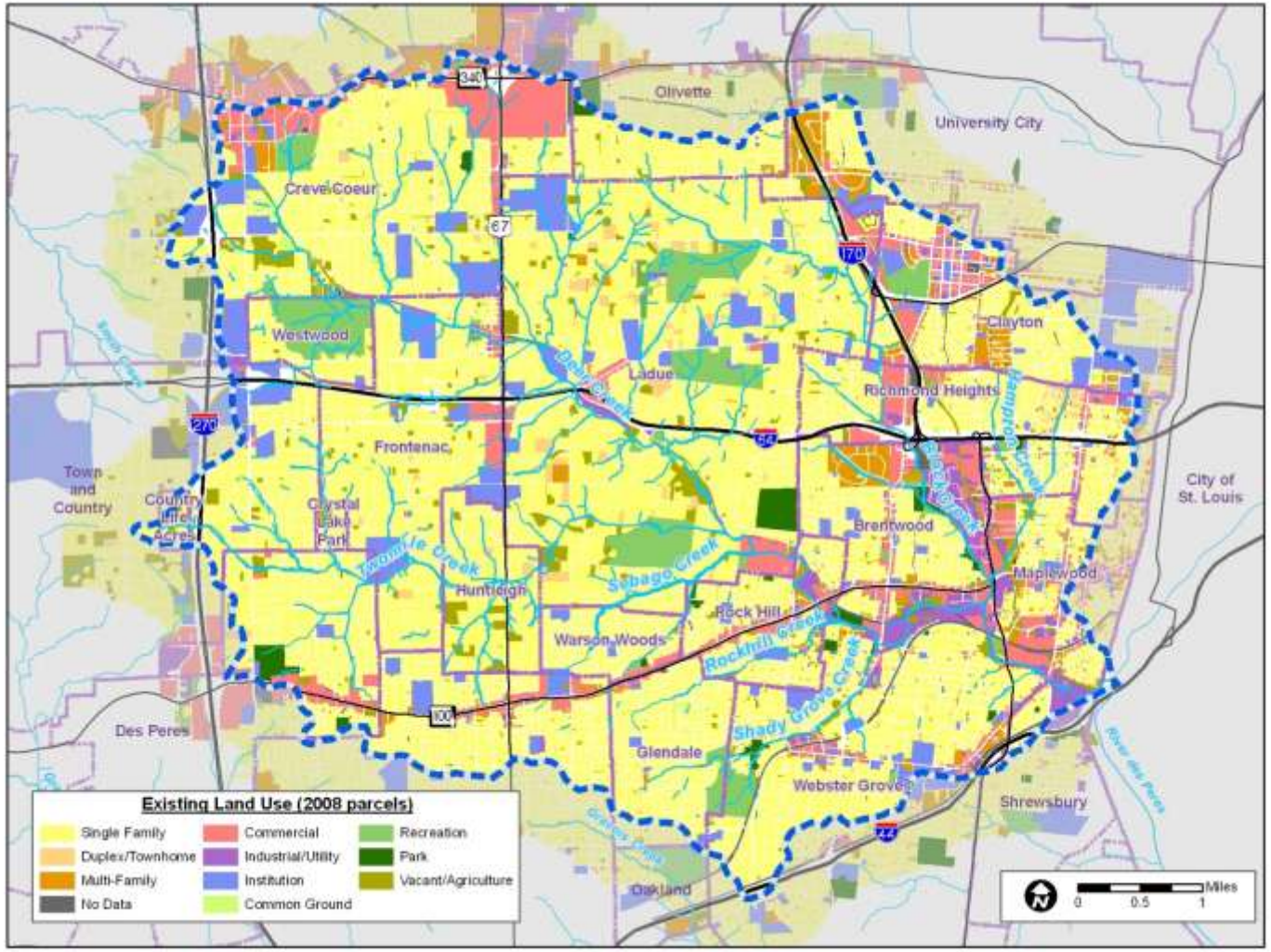
Lawn Reduction to Capture Run-off

Turf, both above and below the soil surface, has very little biomass in comparison to larger perennials, shrubs and trees. The shallow root system of turf prevents the soil from maintaining its permeability (ability to soak up water), and in some cases may result in the formation of an impermeable clay shelf below the grass. Large expanses of irrigated and mowed lawn contribute to significant amounts of runoff that can contain pesticides and fertilizers.

Replace turf with trees, shrubs, perennials and/or prairie gardens along with optional soil amendments and mulching to more effectively manage rainwater in your yard.

For more detailed lawn reduction recommendations see Transform Turf.

Deer Creek Watershed Land Use



RainScaping Guide: Soil Amendments & Mulching

Amending Soil to Improve Infiltration Rates

Incorporating compost-amended topsoil, well-aged compost, calcined clay and/or expanded shale, are recommended strategies for improving soil infiltration rates. In addition, topping the garden with annual application of organic mulch is a key ingredient for reducing compaction and improving soil quality and infiltration capacity. This will, in turn, improve plant growth and root systems which increase the ability of the soil to absorb water over time.

Adding sand in insufficient quantities can result in a concrete-like soil texture that does not drain; therefore adding sand is NOT recommended.

For more detailed soil amendment and mulching recommendations see Conquer Compacted Soils.

For guidance on fertilizing your yard see Fertilizer Management.

RainScaping Guide: Vegetated Bioswales

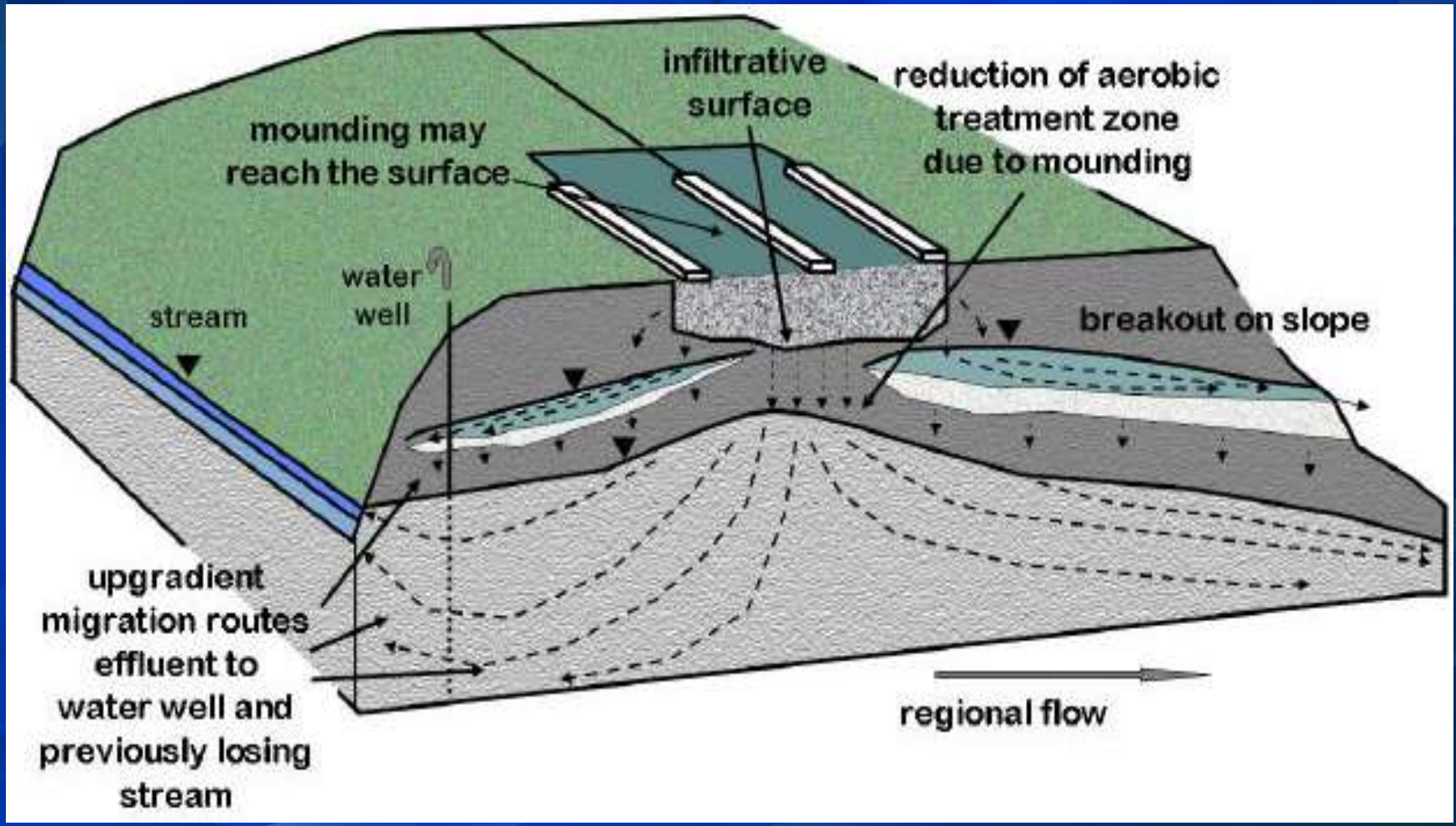
A bioswale is a linear, shallow, planted depression that guides water away from its entry point on the property (gutter downspouts, uphill properties, etc.) and towards a rain garden. Bioswales are also useful for directing water from a rain garden (in the event the rain garden overflows) and towards its exit point on the property or simply to guide water as it moves through the property. These swales are planted or seeded with moisture-loving plant species that are also tolerant of seasonal fluctuations in moisture levels. The plants' structure aids in reducing the flow rate of rainwater runoff and enhances the soil's absorption of water even before it enters the rain garden retention area or exit point.

Bioswales can be constructed independent of a rain garden if circumstances don't allow for the installation of a rain garden (such as limited space or steep, narrow sites). In this case, they guide water to existing storm-water systems such as storm drains in roadways, etc.

Where volume and velocity of water is high, a constructed dry creek bed made of gravel may substitute for a vegetated bioswale. Vegetated swales are preferred, however, as Meramec River gravel is typically the source of gravel in the Greater St. Louis Region, and gravel mining is known to be a major contributor to water quality degradation in the Meramec River watershed.

Bioswale

Mounding & Effluent Breakout on Slopes



Source: Colorado School of Mines, 2005

Rock Weirs

RainScaping Guide: Rock Weirs & Sock Dams

Compost sock check dams or rock weirs (a pile of stones lined up to slow down the flow of water on a hill) are used in place of traditional sediment and erosion control such as silt fences and straw bales. They:

- are used to control and keep sediment from soil erosion from flowing downhill, as is the case in newly constructed rain gardens or bioswales where soil has been exposed.
- slow the velocity of the flow of water, either at the inlet to the rain garden, the overflow of a rain garden or on a slope, thus reducing the potential for erosion.
- when placed at intervals along a bioswale, they slow down the velocity of water flowing through a bioswale.
- when used on hard surfaces, they prevent sediment from flowing into other areas.
- aid infiltration of water into the soil by slowing water flow.

For more details on how and when to use check dams and weirs, see Stabilize Steep Slopes.

RainScaping Guide: Creek Corridor Vegetative Buffers

A creek corridor is the transitional zone where land and stream come together. The land and riparian vegetation or plants that live along a waterway form the creek corridor and create a vegetative buffer strip along the stream. This buffer strip is essential to the health of the stream as it absorbs runoff, reduces erosion, filters out pollutants, shades the stream and provides food and habitat for a number of terrestrial and aquatic species.

RainScaping Guide: Woodland Restoration

If your site is currently wooded, restoring a mix of healthy woodland vegetation is an effective rainwater management strategy.

Removal of invasive plant species (for example, bush honeysuckle) and long term control of all invasive species is essential in the successful restoration of woodland. Invasive species destroy the native ecosystem and out-compete native plants for nutrients, light and moisture. If these species are not controlled, they will continue to spread rapidly and diminish biodiversity as they overtake the woodland.

Following removal of invasive species, replant with mix of native plant species that is appropriate for your particular woodland (dry,

RainScaping Guide: Rainwater Harvesting

Rain Barrels

Rain barrels are a small version of an above-ground cistern. They can range in size from 50 to 200 gallons, in contrast to cisterns that range in size from 100 to 1500 gallons or more. Rain barrels decrease rainwater runoff by collecting and storing rainwater from the roof. In addition, rain barrels provide, at no additional cost, chlorine-free water for use in watering plants and other water needs in the landscape.

A rain barrel is a barrel fitted with an upper (overflow) spigot and a lower spigot (for use in watering vegetation, etc.). The top is fitted with a screen or filter to keep debris and insects out of the barrel. It is a simple design that is inexpensive to construct. Rain barrels should be placed under a gutter downspout, with the downspout directed into the top of the rain barrel. It is helpful to elevate the rain barrel off the ground since the output for watering is gravity flow. The overflow spigot at the top of the rain barrel should have a hose connected that is directed into a rain garden or other landscape planting. More than one rain barrel can be used at each gutter downspout by connecting them together with the overflow spigot, or consider a larger above- or below-ground cistern for harvesting a higher volume of rainfall.

There are many models to choose from, or you can build your own. To build your own rain barrel download the River des Peres Watershed Coalition's Rain Barrel Building Instructions and Installation Guide or purchase an already-constructed rain barrel by downloading an order form.

Cisterns

A cistern is a water storage tank installed either underground or above ground (size varies from 100 gallons to 1500 gallons or more). Water is captured and stored from gutter downspouts diverted into the cisterns, making it available for later use. The most common use is for watering the surrounding landscape. A household shallow well pump can be installed to pump and distribute this stored water from the tank to a hose bib for watering, or may be connected directly to drip irrigation equipment, etc. This cost-free source of water contains less minerals and chemicals and aids in healthier plant growth.

Rain Barrel

RainScaping Guide: Green Roofs

Green roofs, also known as living or vegetated roofs, consist of plants and specialized soil over a protective, waterproof membrane that is laid on top of an existing roof structure. The plant palette is comprised of species that are able to tolerate high heat and dry conditions, such as native glade species and non-native plants such as *Sedum* or creeping thyme.

A green roof captures, slows down and reduces the quantity of rainfall before it enters the gutter. Green roofs also add energy savings by insulating the roof thus reducing heating and cooling costs. The existing roof must be reinforced to carry the additional weight load, anywhere from 15–30 lbs./sq. ft. or more depending on the depth of the soil. While installation of a green roof is initially more expensive than a conventional roof, a green roof has a much longer life span than a conventional roof. Approximate costs may range from $15/sq. ft. to $25/sq. ft. or more depending on the depth of the green roof soil and the specific plants used in the planting. When considering installing a green roof, it is recommended that you consult with an engineer/architect and a reputable roofing company well-versed in installing green roofs.

See our Green Roof Resources section for more information.

Why RainScape?

- What are the Design Goals:
  - Funder/Program Design Goals
  - Landowner/Client Design Goals

Design Goal: Clean Water

Clean Water Act 1972

Fishable

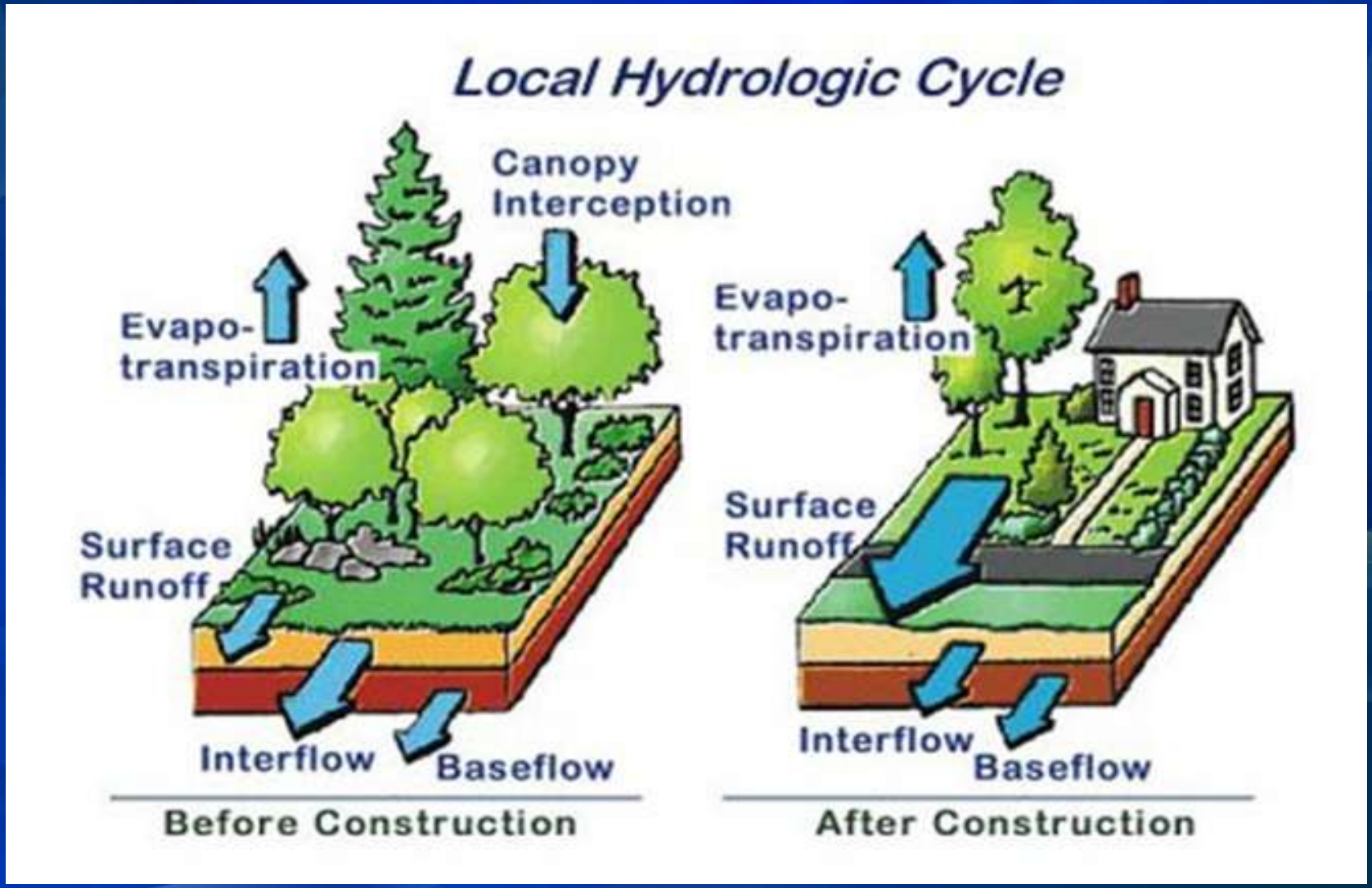
and

Swimmable

Remove Pollutants at the Source

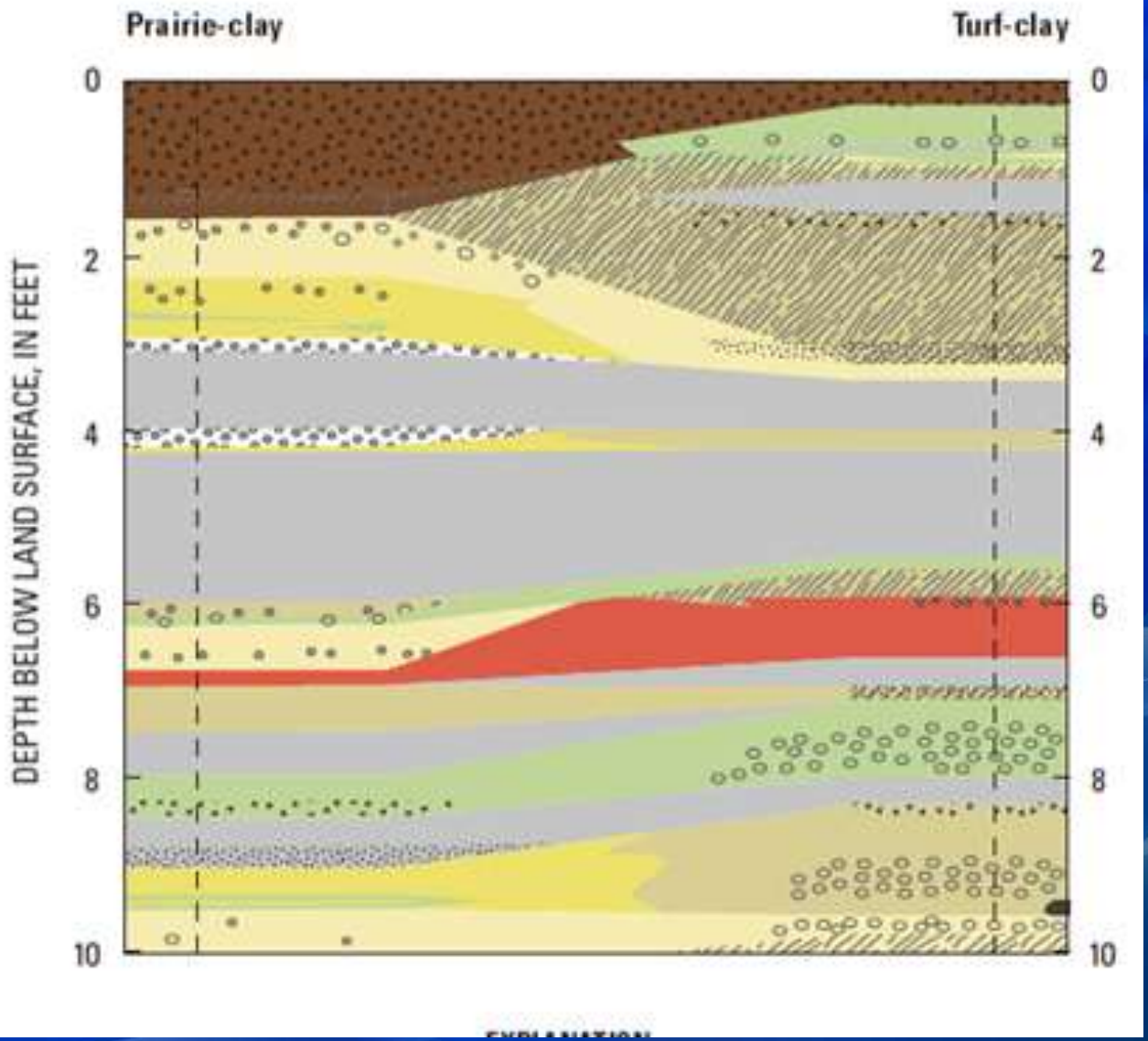
- Use less salt or salt alternatives
- Use less fertilizer
- Use less pesticides
- Don’t overwater
- Pick up dog poop

Capture Water Onsite



Soil is Nature's Pipeline

Madison Wisconsin Case Study



Organic rich A Horizon

Clay

Sandy clay

Sandy loam

Source: USGS Study

Impact of Soil Structure on Infiltration Rates

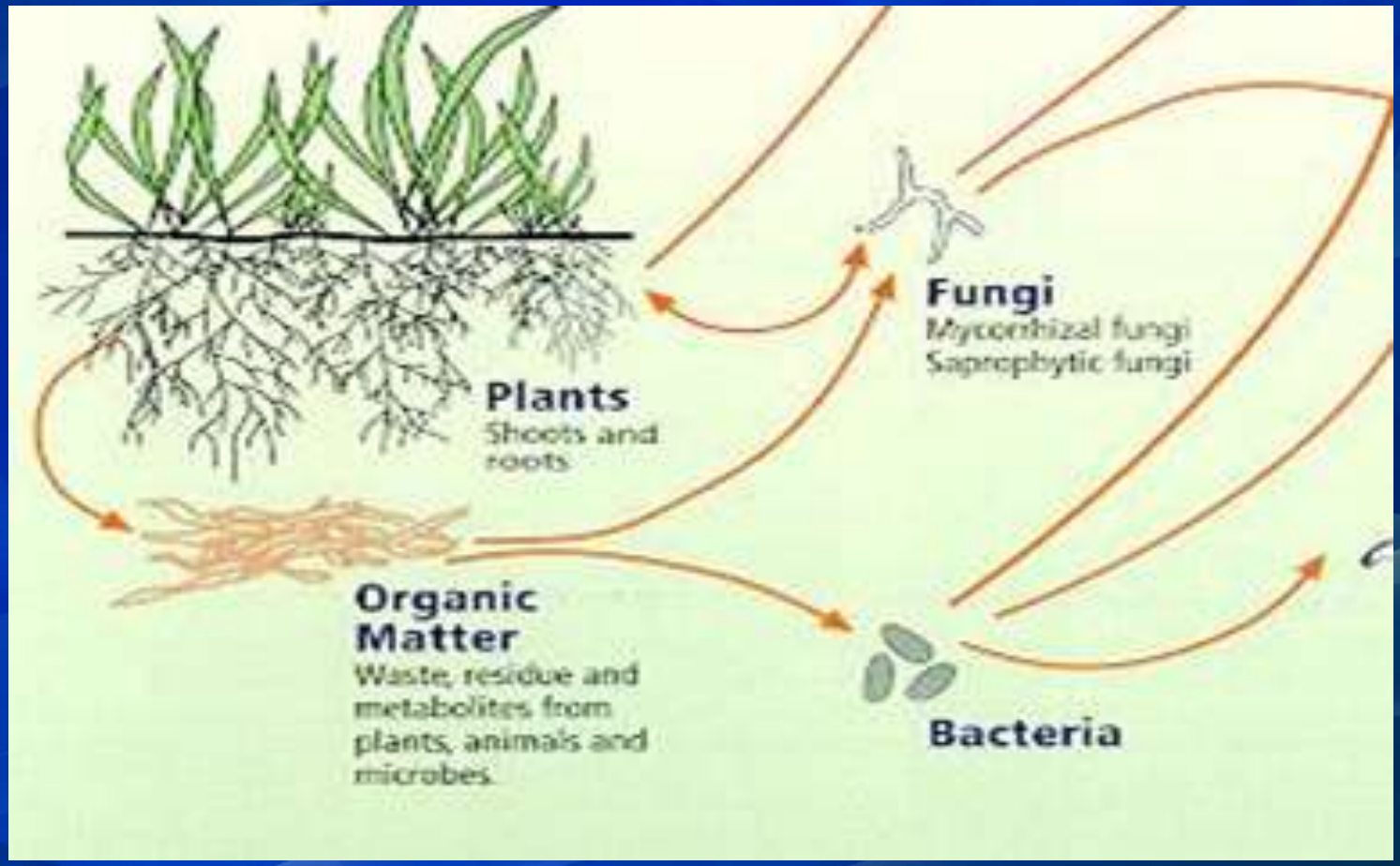
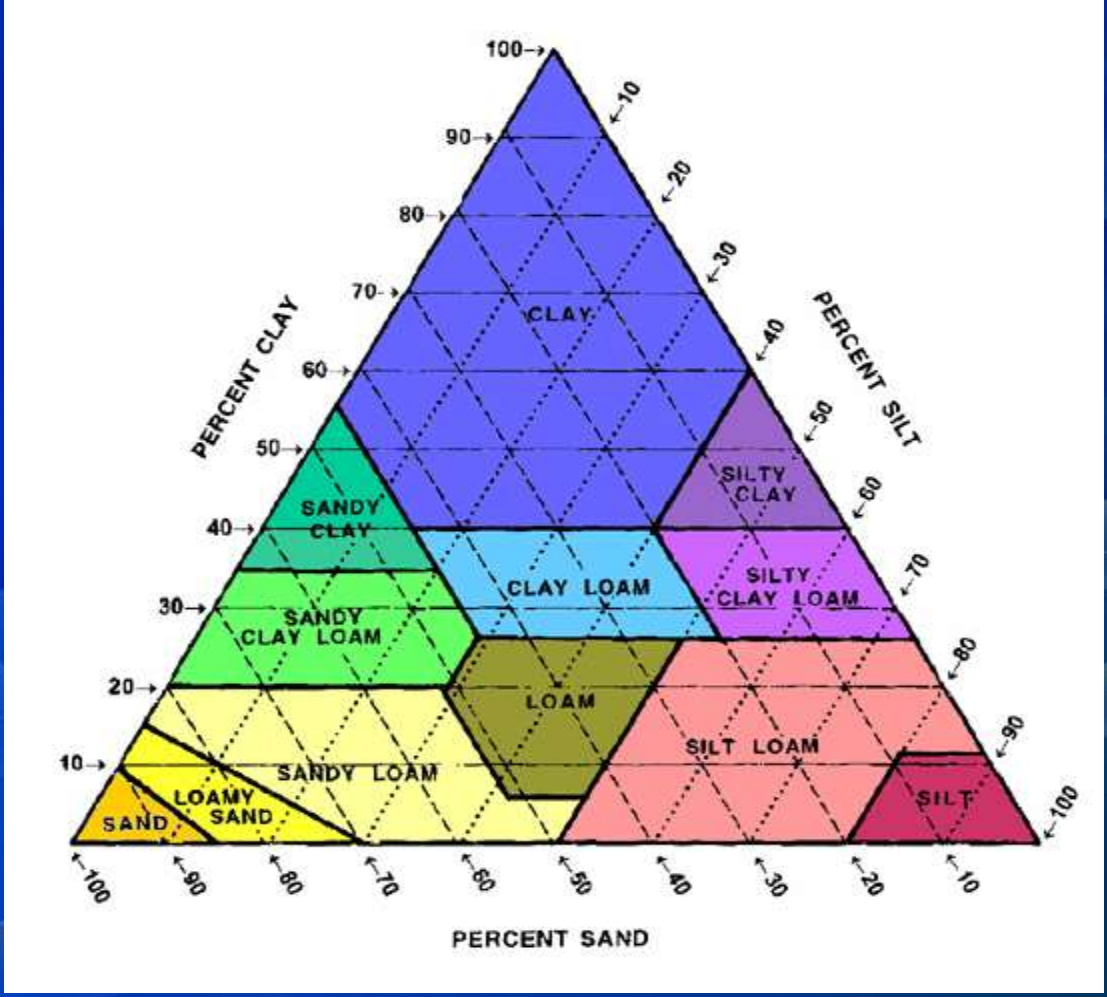


Image Source: The University of Minnesota, 2003

Impact of Soil Texture on Infiltration Rates

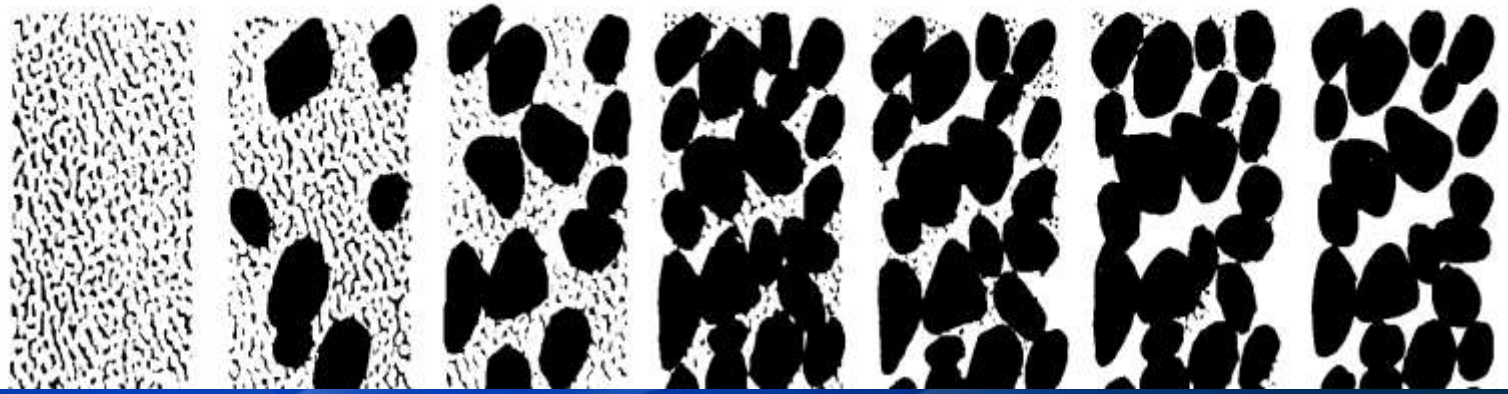


Impact of Sand on Infiltration Rates

Effect of Amendment on Soil Porosity

AMOUNT OF SAND, SOIL & PORES (yd^3 in ten yd^3 mixture)

soil ➧	10.	7.7	5.5	3.6	2.5	1.5	0.
sand ➧	0.	3.5	7.	10.	10.	10.	10.
pores ➧	5.	3.9	2.8	1.8	2.4	2.9	3.6



Source: Physical Amendment of Landscape Soils; Spomer, 1983

Clogging

Rain Garden Type Comparison

Native Soil Rain Garden

- Less expensive
- Less risk of clogging
- Improves over time
- Improves soil structure

Engineered Bioretention Rain Garden

- Can be installed where soil is heavily compacted
- Immediate high impact
- Improves soil texture

Client / Landowner Design Goals

- Solve a drainage problem.
- Increase biodiversity & wildlife habitat.
- Increase property values.
- Contribute towards clean water.
- Conserve soil.
- Save energy.
- Enhance mental well-being.
- Reduce watering needs.
- Reduce air pollution.
- Provide educational opportunities.

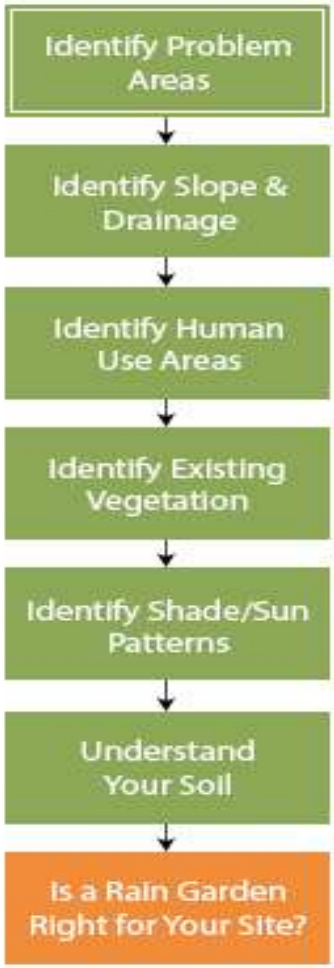
How To RainScape

How to RainScape

For guidance on which RainScaping features will work best in your yard and how to install them, follow our **RainScaping Flowchart** below. Click on a step to go to that section:

What do you know about your site?

Consider including the following in your drawing (click on each topic in the flowchart below to view that section):



Identify Problem Areas

Identifying problem areas on your property helps determine your goals and indicates choices for specific landscape options to solve problems.

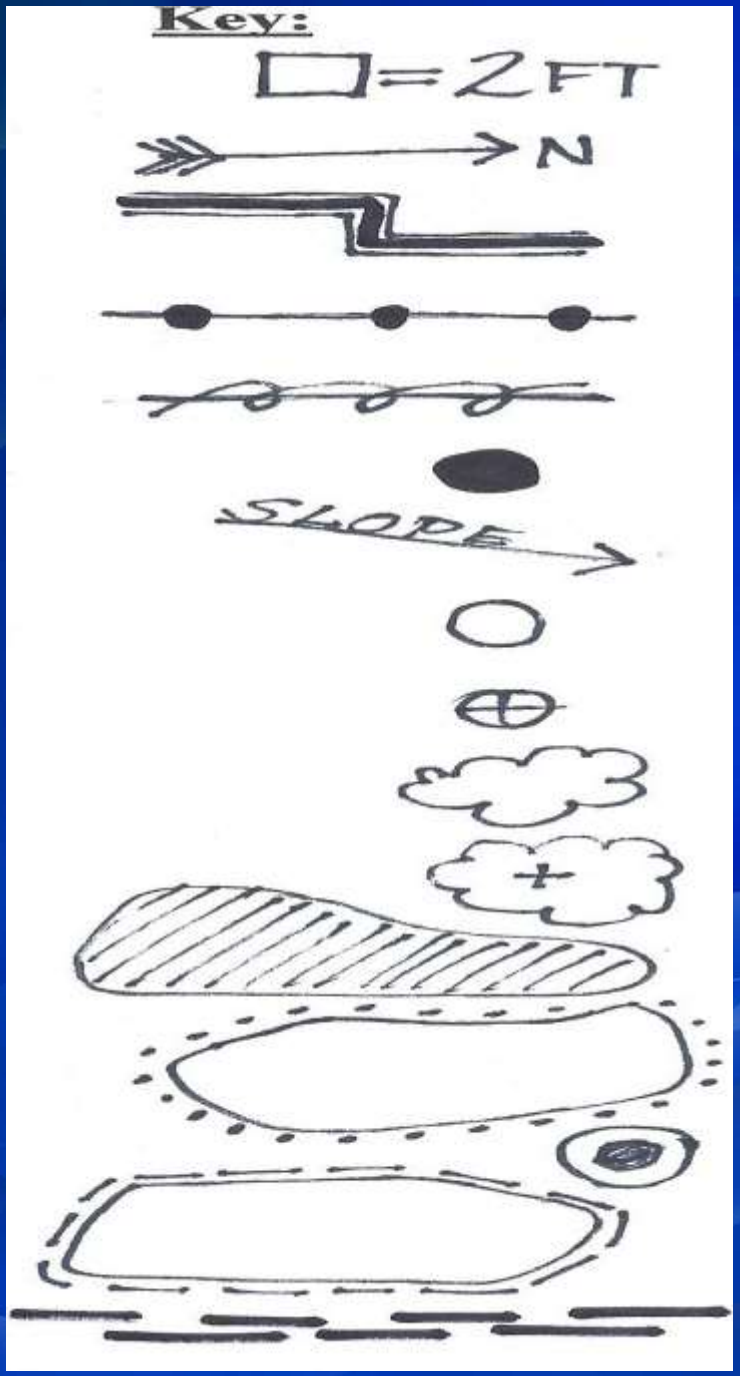
Topography and Flow

Observe the topography of your property and note how water flows during periods of heavy rainfall, as well as where offsite water enters the property. Other potential problem areas to record on your map include steep slopes, ponding in low wet areas, areas of recent construction and utility lines.

Utilities

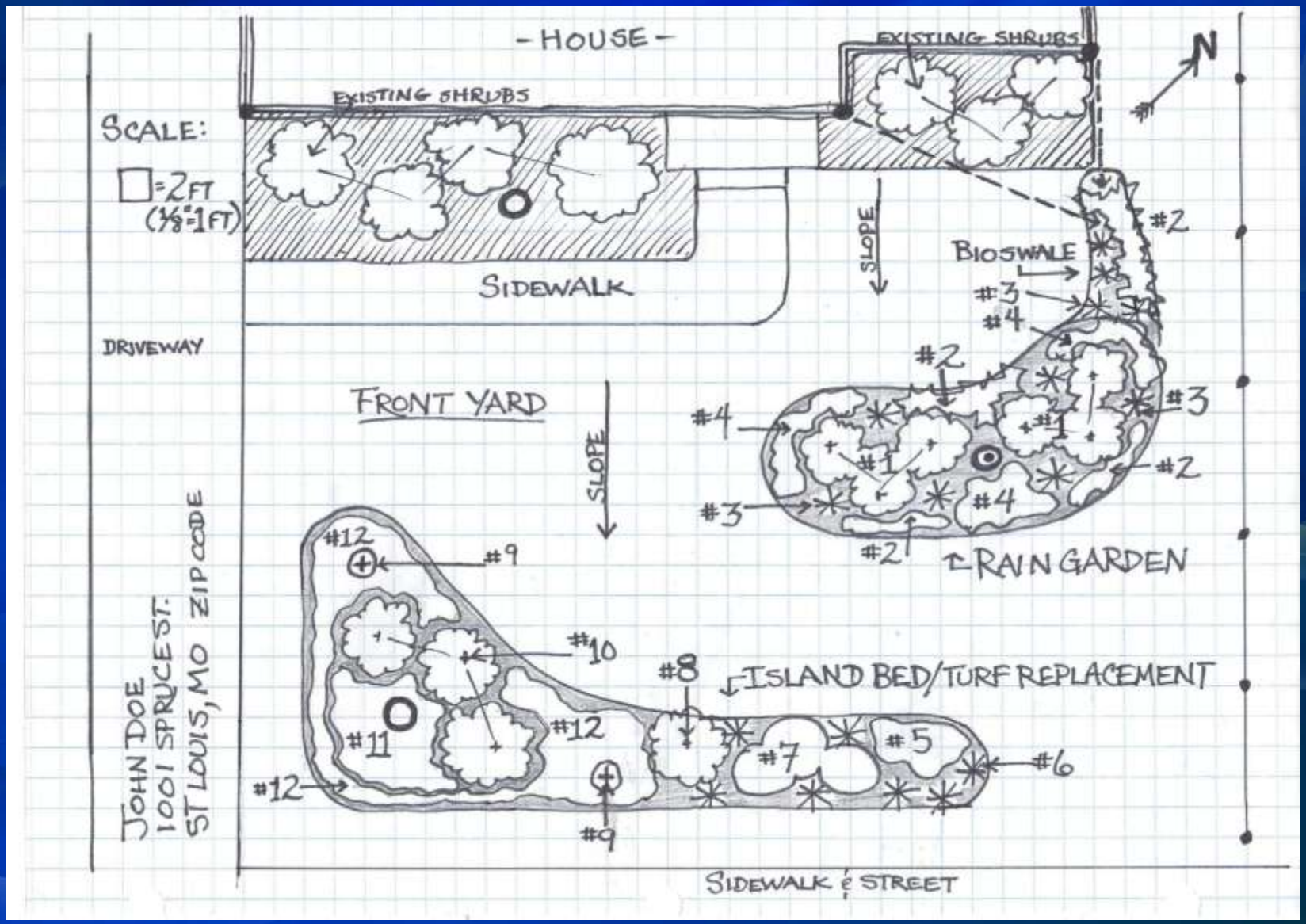
Be sure to include overhead utilities on your map. In addition, call 1 (800) DIG-RITE to have all underground utilities identified and add them to your map as well.

Continue on to Identify Slope & Drainage



- Scale of map
- Orientation of property to North
- House and other buildings
- Above ground utility lines
- Below ground utilities
- Downspout on house
- Direction of slope
- Existing tree
- Proposed tree
- Existing shrub
- Proposed shrub
- Existing herbaceous planting
- Proposed herbaceous planting
- Percolation test location
- Rain garden outline
- Underground pipe

Sample Homeowner Plan

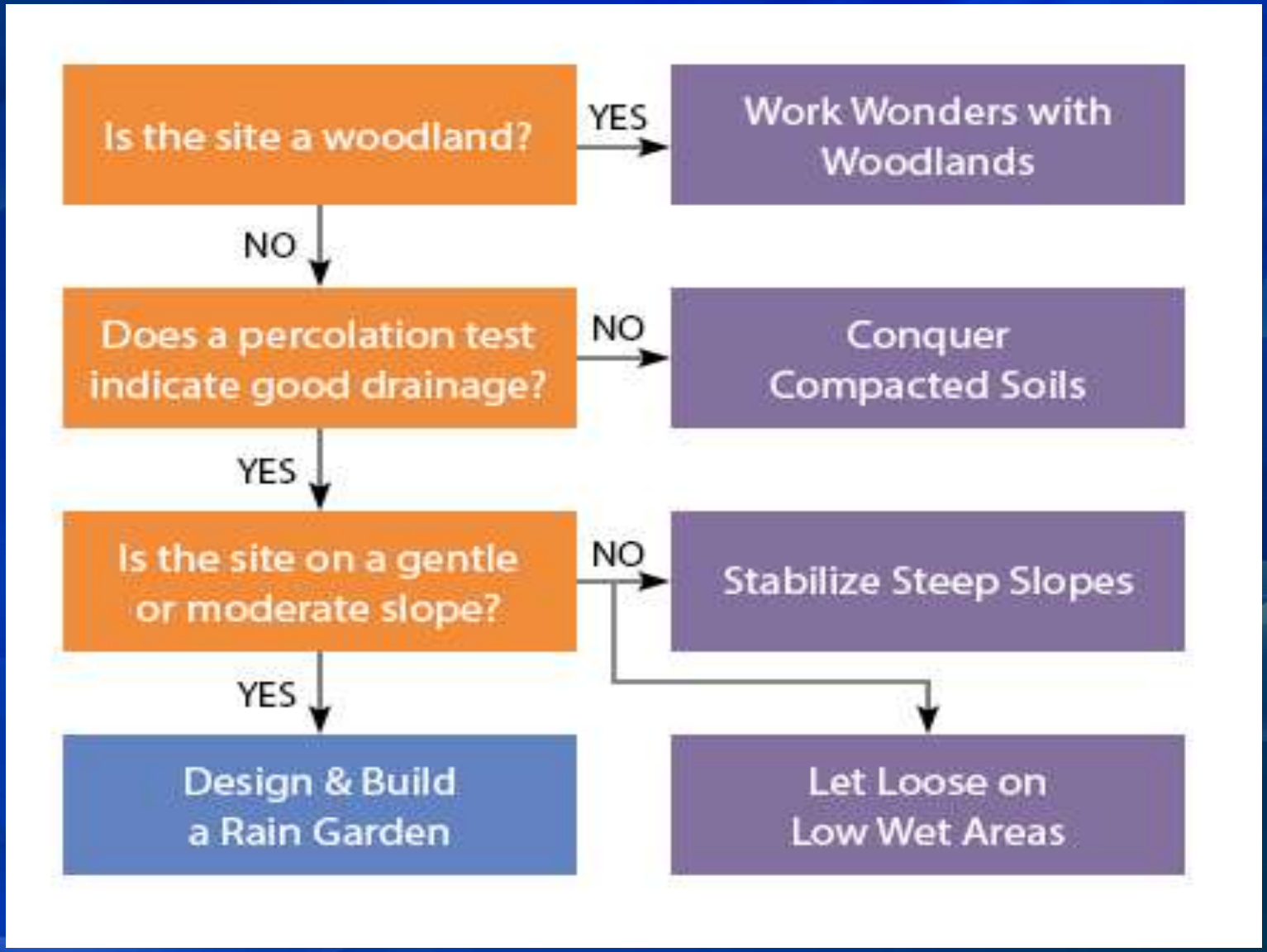


How To RainScape

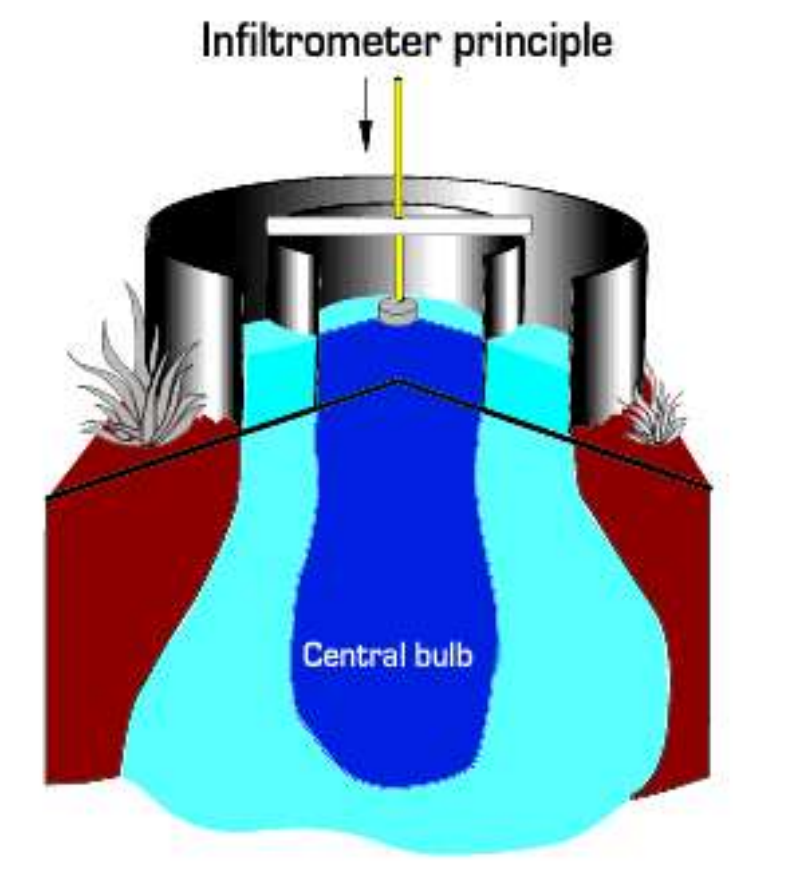
How to RainScape

For guidance on which RainScaping features will work best in your yard and how to install them, follow our **RainScaping Flowchart** below. Click on a step to go to that section:

Is a Rain Garden Right for your Site?



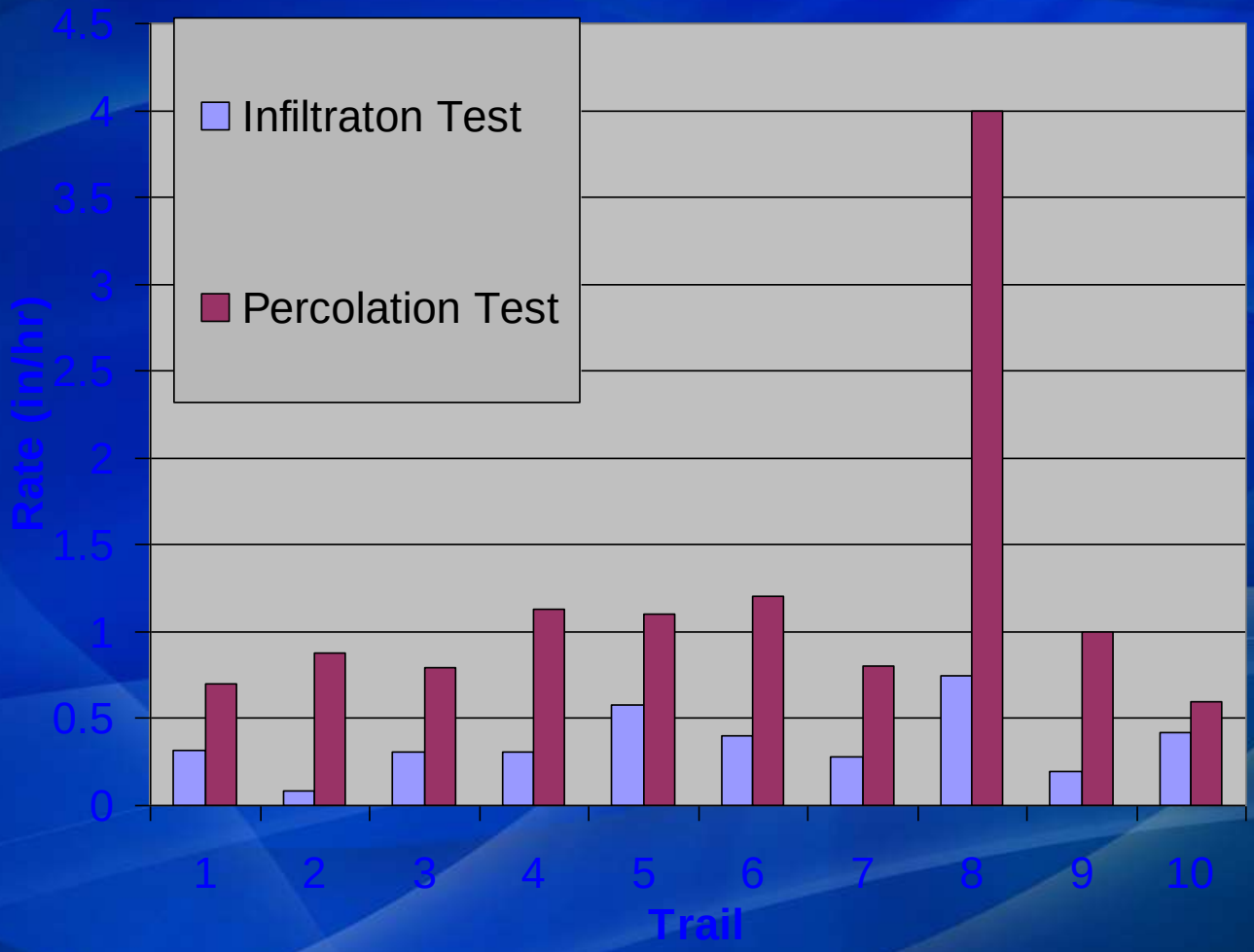
Infiltration Test



Source: On-site Soils Testing, (Oram, B., 2003)

Percolation Test

Determining Infiltration Rates



Source: On-site Soils Testing Data, (Oram, B., 2003)

Soil Compaction

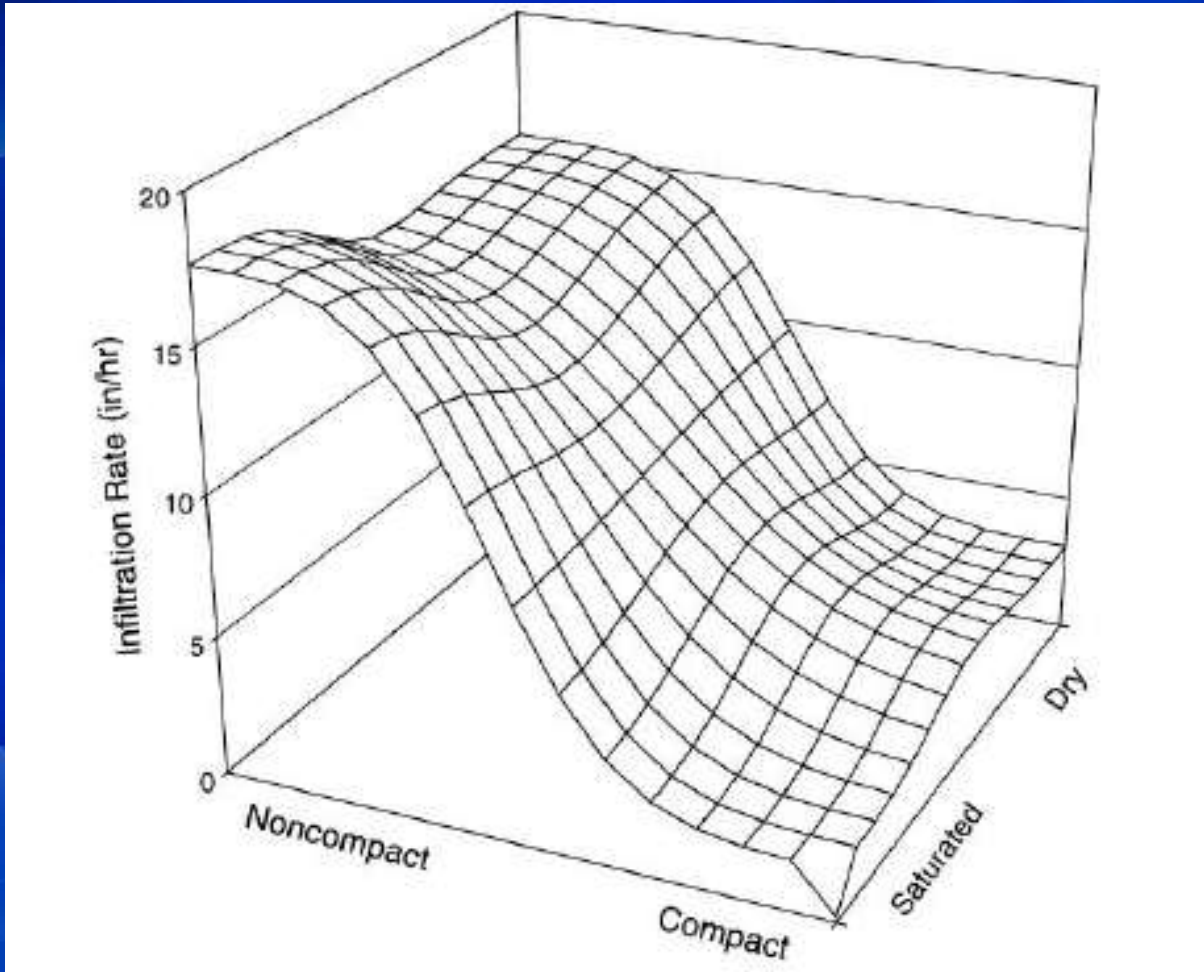


Figure 3-1. Three dimensional plot of infiltration rates for sandy soils.

Image Source: Brian Oram, Wilkes University

Select Other RainScaping Options

- Work Wonders with Woodlands
- Conquer Compacted Soils
- Stabilize Steep Slopes
- Let Loose on Low Wet Areas
- Transform Turf
- Design & Build a Rain Garden
- Select Plants

Transform Turf

Reduce the amount of turf in your yard to slow down stormwater runoff and increase infiltration, allowing water to percolate into the soil. Identify areas that can be converted from turf to plantings of trees, shrubs and low-maintenance ground covers to absorb rainwater. Use of native perennials, shrubs, and trees reduces the need for fertilizers and pesticides. Consider more sustainable ways of maintaining the turf that remains—organic fertilizers, less mowing, use of regional low-maintenance turf blends, and minimizing or eliminating pesticide use.

Trees

RainScaping Guide: Soil Amendments & Mulching

Amending Soil to Improve Infiltration Rates

Incorporating compost-amended topsoil, well-aged compost, calcined clay and/or expanded shale, are recommended strategies for improving soil infiltration rates. In addition, topping the garden with annual application of organic mulch is a key ingredient for reducing compaction and improving soil quality and infiltration capacity. This will, in turn, improve plant growth and root systems which increase the ability of the soil to absorb water over time.

Adding sand in insufficient quantities can result in a concrete-like soil texture that does not drain; therefore adding sand is NOT recommended.

For more detailed soil amendment and mulching recommendations see Conquer Compacted Soils.

For guidance on fertilizing your yard see Fertilizer Management.

Click on a landscaping option from the graphic below to learn more about that topic:

RainScaping Quick Links

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- *Benefits & Goals*

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- *What Do You Know About Your Site?*
- *Is a Rain Garden Right for Your Site?*
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Resources

The Missouri Botanical Garden RainScaping Guide is partially funded by the Mabel Dorn Reeder Foundation and US EPA Region 7 through the Department of Natural

Amending Soil

- NO Sand (or sandy loam topsoil)
- Mulch
- Well Aged Compost
- Topsoil (Silt loam only)
- Mycorrhizal Inoculant
- Calcined Clay “Turface”
- Expanded Gypsum
- Aeration backfilled with compost
- Tilling
- Plants with robust root structures

Design and Build Rain Garden

- Is a Rain Garden Right for Your Site?
- Determine Rain Garden Size & Depth
- Decide Which Rain Garden Elements to Include
- **Organize Water Flow**
- Select Plants
- Gather Tools & Supplies
- Lay It Out & Dig In
- Plant the Rain Garden
- Maintain the Rain Garden

Organize Water Flow

Several options exist when deciding how to direct water into the rain garden:

- When designing a rain garden to manage runoff from the roof, redirect your gutter downspout(s) to point towards your rain garden and reroute the water through an underground pipe or a bioswale.
- If a rain barrel has been installed on the gutter downspout, redirect the overflow from the rain barrel to the rain garden through an underground pipe or a bioswale.
- In some cases, the topography of the property allows for a natural flow of water. Take advantage of this when designing a rain garden and/or bioswale.
- Be sure to reinforce the area where water enters the rain garden if there is a potential for erosion with erosion netting and/or stone.
- It may be a good idea to leave your rain garden "off line" for an initial period. By allowing time for your plants to become well-established in your rain garden before redirecting gutter downspouts or adding the directional pipe or bioswale to route water to your rain garden, the plants will become strong and tall enough to withstand flooding.

Continue on to Select Plants

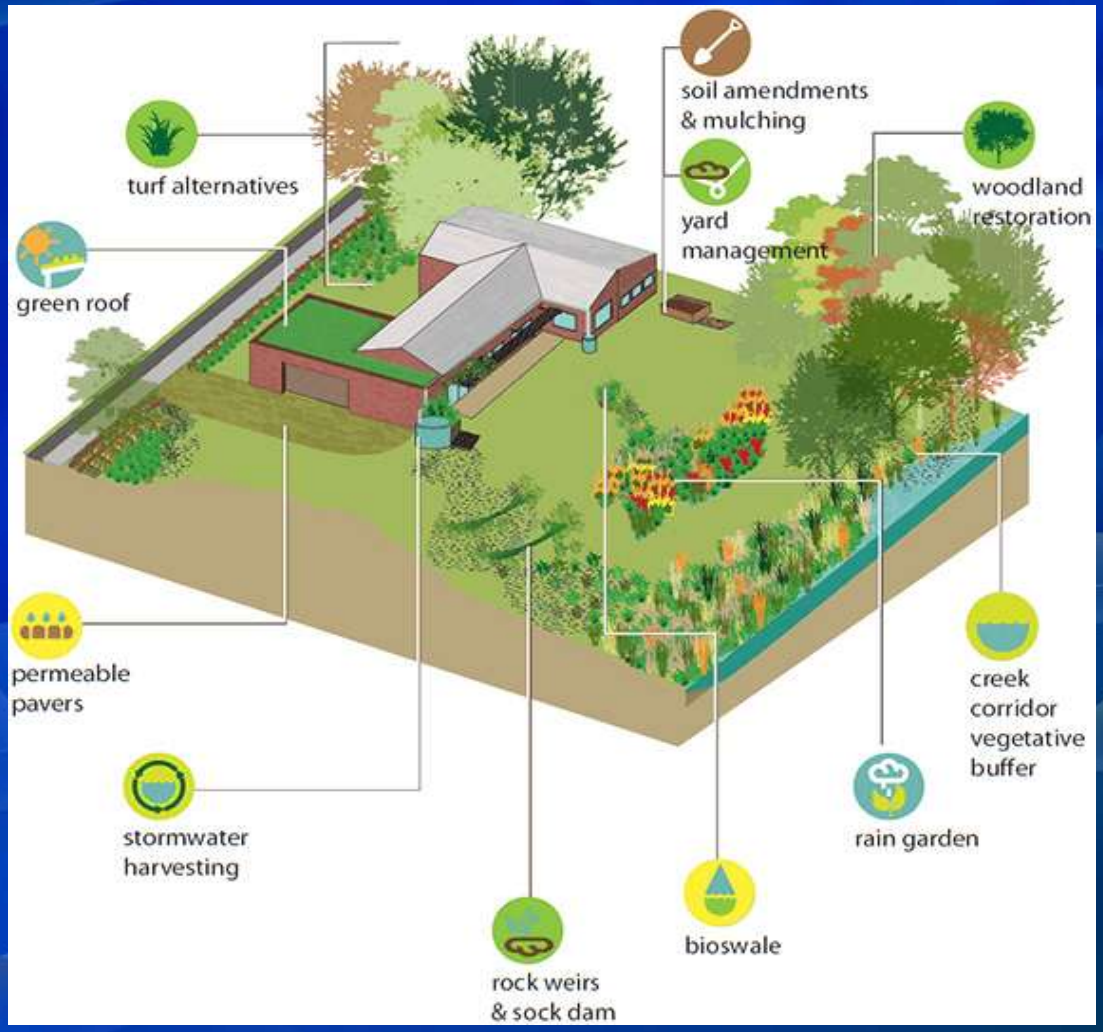
Select Plants

Source: Cindy Gilberg

Creve Coeur Demonstration Site

U. City Demonstration Rain Garden

deercreekalliance.org
mobot.org/rainscaping



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