



Your Land. Your Water. Your Solution.

Lakes Congress Rain Gardens

May 31, 2019



Soak Up the Rain NH

Rain Gardens Basics

Resources

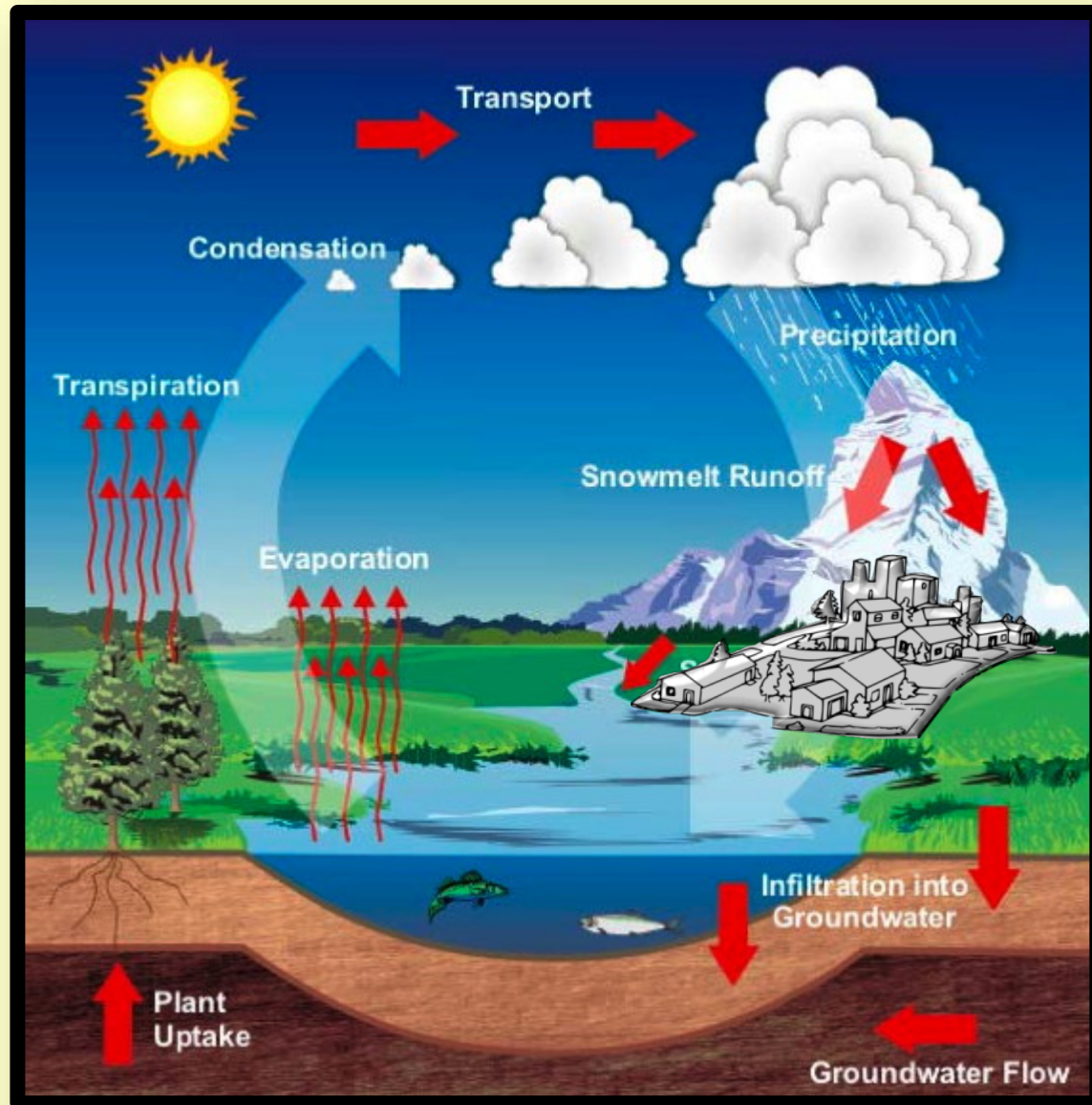
Q & A

Intro to Waukegan Boathouse rg

Field Trip

Back in time for closing remarks

Infiltration Interrupted





stormwater runoff

Water from rain or melting snow that doesn't soak into the ground.

Runoff Carries Pollution



Pollutant Examples

Sediment

Nutrients

Bacteria



ADVISORY
High levels of BACTERIA have been detected in this WATER.
N.H. Dept. of Environmental Services

WATER CURRENTLY NOT SUITABLE FOR WADING OR SWIMMING!

Exposure to this water may cause nausea, vomiting, diarrhea, or fever.
Children, the elderly and others with sensitive immune systems are especially vulnerable.

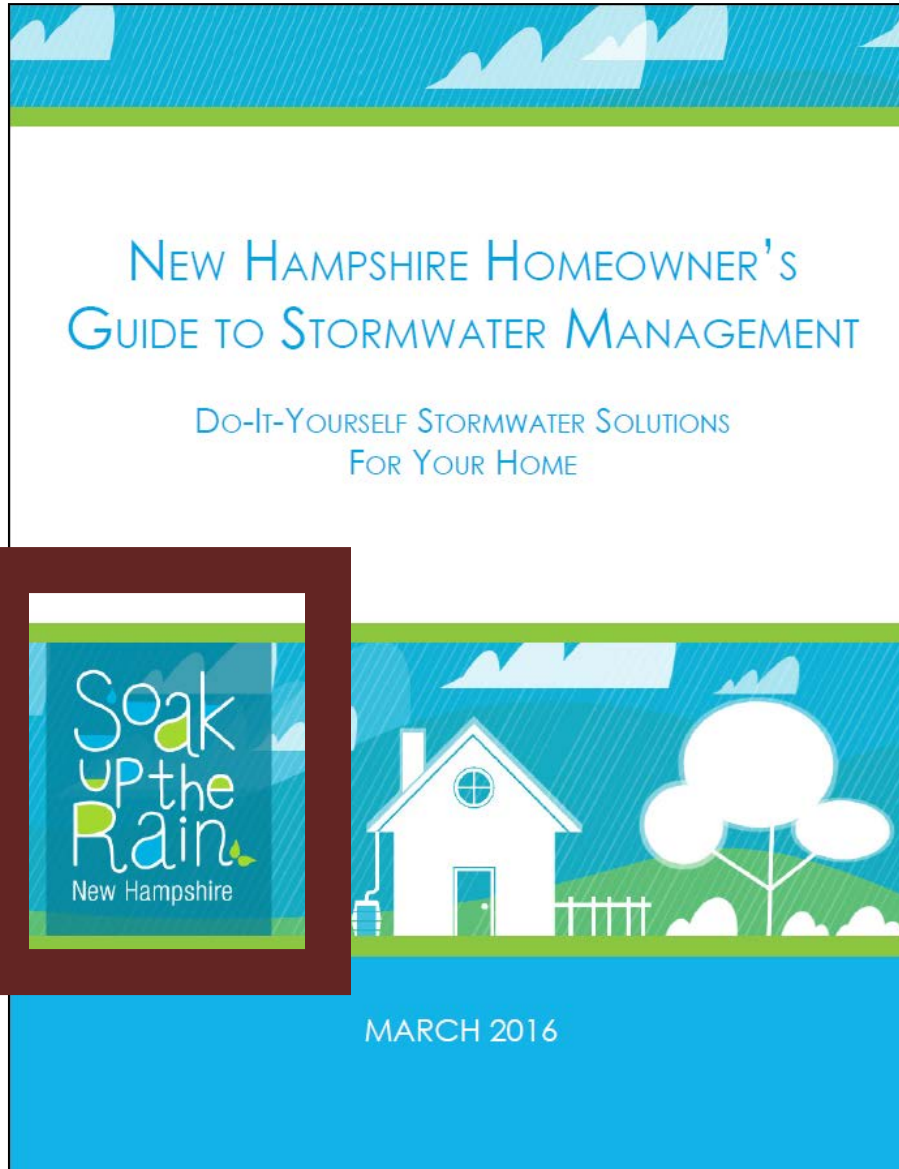
All current advisories posted at www.des.nh.gov
Click "beach advisory" in left column

CONTACT INFORMATION:
NHDES Beach Program
79 Main St., Concord, NH
(603) 271-6698
beachinfo@des.nh.gov

Residential Runoff



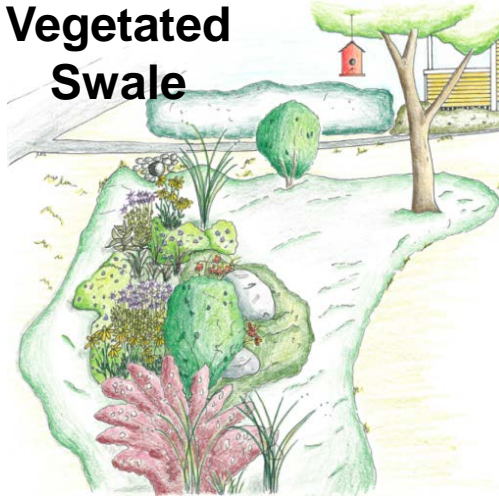
Residential Stormwater Management



- Why
- How
 - Property assessment
 - 10 Stormwater Solutions
- Resources

Capture / Slow / Direct

Vegetated Swale



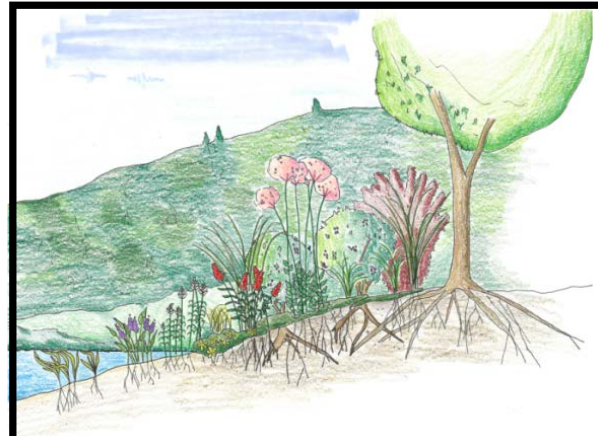
Rain Barrel



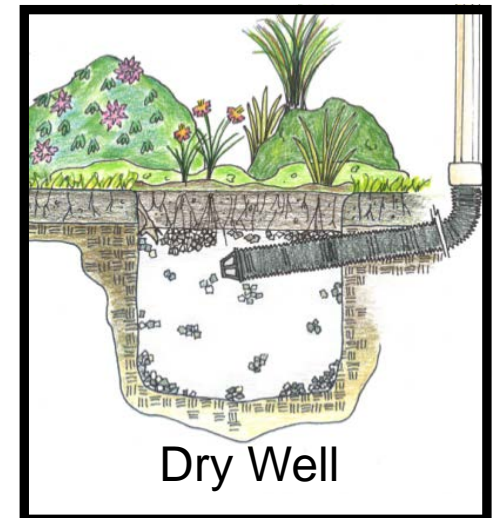
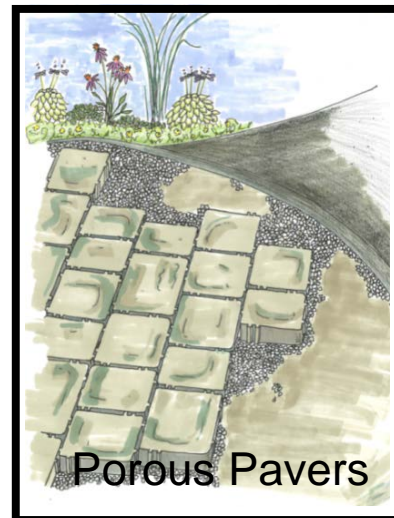
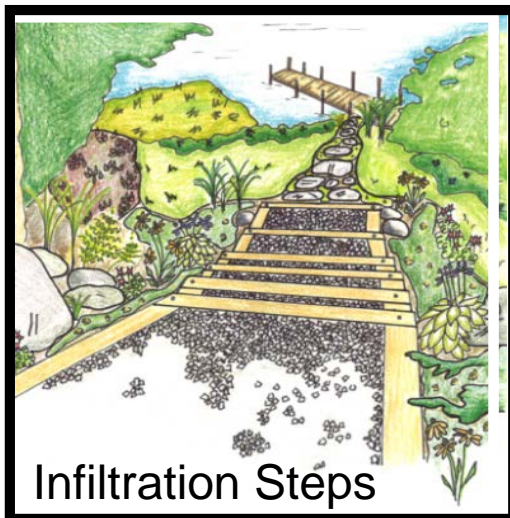
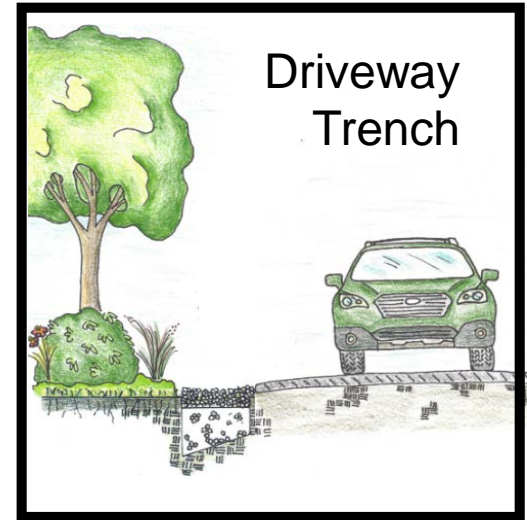
Water Bars



Vegetated Buffer



Holes filled with stones or PLANTS!

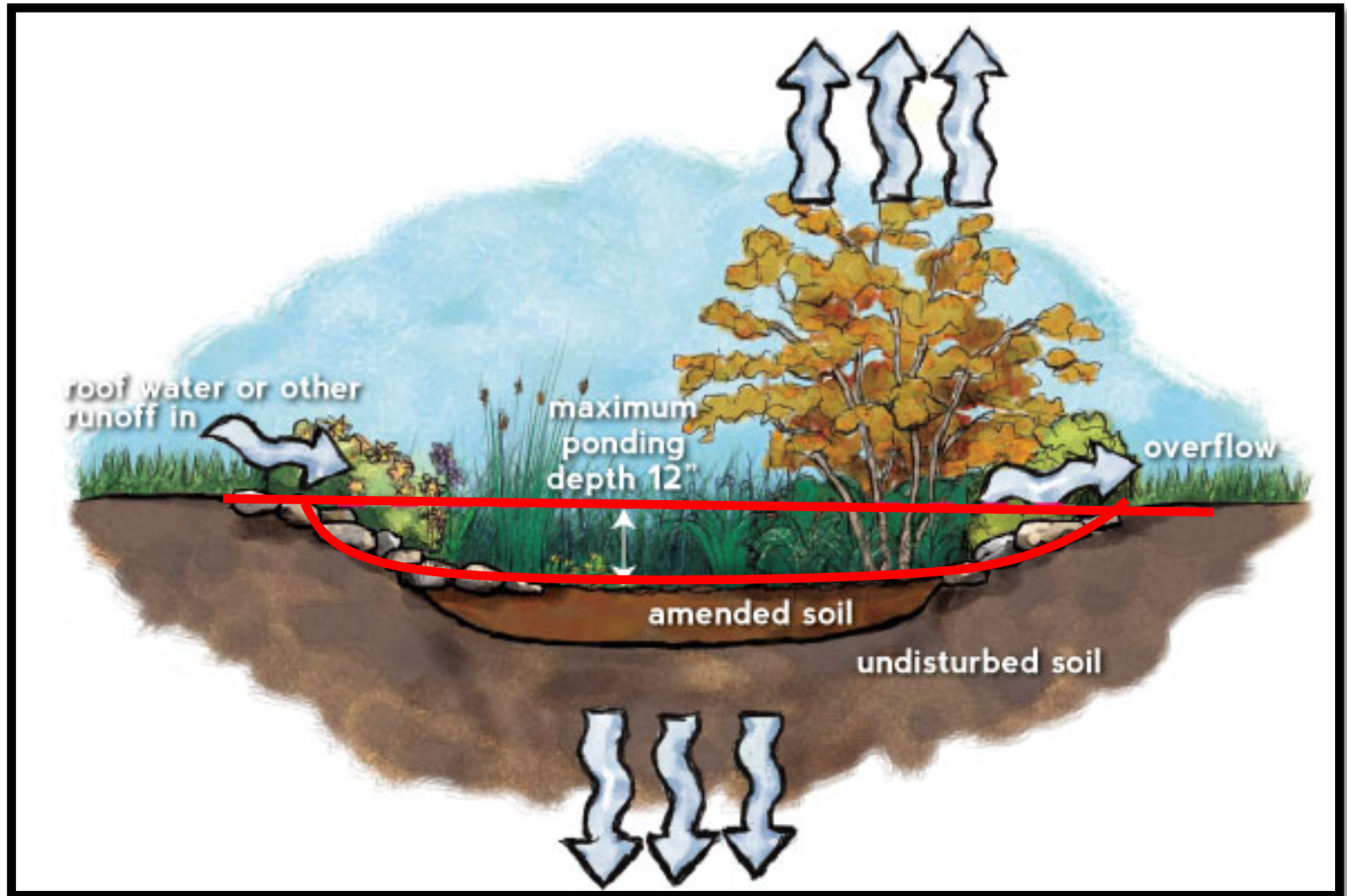


What is a Rain Garden?



A sunken garden that uses plants and soils to capture, absorb and, treat stormwater.

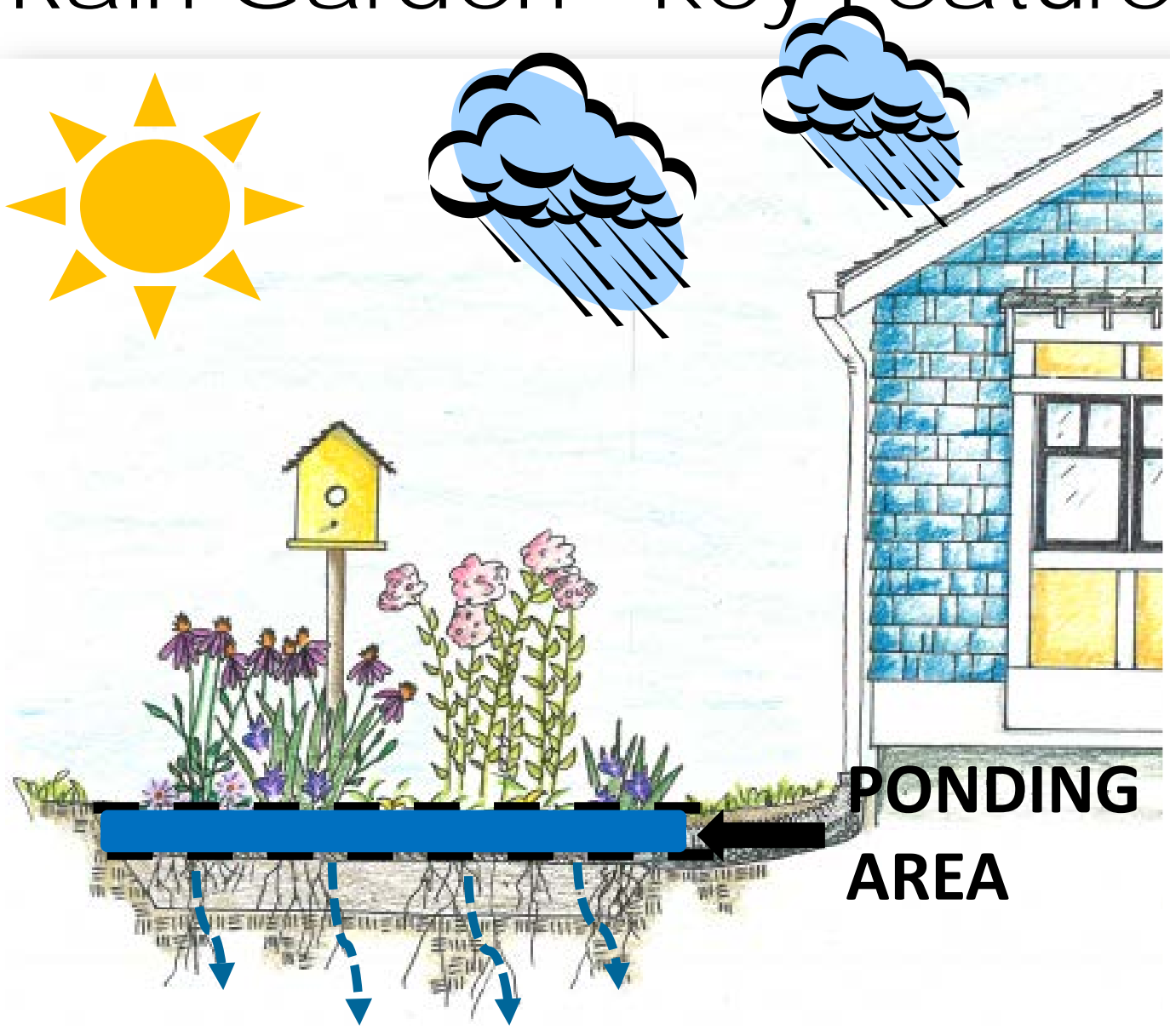
Rain Garden Profile



How Does a Rain Garden Work?



Rain Garden - Key Feature

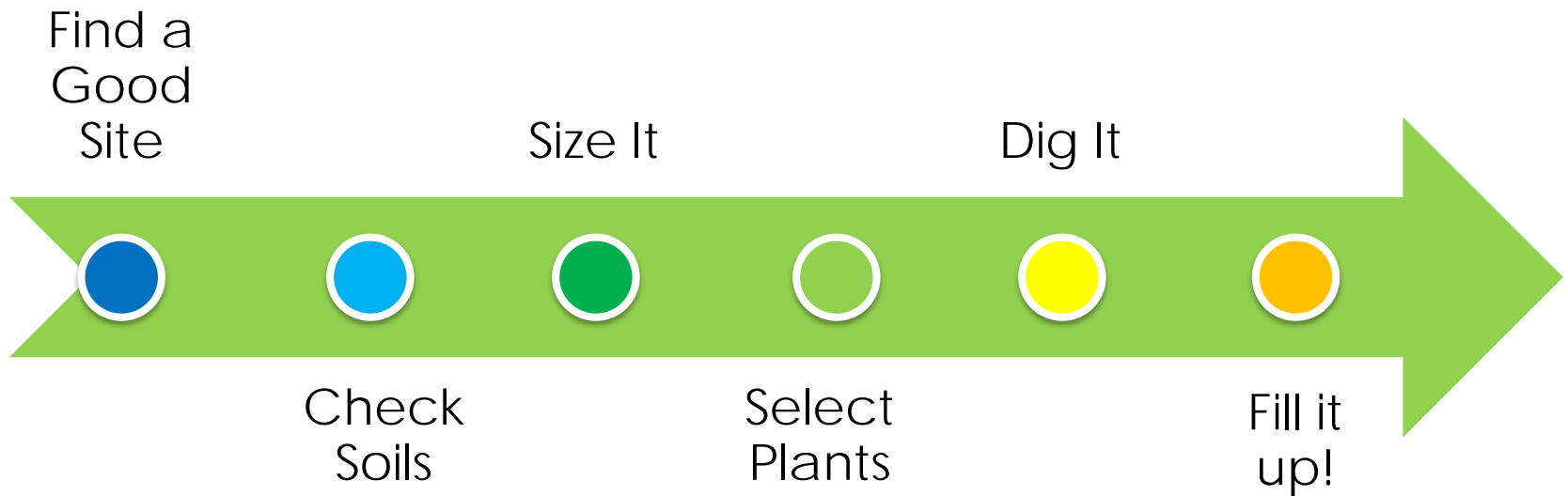


Rain Garden Benefits


- Reduce runoff
- Replenish groundwater
- Filter pollutants to reduce pollution
- Provide habitat
- Beautiful!



Steps to Build a Rain Garden



Select a Good Site

- 
- A decorative graphic on the left side of the slide. It consists of a large green arrow pointing downwards, with a blue circle at its top. The background of the graphic is a blue and white diagonal striped pattern.
- What runoff will you capture?
 - Avoid areas:
 - With standing water after it rains
 - Within 10 feet of your foundation
 - Near your water well
 - Near tree roots
 - Septic tank or leach field
 - Steep slopes (<12%)
 - Call DIGSAFE to check for underground utilities.

No Standing Water



Check Soils – Perc Test

1. Dig a hole ~12" deep.



2. Fill it with water. Let drain. Fill again.



3. Note water level & time.



Ideally, area will drain within 24 hours.

Check Soils – Ribbon Test



Soil Type	Ribbon Length (inches)
sand	soil does not form a ribbon at all
silt	a weak ribbon <1.5" is formed before breaking
clay	a ribbon >1.5" is formed

Size It



- Soil type
- Slope of the ground
- Drainage Area







Size It – Wiggle room!



Select Plants

- Native (at least non-invasive)
- Tolerant of fluctuating wet and dry conditions
- Sun or shade
- Different bloom times
- Native Plant List for New England Rain Gardens



	Scientific Name Common Name	Rain Garden Zone			Soil Moisture	Light Exposure	Bloom Period & Color					Mature Size		USDA Hardiness Zone	Attractive to:	Plant Notes	
		Base	Slope	Bank			May	June	July	Aug	Sept	Oct	Height (feet)				Spread (feet)
PERENNIALS																	
	Eutrochium (formerly Eupatorium) purpureum Sweet Joe Pye weed	•			☔ ☀	☀				• • •			3-6'	3'	3-8	☦	Popular cultivars include "Gateway" (6' tall) and "Little Joe" (3' tall). Other Eutrochium species are also suitable.
	Gentiana clausa Closed gentian or Meadow bottle gentian	•			☔ ☀	☀				• •			1-3'	1-2'	3-8	☦	True blue flowers never fully open. Good understory plants.
	Geranium maculatum Spotted crane's bill	•			☔ ☀ ☁	☀				• •			1'	1-1.5'	4-8	☦	Geraniums come in many species and cultivars. "Spessart" is a popular cultivar with pale early summer bloom. "Kazanne" is a blue, late summer bloom.
	Helenium autumnale Common sneezeweed	•			☔ ☀	☀				• •			2-5'	3'	3-8	☦	Orange and red-colored cultivars available.
	Iris versicolor Blue iris or Blue flag	•			☔ ☀	☀				•			2-3'	2-3'	2-7	☦	Sturdy plant with thick rhizomes. Great choice for placing near the rain garden inlet and outlet.
	Lobelia cardinalis Cardinal flower	•			☔ ☀ ☁	☀				• • •			2-4'	2'	3-8	☦	Lobelia will often reseed itself and migrate in the garden.

Dig It - Shape



Dig It – Remove Sod



Dig it – Level it



Dig It – Build Berm

Uphill
stake

Downhill



Up
st

Connect it



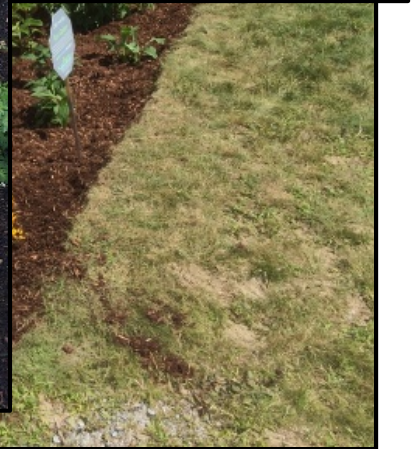
Inlet and Outlet



Fill it up



Finished Product(s)



Let it Rain!



Maintain it

1. Inspect periodically and after heavy rain.
2. Respond as needed – weed, mulch, refresh materials.



Water



Weed



Refresh
Mulch



Replace
Plants

Rain Garden (and beyond!) Resources

INFILTRATION

Infiltration strips are designed to capture and infiltrate runoff from moderate slope areas, such as driveways, and paths. They are often used for shorefront erosion control.

WATER BAR

A water bar intercepts runoff traveling down a steep driveway, sidewalk, or path and diverts it into a vegetated area to prevent erosion.

RAIN GARDEN

A rain garden is a sunken, flat-bottomed garden that uses soil and plants to capture, absorb, and treat stormwater. This helps to reduce stormwater runoff and recharge groundwater.



SIZING AND DESIGN

STEP 1. Measure the overall rise and run of the area (Figure 1).

STEP 2. Determine the number of steps needed. Divide the overall rise by the depth of the step (6" U.S. standard) to get the nearest whole number of steps.

$\text{RISE} \div \text{TIMBER HEIGHT} = \text{NUMBER OF STEPS}$

STEP 3. Determine the slope by the run. Divide the overall run by the depth of the step (15" to be comfortable).

$\text{RUN} \div \text{NUMBER OF STEPS} = \text{SLOPE}$

STEP 4. Determine the width. The width is usually 4 feet, or the width of the driveway, or other site-specific requirements.

SIZING AND DESIGN

STEP 1. Determine slope. Measure the overall rise and run of the area to determine slope.

- Place one stake at the uphill end of the slope and another at the downhill end.
- Tie a string to the stake at the uphill end and pull it taut at ground level. Use a level to level the string.
- Measure the length of the slope. This is the run or length.
- On the downhill side, measure the distance from the string to the ground to the string.
- Divide the rise by the run and multiply by 100. This is the slope.

$\text{SLOPE} = \frac{\text{RISE}}{\text{RUN}} \times 100$

STEP 2. Determine how many steps.

- Compare your slope to the spacing in Table 1. The number of steps should be the number of times the slope is greater than the spacing.

DESIGN CONSIDERATIONS

STEP 1. Site Constraints. Identify site constraints in the area that the rain garden will be located such as:

- High water table - rain gardens should not be placed in persistently wet areas or areas where puddles regularly form.
- Underground obstructions such as gas or electrical lines, other utilities, structures or bedrock. Contact DigSafe 72 hours in advance of your project.
- Property boundaries and local setbacks.

STEP 2. Setbacks. Be sure to locate the rain garden:

- At least 10 feet away from buildings with basements to prevent seepage into the basement.
- At least 15 feet away from septic tank or leach field.
- Away from tree roots and drinking water wells.

STEP 3. Infiltration test. Perform a simple perc test to determine the ability of the soil to infiltrate water. Rain gardens should only be built in areas where a simple perc test drains completely within 24 hours. To complete a simple perc test:

EQUIPMENT & MATERIALS

- ✓ Calculator
- ✓ Measuring tape
- ✓ Spray paint
- ✓ Yard stick
- ✓ 6-12 Stakes
- ✓ 2-4 long stakes (4')
- ✓ String
- ✓ Shovels
- ✓ Carpenter's level
- ✓ String level
- ✓ Rakes
- ✓ Compost/Woodchips
- ✓ Mulch
- ✓ Crushed stone
- ✓ Flat stones or pavers
- ✓ Tarp(s)
- ✓ Wheel Barrow(s)
- ✓ Plants

SOAK Stories

Soak Up the Rain Projects in NH

Completed SOAK Projects

Check out these projects on our [map](#).

2018 Projects

[Infiltration Landing at Wentworth Lake in Wolfeboro](#) – Association

[Dave Denby's Infiltration Steps at Wentworth Lake](#)

[Infiltration Steps at Hothole Pond in Loudon](#)

2017 Projects

[The Villages at Loudon Soak Up the Rain](#) – The Villages Association

[Balmoral Clubhouse Infiltration Steps](#) – Lake Winnipesaukee Association

[Waukegan Bathhouse Rain Garden](#) – Lake Winnipesaukee Association

[Lake Friendly, Less Convenient Retaining Wall Project](#) – Lake Winnipesaukee Association

Photo Galleries



Denby Infiltration Steps at Wentworth Lake 2018

8 images



Dry Well Greenland 2014

13 images



Infiltration Landing at Wentworth Lake 2018

7 images



Rain Garden and Driveway Trench PEA 2016

22 images



Rain Garden and Landscaper Training, Hampton 2015

27 images



Rain Garden Durham Residential 2016

21 images













Install a Rain Garden

Learn the steps involved in installing a residential rain garden.

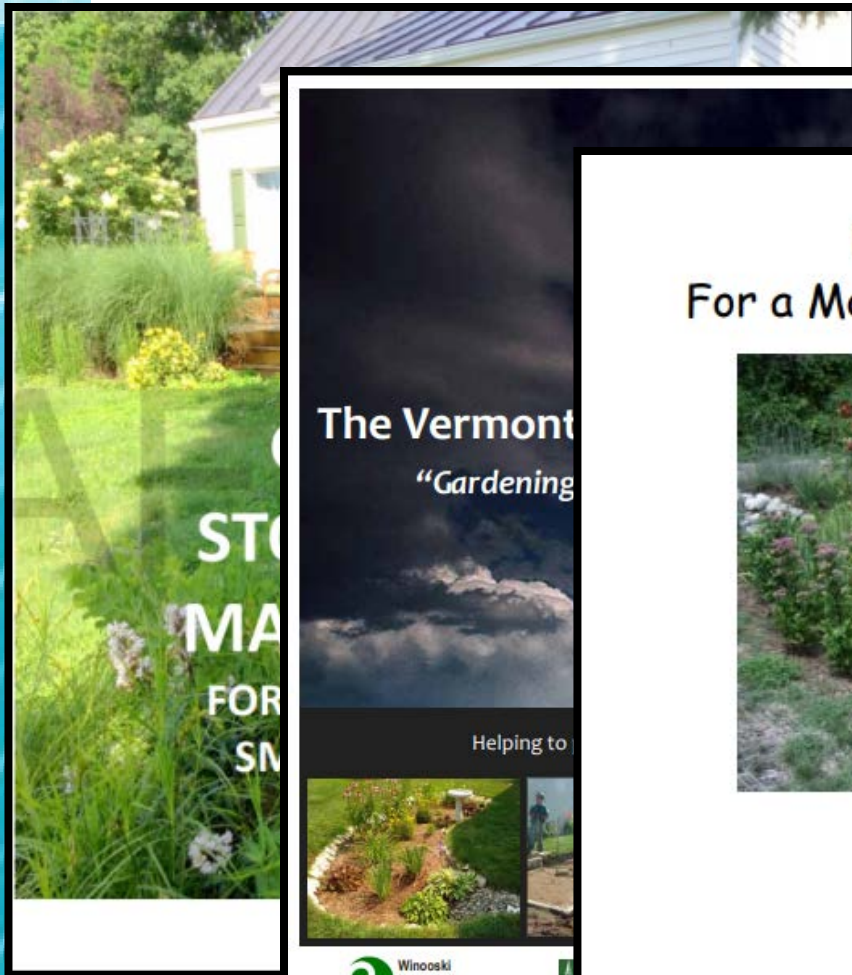


PERENNIALS

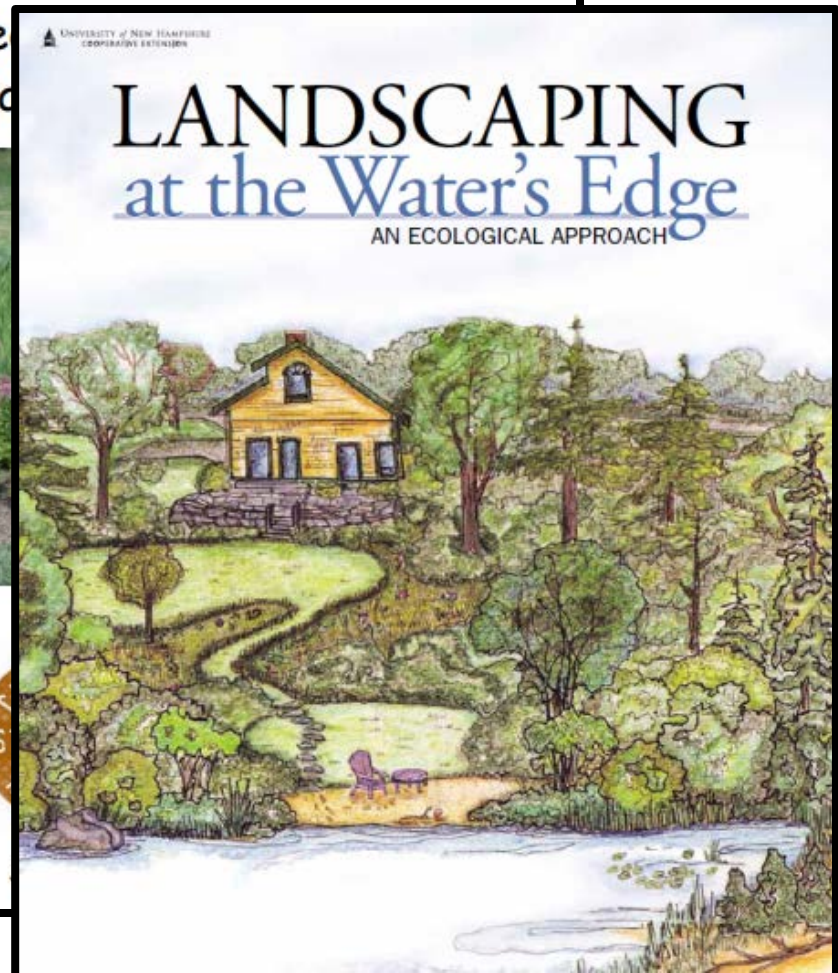


Plant Notes	Attractive to:	ness zone
Popular cultivars include 'Gateway' (6' tall) and 'Little Joe' (3' tall). Other Eutrochium species are also suitable.	 	8
True blue flowers never fully open. Good understory plants.		8
Geraniums come in many species and cultivars. 'Spessart' is a popular cultivar with pink early summer bloom. 'Rozanne' is a blue, late summer bloom.	 	8
Orange and red-colored cultivars available.	 	8
Sturdy plant with thick rhizomes. Great choice for placing near the rain garden inlet and outlet.	 	7
Lobelia will often reseed itself and migrate in the garden.	  	8

Resources



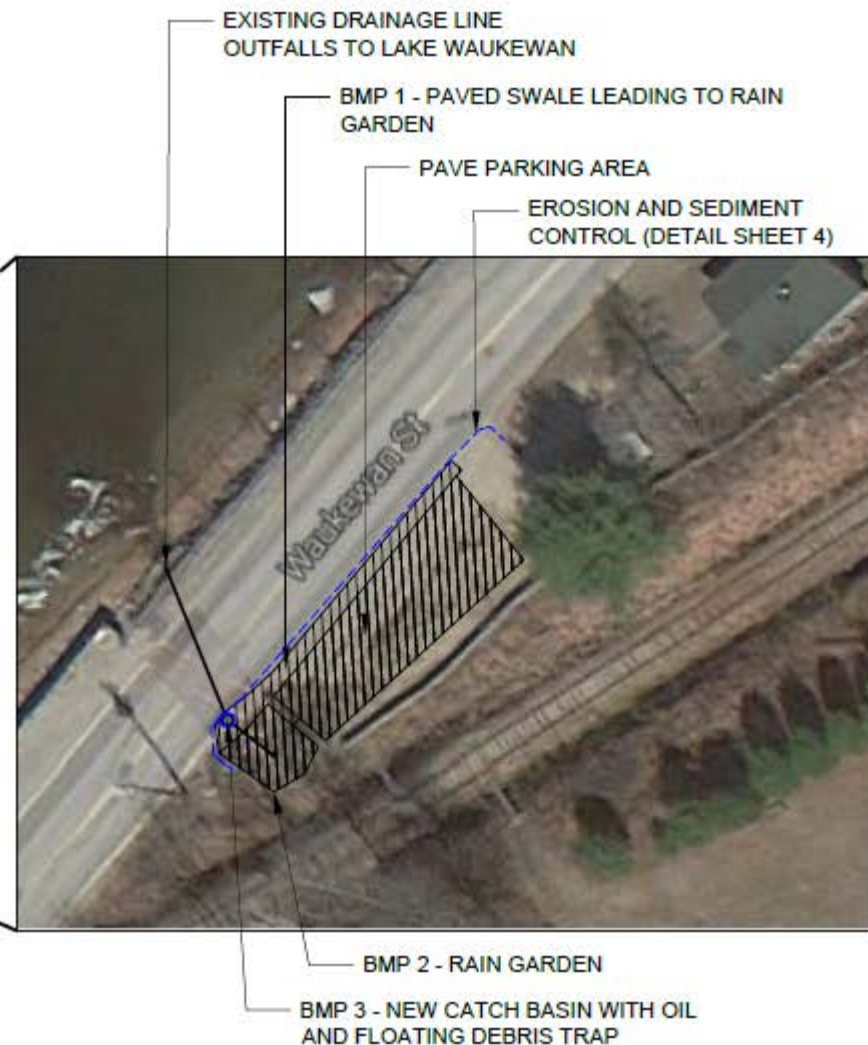
Home
For a More Bo



Questions?

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www.soaknh.org





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No.	Date	Revision	Designed	Checked	Approved
1			TAP	JH	TFB

GRAPHIC SCALE
NOT TO SCALE
Original Drawing Size = 11 x 17 in.



Project:
PROJECT LOCATION
STORMWATER MANAGEMENT
WAUKEWAN ST, MEREDITH, NH

Date:
January 15, 2016
Sheet No.
1 of 4

Site 1-08A: Lake Waukewan Bathhouse Parking lot

Problem: Moderate surface erosion, bare soil in parking area, adjacent to catch basin that empties directly into the lake.





Site 1-08A: Lake Waukewan Bathhouse Parking lot

Solution: Pave the parking lot, install bio-retention basin with rain garden. Install deep sump catch basin.

Paved swale directs stormwater runoff to bio-retention basin.



Rain garden captures and infiltrates stormwater runoff.