Rain Garden Site Selection and Design

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Outline

- What to look for around your property
- How do the soils drain?
- Choosing a rain garden type
- Sizing RG
- Overflow/bypass

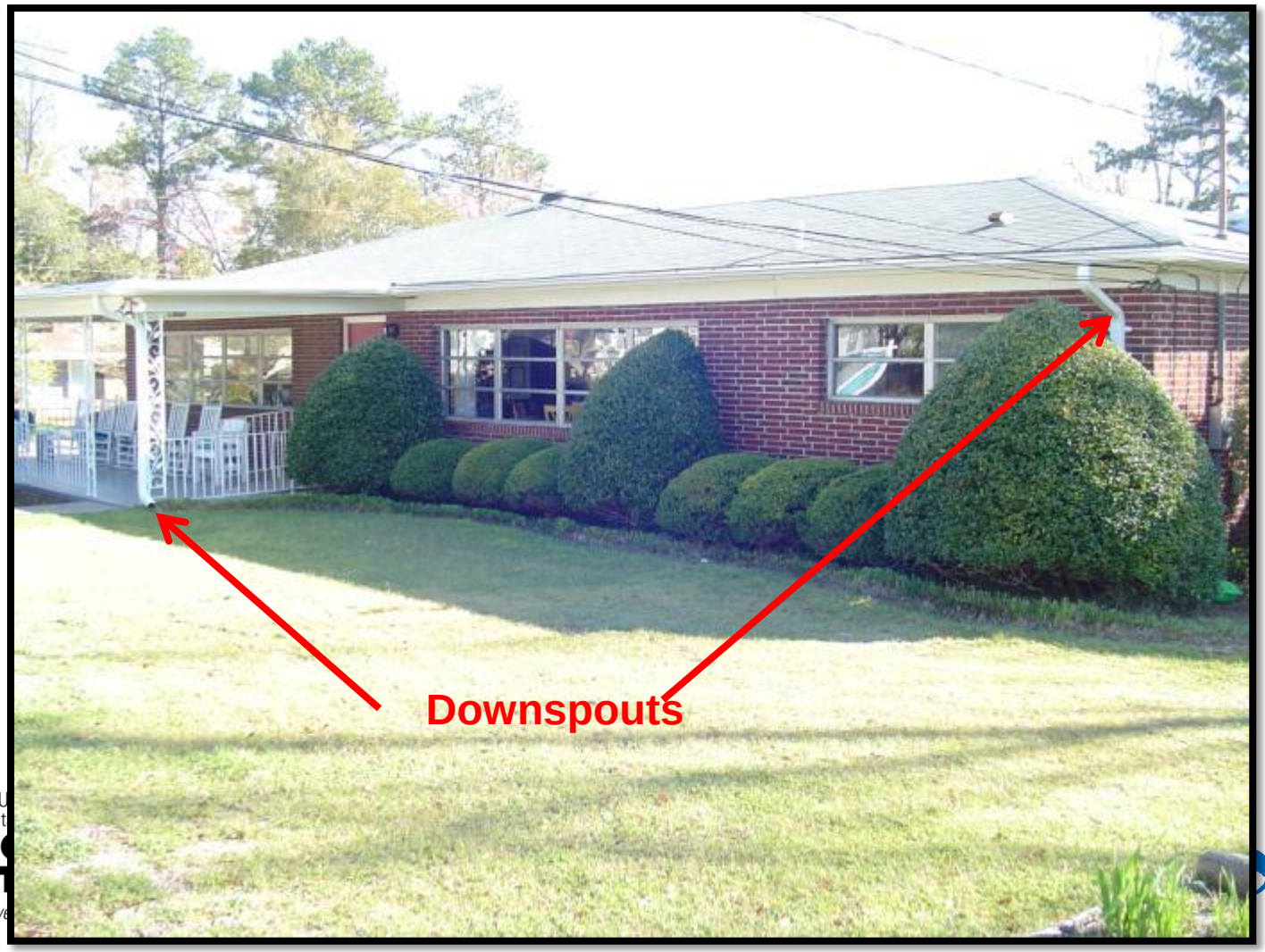
Rain Garden Location

- Considerations
  - *Topography*
  - *Downspouts*
  - *Ponding*
  - *Existing Landscape*
- Constraints
  - *Utilities*
  - *Soil Type*
  - *Water Table*

Best Source of Water for your RG?

DOWNSPOUTS

Rain Garden Location



Rain Garden Location

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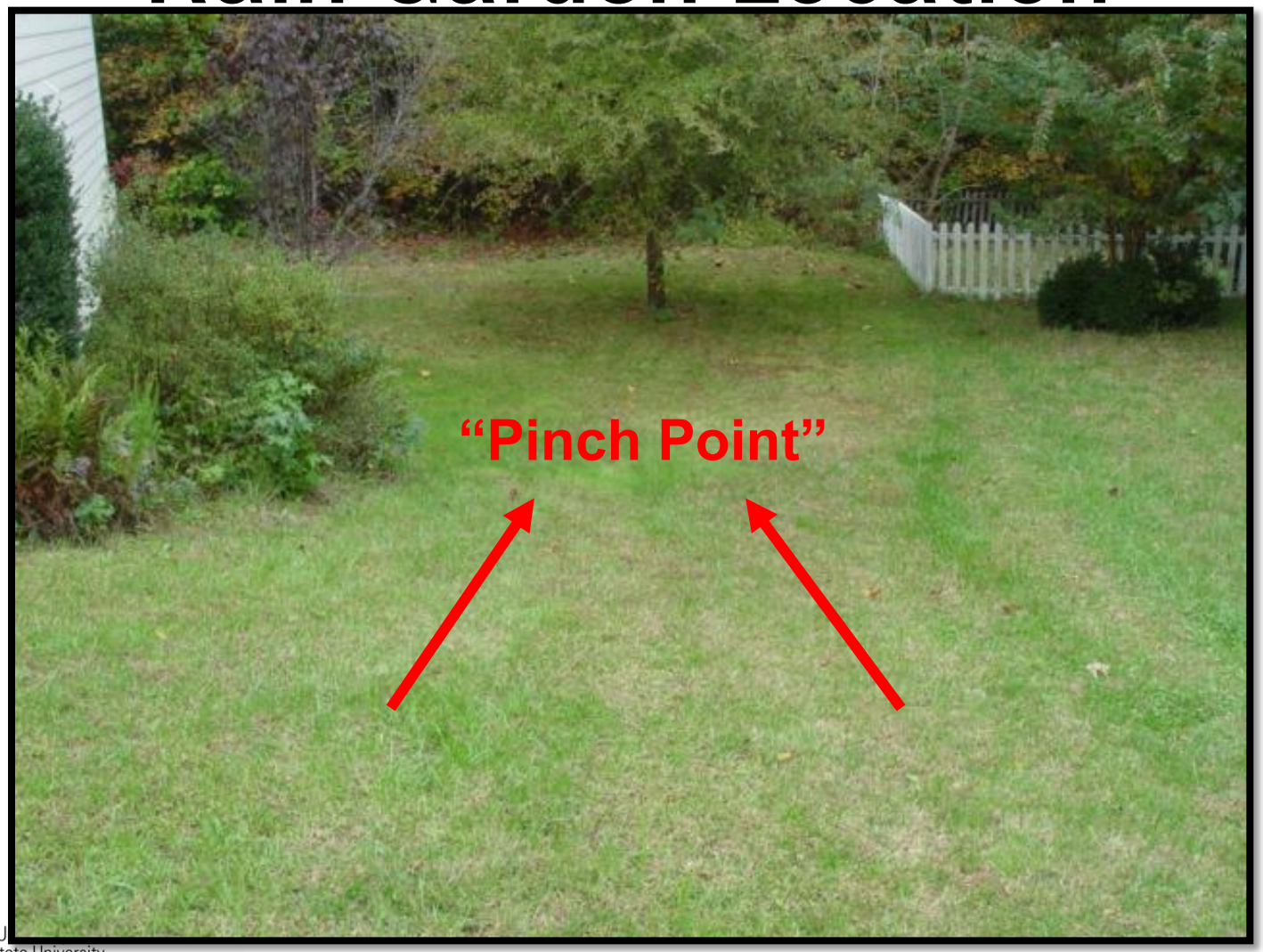

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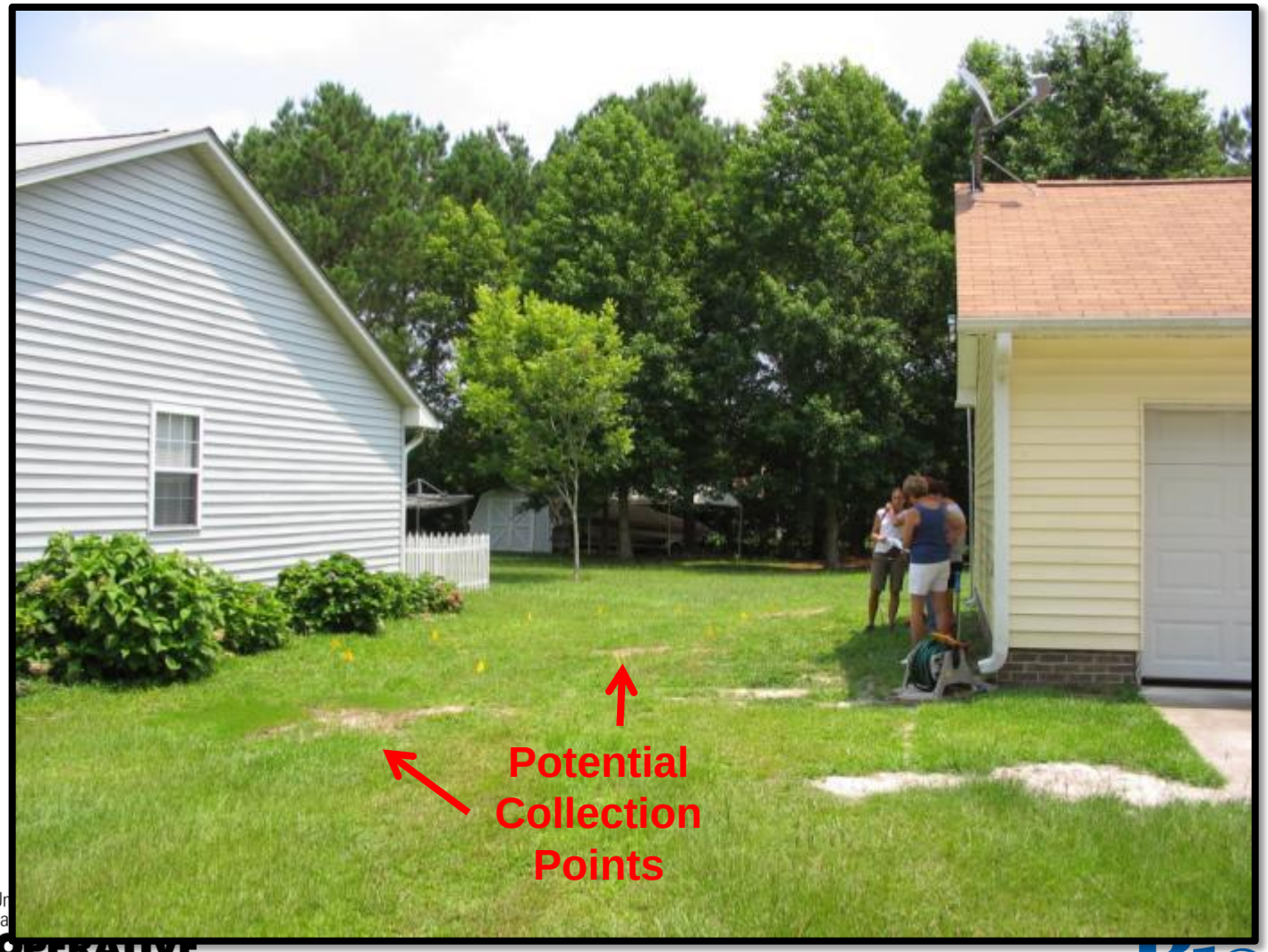


Rain Garden Location

Observe your yard during a rainfall event

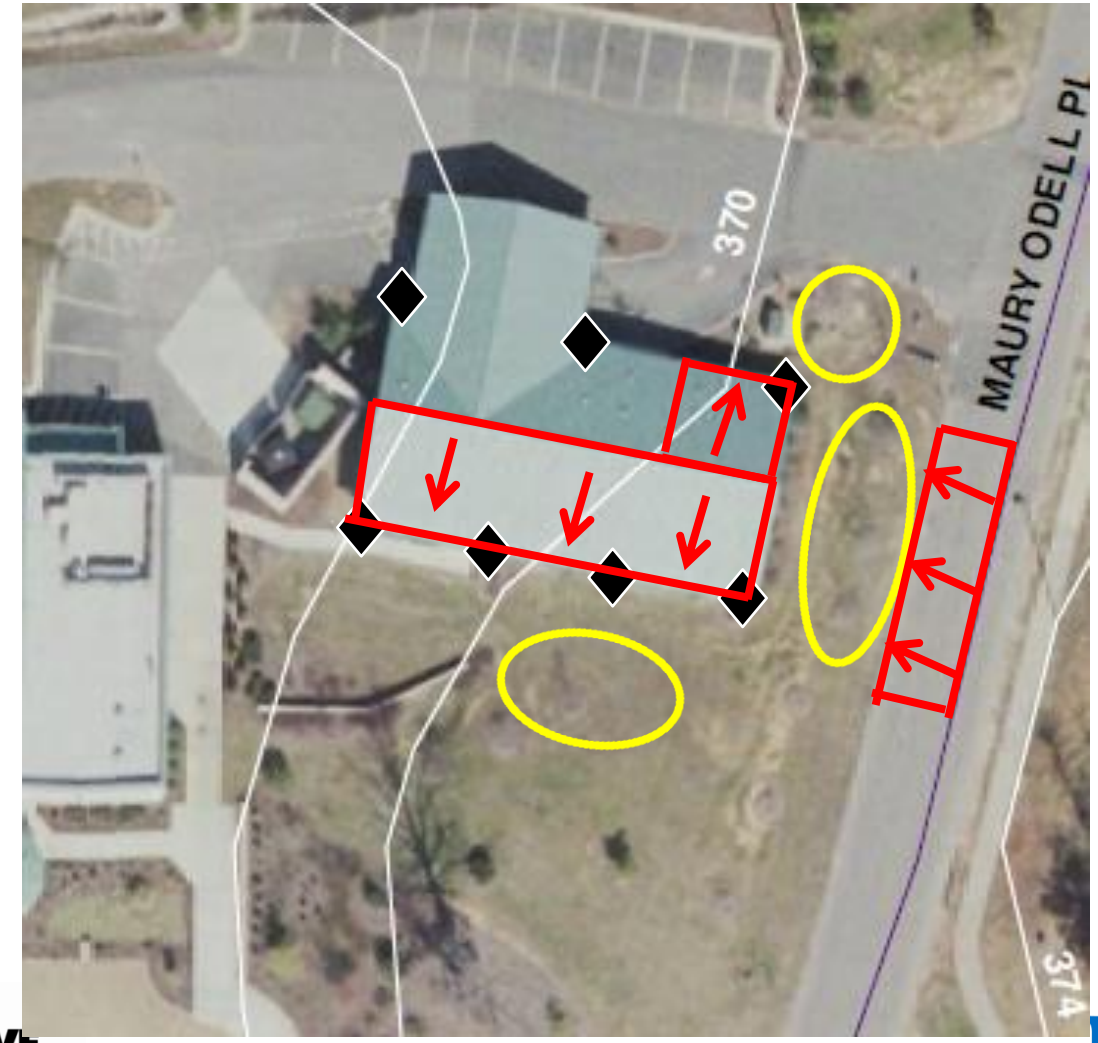
- Where does water flow from?
- Where does water travel to or collect?

Rain Garden Location

- Place your garden between runoff source and destination

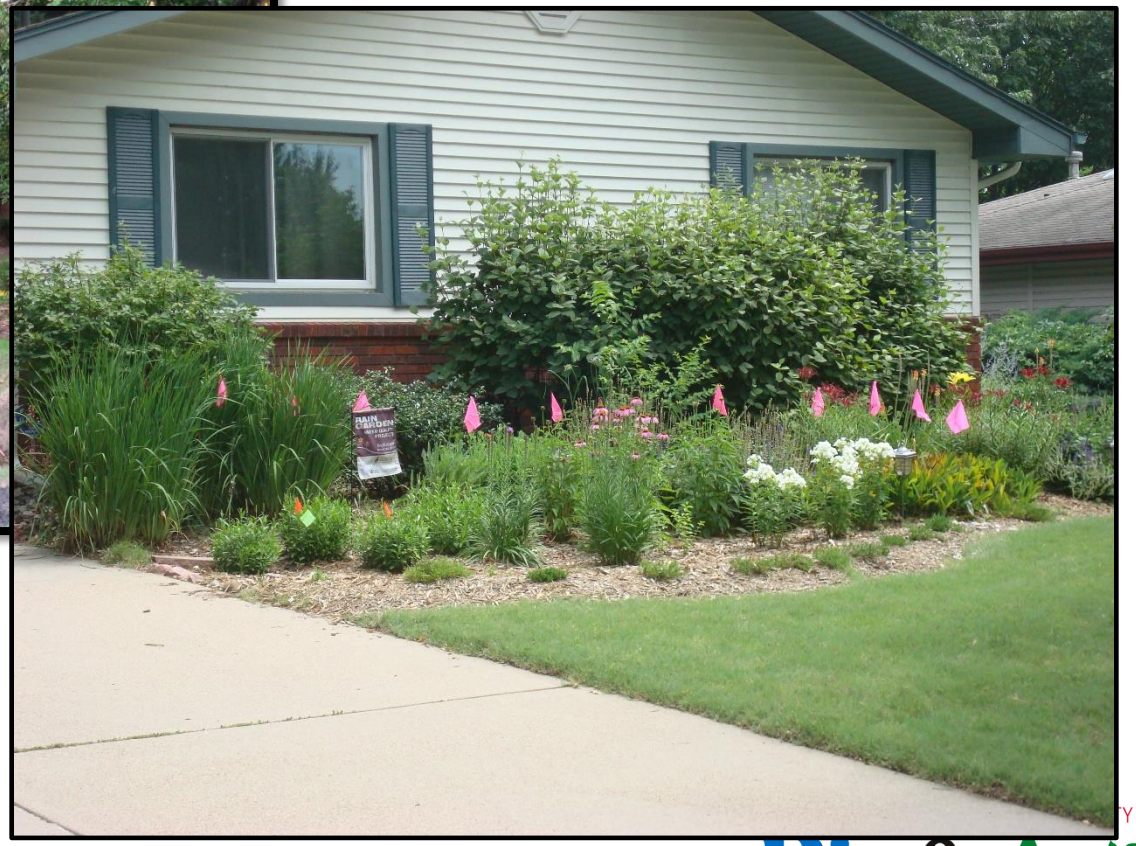
- We want to intercept water before it reaches surface waters or the storm drain network!

Identifying a RG Location

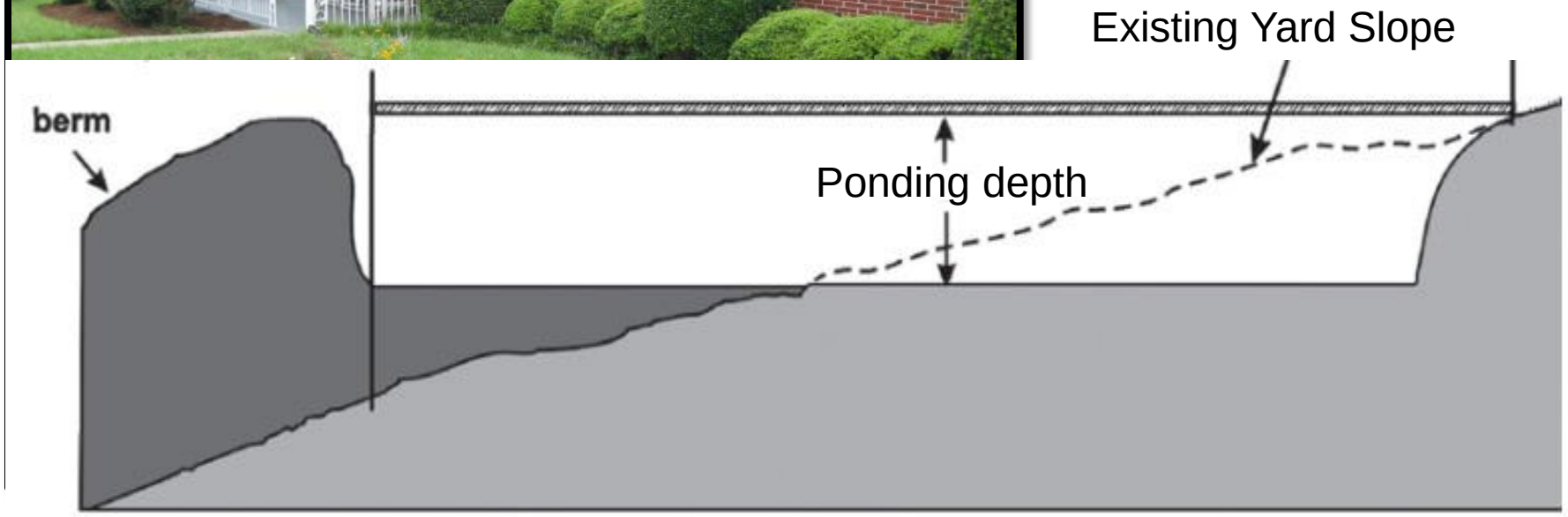


Rain Garden Location

Integrate into existing landscaping



Locate Rain Garden with Topography in Mind to Minimize Digging and Berm Construction



Rain Garden Construction Sequencing

- Add garden after other construction is finished
- Take note of potential or active construction

Rain Garden Construction Sequencing

Rain Garden Location: Determine Constraints

- Locate wells, septic systems, and utilities
- Ask the owner (trust, but verify!)

Rain Garden Location: Site Constraints

- Stay away from utility lines

- Locate utilities before digging

Rain Garden Location: Site Constraints

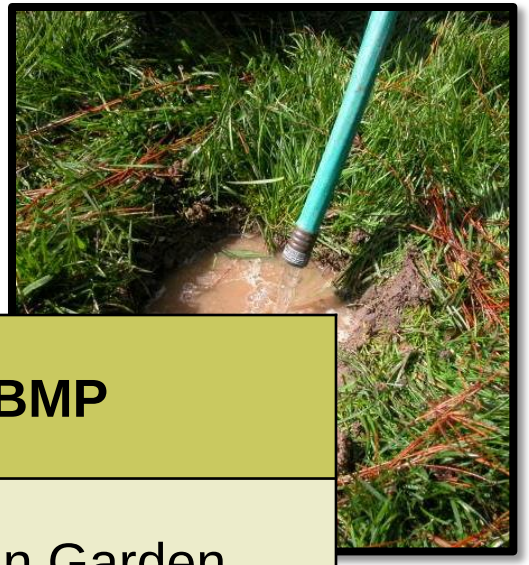
SITING GUIDELINES:

- > 10 ft from house crawl space or basement
  - NEVER uphill
- > 10 ft from wellhead
  - NEVER uphill
- > 25 ft downhill or laterally from septic system drain field
  - NEVER uphill
- In full to partial sun if possible

Infiltration Test

1. Dig a 1-foot hole at 2-3 potential locations based on drainage, utilities, and landscape aesthetics
2. Fill holes to top with water
3. Measure drainage time at each test hole
4. Repeat 2-3 times *per hole*
5. Record drainage times
6. Determine longest drain time for each hole
7. **This rate determines type of rain garden**

Infiltration Test



Drain Time	Appropriate BMP
< 12 hours	Quick-Draining Rain Garden
12 hours – 3 days	Standard Rain Garden
> 3 days	Wetland Garden

Evaluate Soils and Drainage

Signs of an impermeable soil

- Water remains in test pit three days after rainfall
- Ponded water on surface for extended periods
- Wetland soils – grey matrix mixed with areas of brown color

Evaluate for Wetland Soils

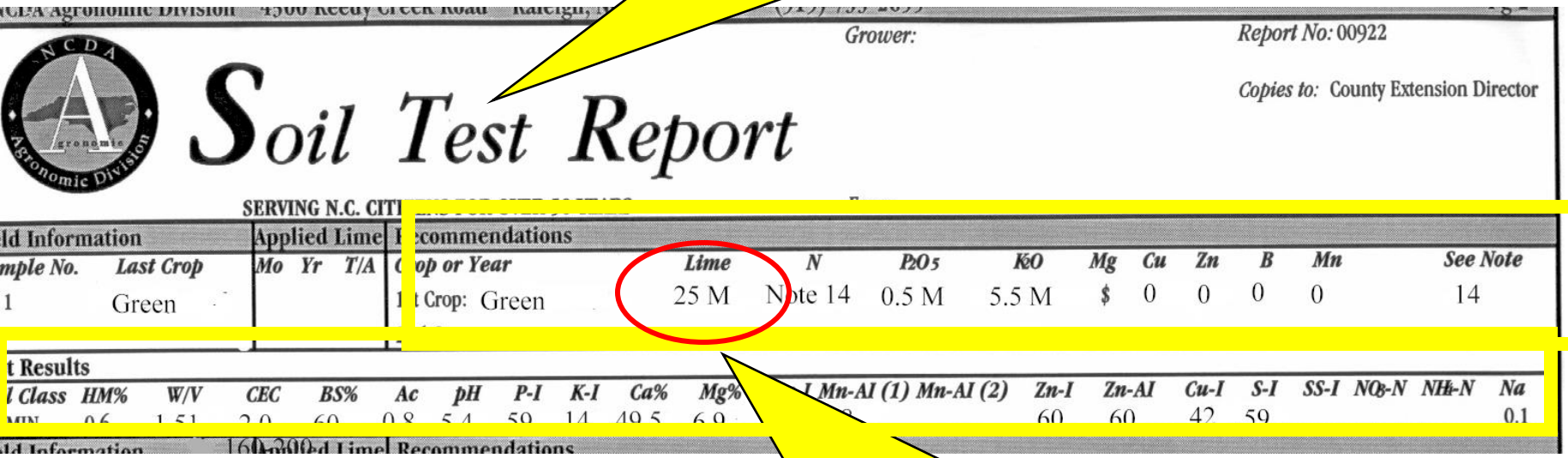
Soil Test

- After installation
- Can now enter BMP code on soil test sheet
- Ensure good plant growth and quality
  - Determine lime requirements

Don’t guess: Soil test

Soil Test Interpretation

Soil Test Recommendations



Grower:

Report No: 00922

Copies to: County Extension Director

Soil Test Report

SERVING N.C. CIT

ld Information		Applied Lime			Recommendations										
mple No.	Last Crop	Mo	Yr	T/A	op or Year	Lime	N	P_2O_5	K_2O	Mg	Cu	Zn	B	Mn	See Note
1	Green				t Crop: Green	25 M	Note 14	0.5 M	5.5 M	$	0	0	0	0	14

t Results																				
l Class	HM%	W/V	CEC	BS%	Ac	pH	P-I	K-I	Ca%	Mg%	l Mn-AI (1)	Mn-AI (2)	Zn-I	Zn-AI	Cu-I	S-I	SS-I	NO_3-N	NH_4-N	Na
MIN	0.6	1.51	2.0	60	0.8	5.4	59	14	49.5	6.9			60	60	42	59				0.1

ld Information | 60-200d Lime Recommendations

Add lime if needed

Final Siting Considerations

- Get P.E. or RLA help for larger rain gardens, bioretention, or for steep slopes
- Don't concentrate runoff towards neighbors property
- Designed to capture first 1" of runoff
- Won't necessarily solve standing water or poor drainage
- Not a solution for curing increased stormwater runoff from additional developments uphill –

  - sediment filling a rain garden will cause clogging and kill plants

Rain Garden Types

Two major differences:

1. "Wetness"
2. Plant selection

What drainage time is acceptable?

> 3 days Wetland Garden

3 options:

1) Look for another location.

2) Work with it! (Install a backyard wetland.)

3) Using soil media & under-drain. ($$$)

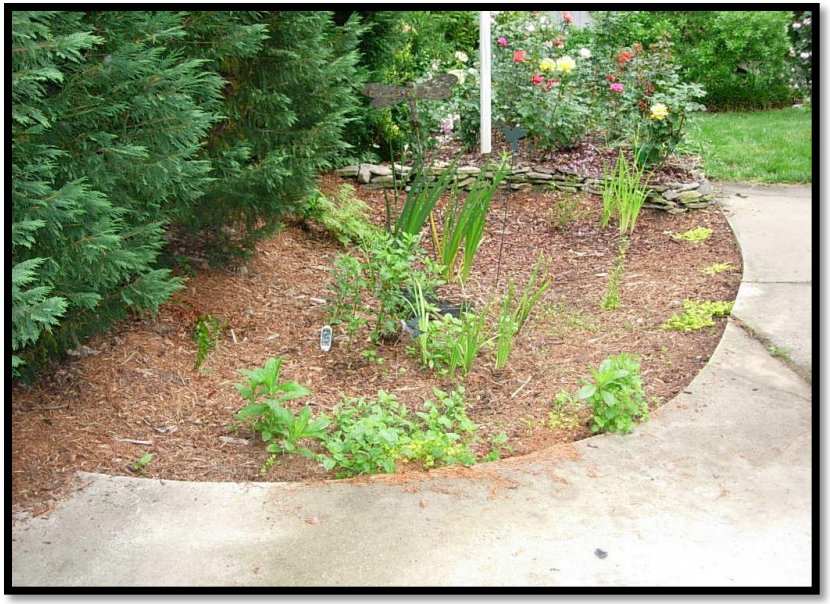
A backyard wetland / raingarden combo !

Working with wet conditions

Important!

The landowner/homeowner MUST know that at times, rain gardens will be very wet.

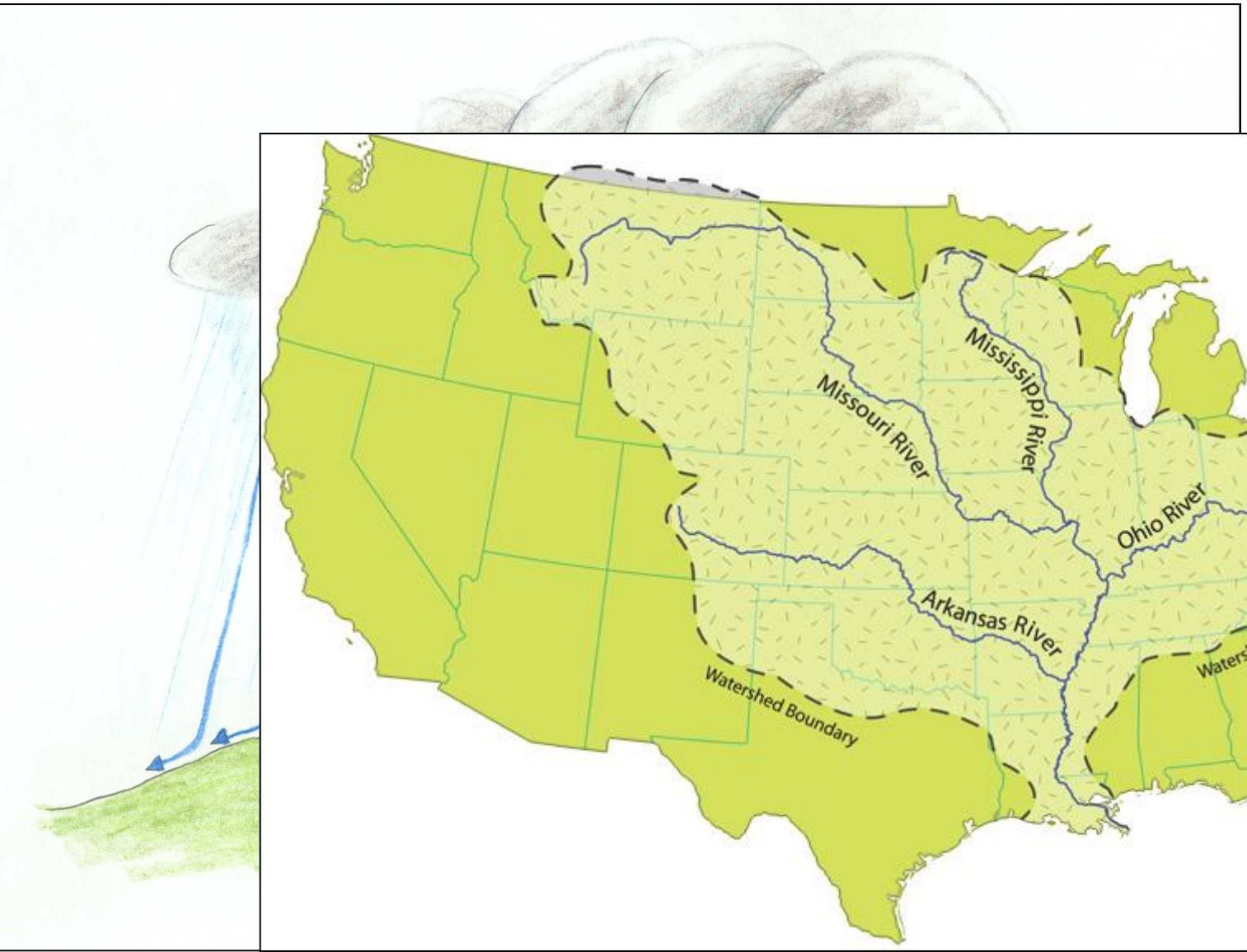
They can also be very dry.



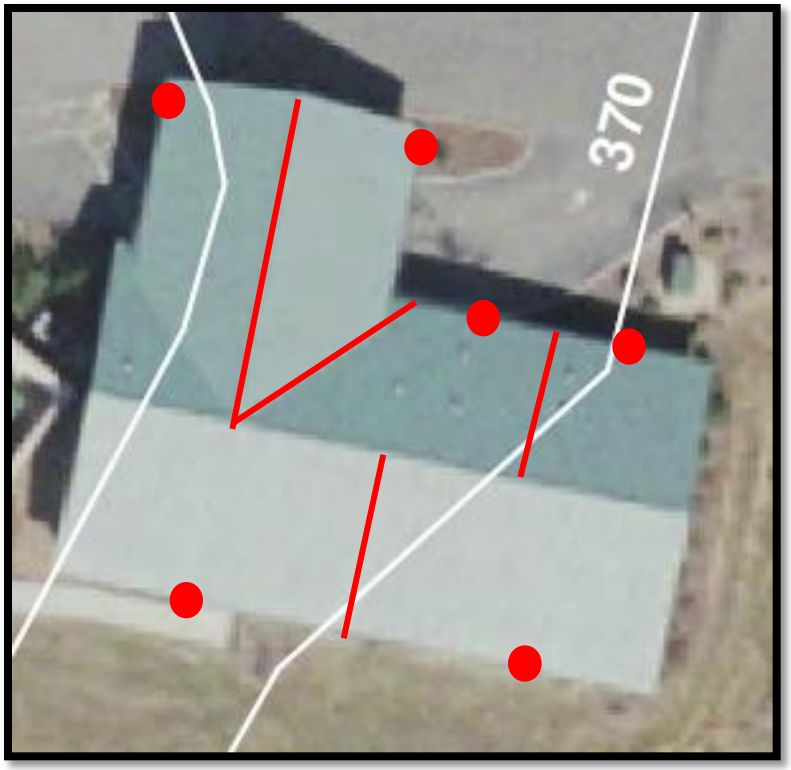
Steps to sizing a rain garden:

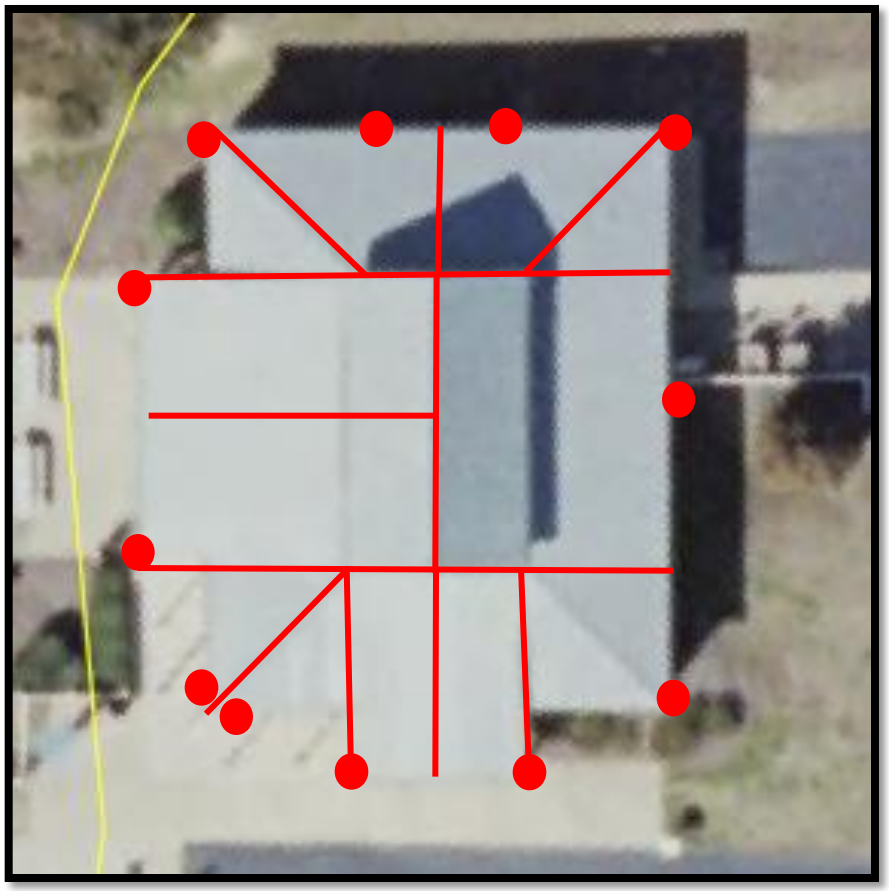
1. Determine the watershed boundaries (i.e. “delineate”)
2. Estimate the drainage area
3. “10/10” Method
4. Design the shape and size the weir

What is a watershed?



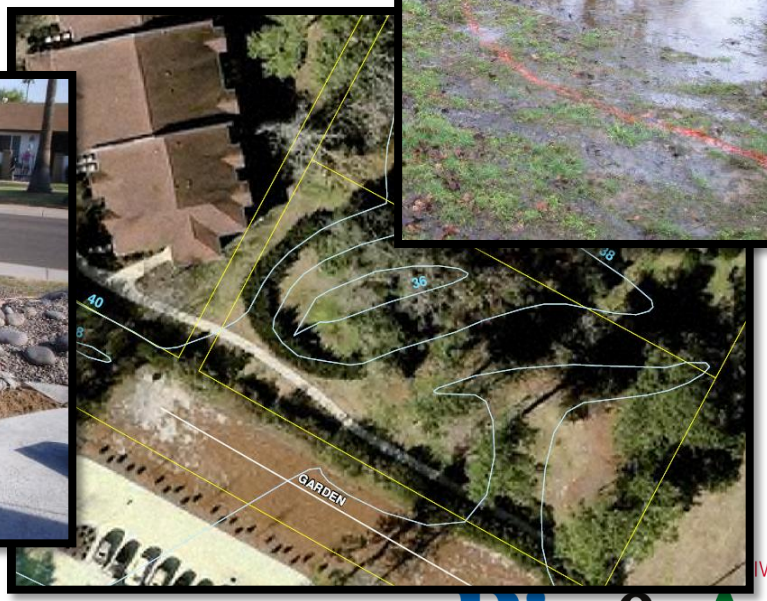
Delineate the watershed…smaller scale





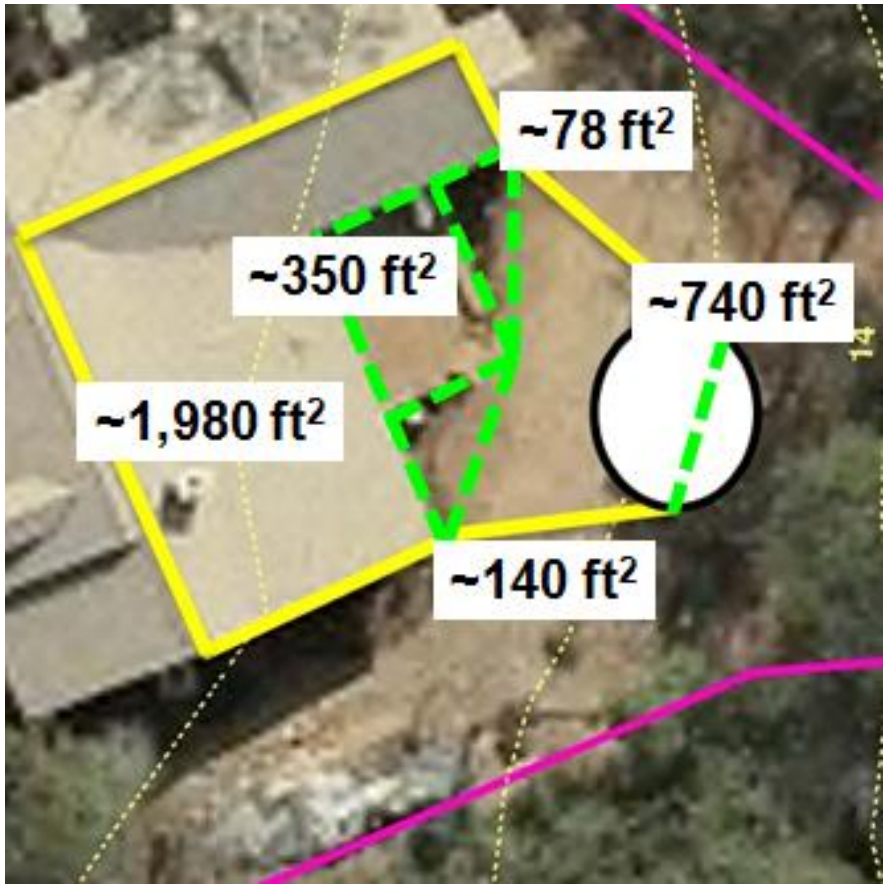
Delineate the watershed…smaller scale

- Topography & Aerial photography
  - County GIS websites
- Laser level/survey
- Landscape characteristics
- GET WET!



Calculate total watershed area.

- Mapping program
- By Hand
  - 1 adult pace ≈ 2.5 feet
  - Measuring tape
  - Aerial photograph
- Site visits should always be conducted.



Add More Watershed Area?

- Examine watershed at selected BMP location.....is there opportunity to increase drainage area?
  - Diversion berms?
  - Swales?
  - Pipes?

- Is there space for bigger BMPs?

Estimating Area

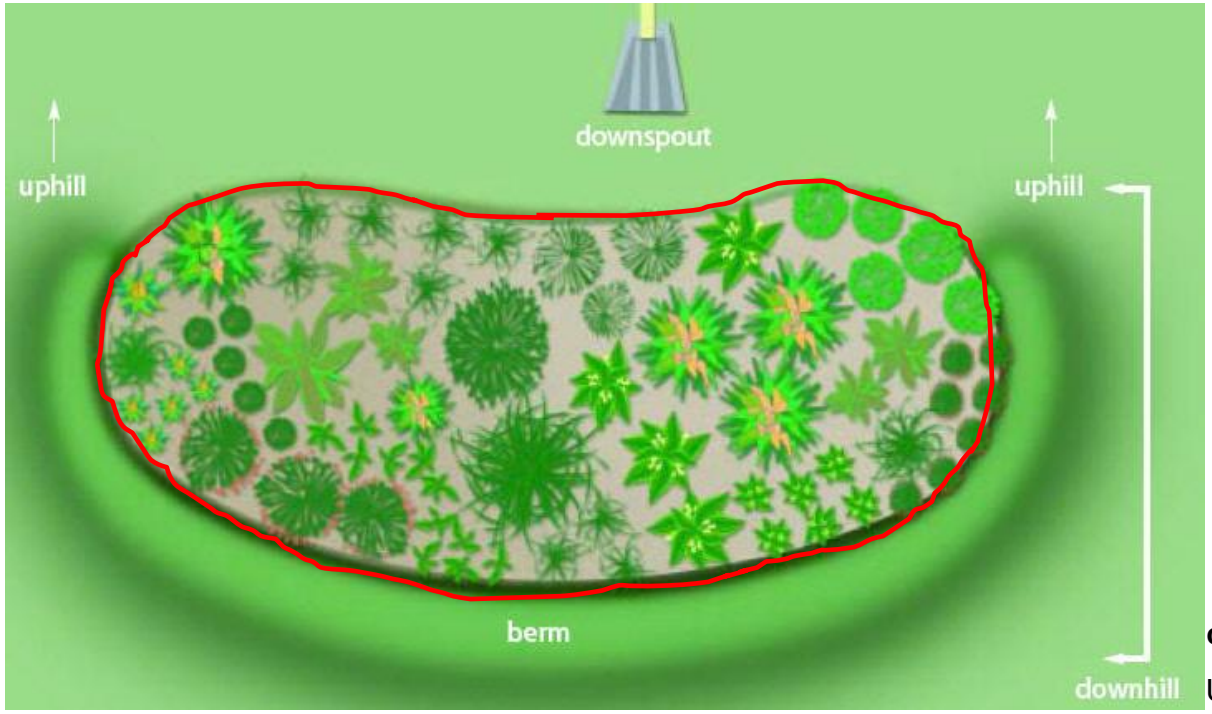
- Your rain garden's drainage area consists of: *Impervious Area*

Estimating Area

- Your rain garden's drainage area consists of:
  Pervious Area

Sizing the Rain Garden

- Take 10% of impervious area draining to site
- Take 1% of pervious area
- Add the two together! Result is the optimal square feet of rain garden needed



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UWEX Publication GWQ037

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Another way to think of it….

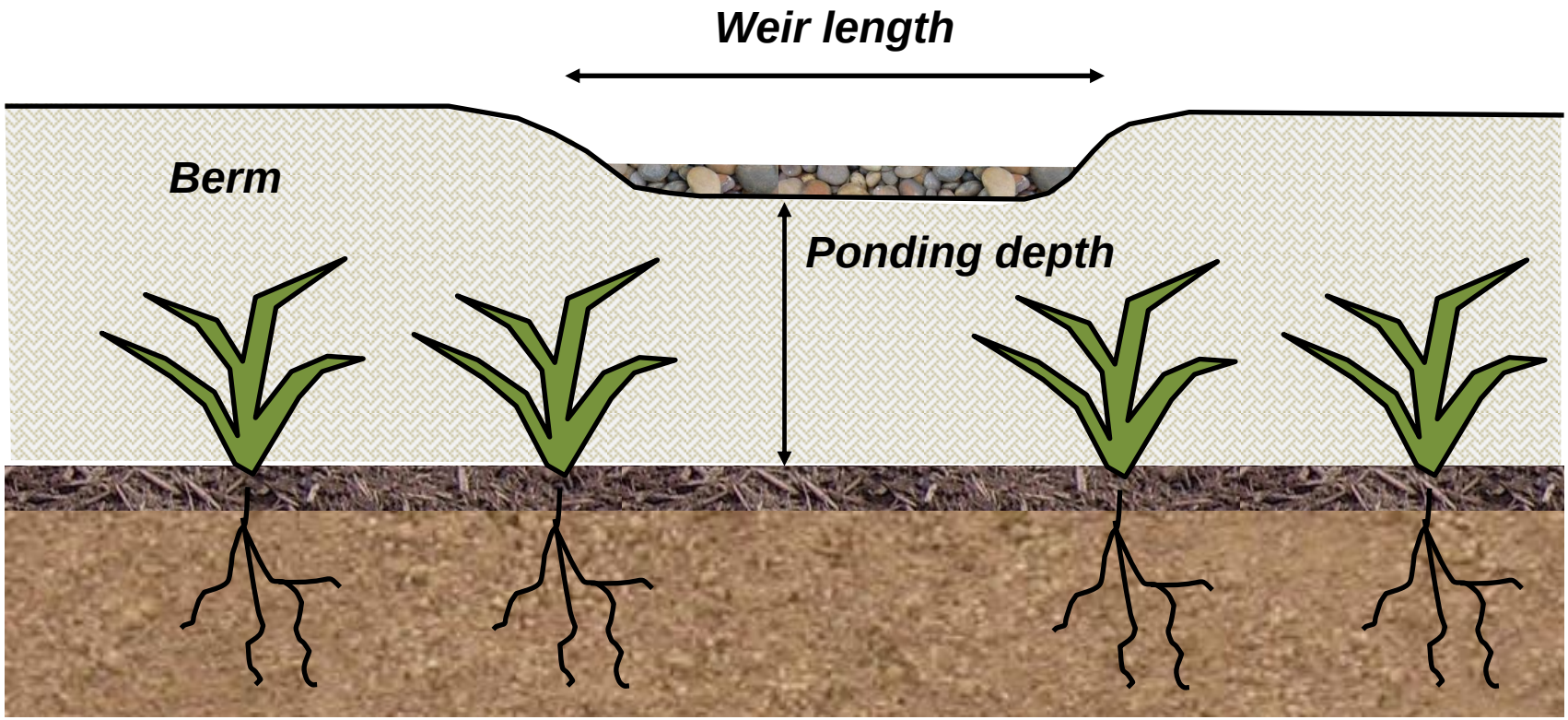
- $Rain\ Garden\ Size\ (ft^2) =$
  $(1\%\ of\ Pervious\ Watershed) + (10\%\ of\ Impervious\ Watershed)$

10% Impervious Area

1% Pervious Area

What Happens When It Fills Up?

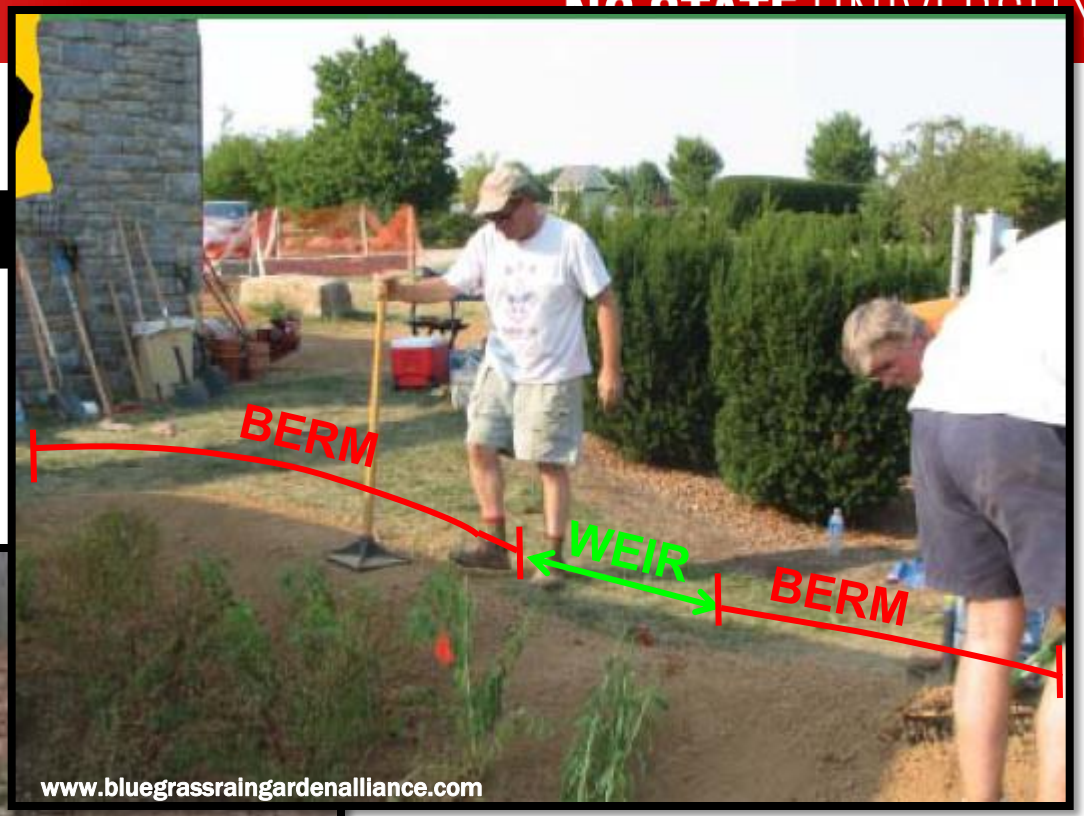
Weirs: Key to Bypassing Extra Water



CROSS-SECTIONAL VIEW

Overflow Weirs

Weir vs. I


BERM
WEIR
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www.bluegrassraingardenalliance.com


BERM
WEIR
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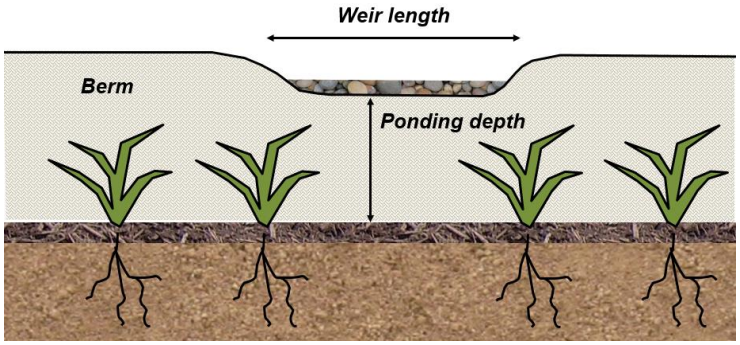
seagrant.oregonstate.edu

Overflow Weir

Impervious Surface Area (ft^2)	Overflow Weir Length (ft)
2000 or less	1.0
3000	1.5
4000	2.0
5000	2.5

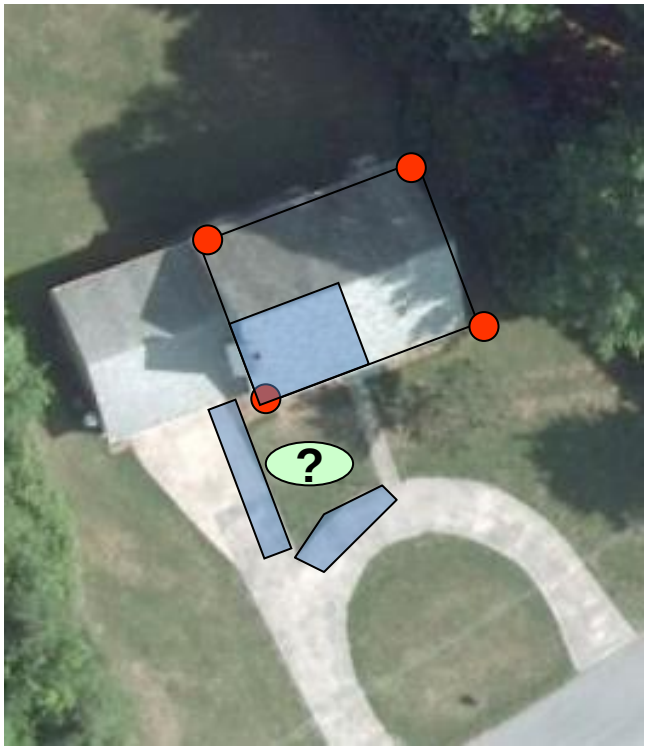


An Example:

The rooftop for a house is 60ft by 60 ft. One downspout (there are 4 total) will be directed to the rain garden.

Approximately 500ft^2 of driveway will also drain to the rain garden.

With the “10 and 10” rule, what size should the rain garden be?



1. Determine watershed boundaries.
2. Estimate each type of contributing area

$$\text{Roof area} = \frac{60 \text{ x } 60}{4} = 900\text{ft}^2$$

$$\text{Driveway area} = 500\text{ft}^2$$

$$\text{Pervious area} = 1000\text{ft}^2$$

Impervious = 900 + 500 = 1,400 ft²

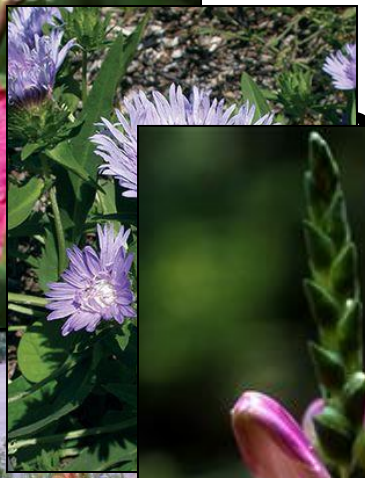
3. Impervious x 10%
4. Pervious x 1%

$(1{,}400\ ft^2 * 10\%) + (1{,}000\ ft^2 * 1\%) = 150\ ft^2$

5. Set ponding depth at 10”

4. Choose rain garden dimensions

Effective Impervious Area	Rain Garden Surface Area (10" deep)	Potential Rain Garden Dimensions (ft x ft)
800 ft^2	80 ft^2	7x12, 8x10, 9x9
1000 ft^2	100 ft^2	7x15, 10x10
1200 ft^2	120 ft^2	8x15, 10x12
1400 ft^2	140 ft^2	7x20, 12x12
1500 ft^2	150 ft^2	10x15, 12x13
2000 ft^2	200 ft^2	10x20, 14x15
2500 ft^2	250 ft^2	10x25, 13x20
3000 ft^2	300 ft^2	15x20, 12x25
4000 ft^2	400 ft^2	20x20, 40x10



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Questions?