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Site Selection and Analysis

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Objectives

By the end of this session, you will:

1. Understand what makes a good site for a rain garden
2. Be able to select a site in various landscapes
3. Be able to determine the appropriate size for a rain garden by:
   a. Determining the **depth** based on the soil type
   b. Determining the **area** based on depth and the area that drains into the garden
4. Understand options for inlets and outlets

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Site Selection and Analysis

What Makes a Good Rain Garden Site?

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Understand Water Flow

- Rain runs off impervious surfaces
- Gutters and downspouts concentrate flow

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Where Are the Impervious Areas?

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Where Does Runoff Flow?

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Where Are the Impervious Areas?

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Where Do Storm Drains Lead?

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What Flow Could a Rain Garden Capture?

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Identifying Good Locations for Rain Gardens

A good rain garden site should be:

- Downhill from the impervious area
- On a gentle slope — very flat ground requires more digging, and steep slopes can be problematic
- Well-fitted into the landscape
- At least 10 feet from house foundations (possibly less for a slab)

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Select a Site in Various Landscapes

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Examples of Rain Garden Locations

Good things about this location?

Concerns?

Photo provided by Jason Donati, Muncie Sanitary District

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Examples of Rain Garden Locations

Good things about this location?

Concerns?

Photo provided by Rick Parsons

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Examples of Rain Garden Locations

Good things about this location?

Concerns?

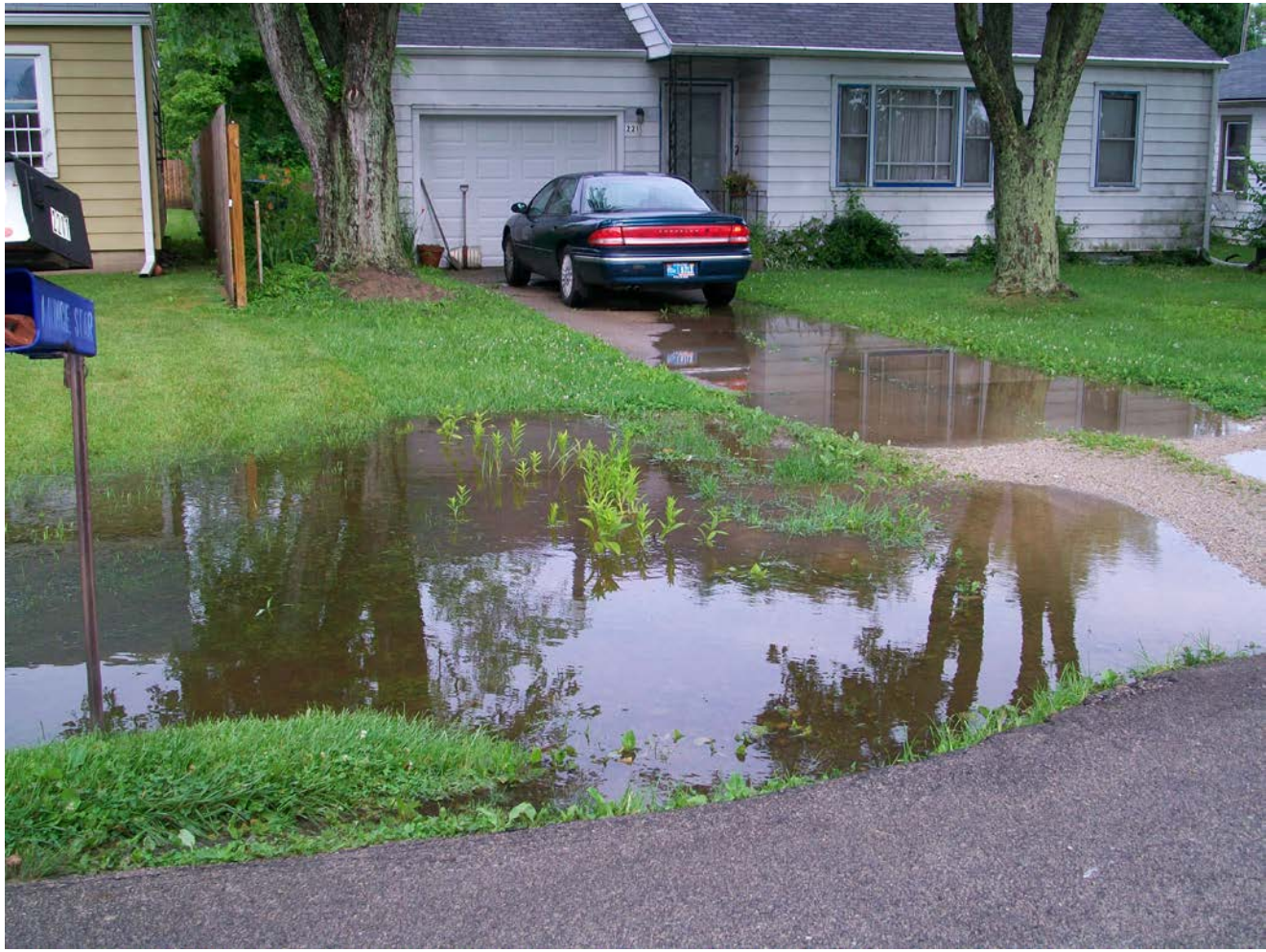

Photo provided by Jason Donati, Muncie Sanitary District

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Examples of Rain Garden Locations

Good things about this location?

Concerns?

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Examples of Rain Garden Locations

Good things about this location?

Concerns?

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Where Would You Build a Rain Garden?

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Avoid These Locations

- Areas over underground utilities (Call 811)
- Areas where water ponds or floods, which likely have poor natural drainage
- Boulevards between sidewalks and streets
- Areas over septic systems
- Areas under tree canopies

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Example 1: Where To Install a Rain Garden?

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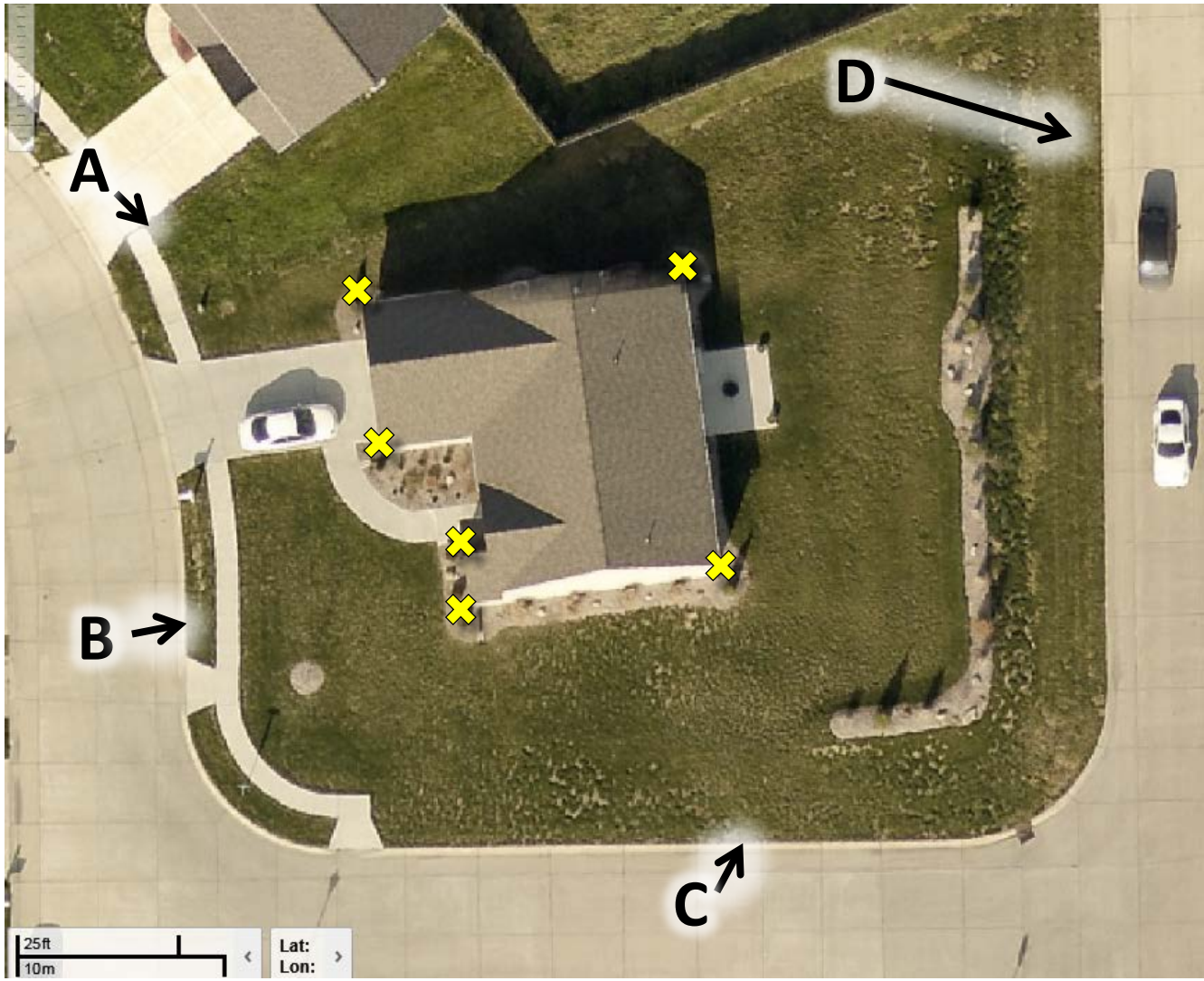
Example 1: Where To Install a Rain Garden?

✖ = downspout



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Example 1: Where To Install a Rain Garden?

A

B

C

D

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Example 2: Work in Small Groups

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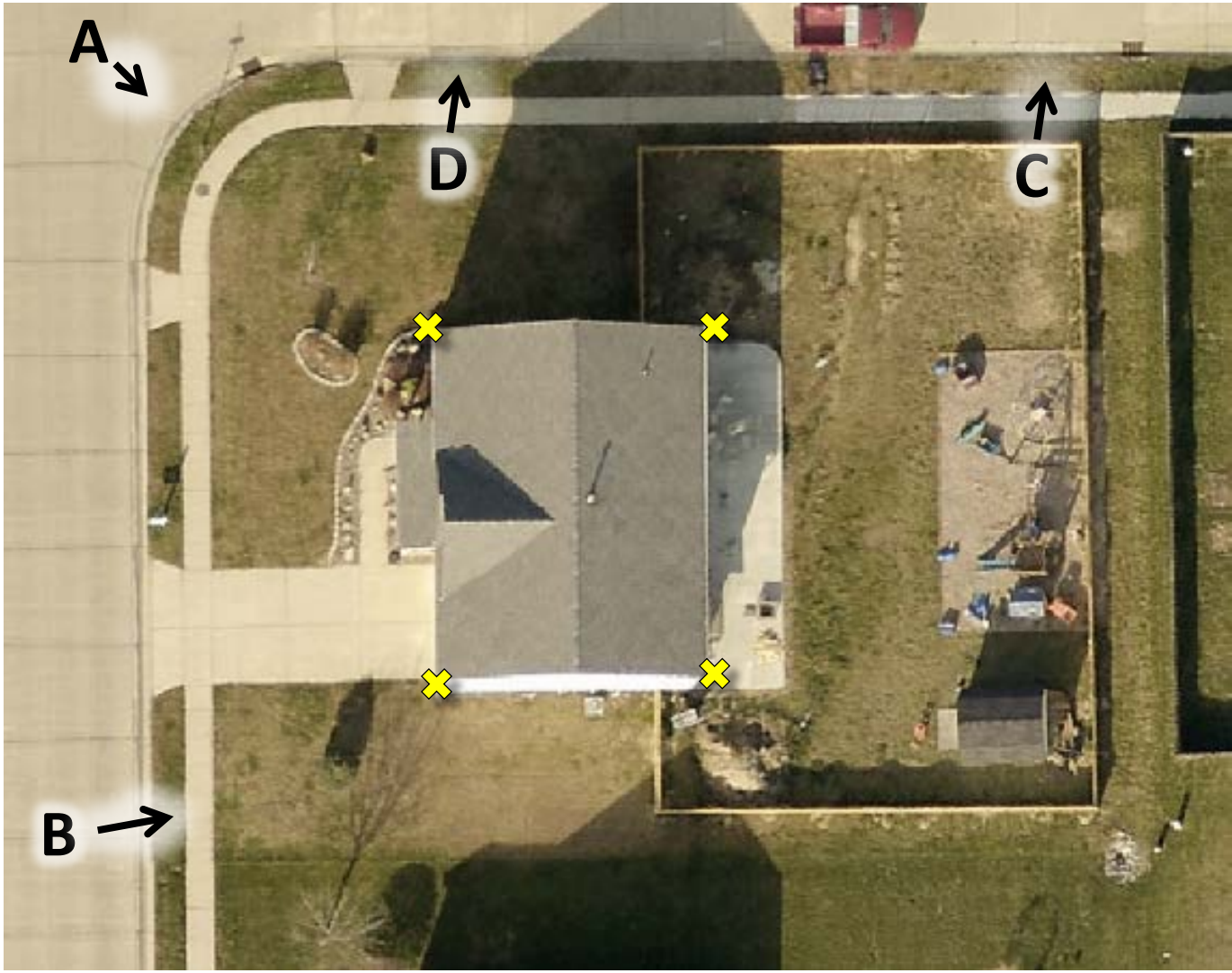
Example 2: Work in Small Groups

✖ = downspout



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Example 2: Work in Small Groups

A

B

C

D

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Example 3: A Public Building

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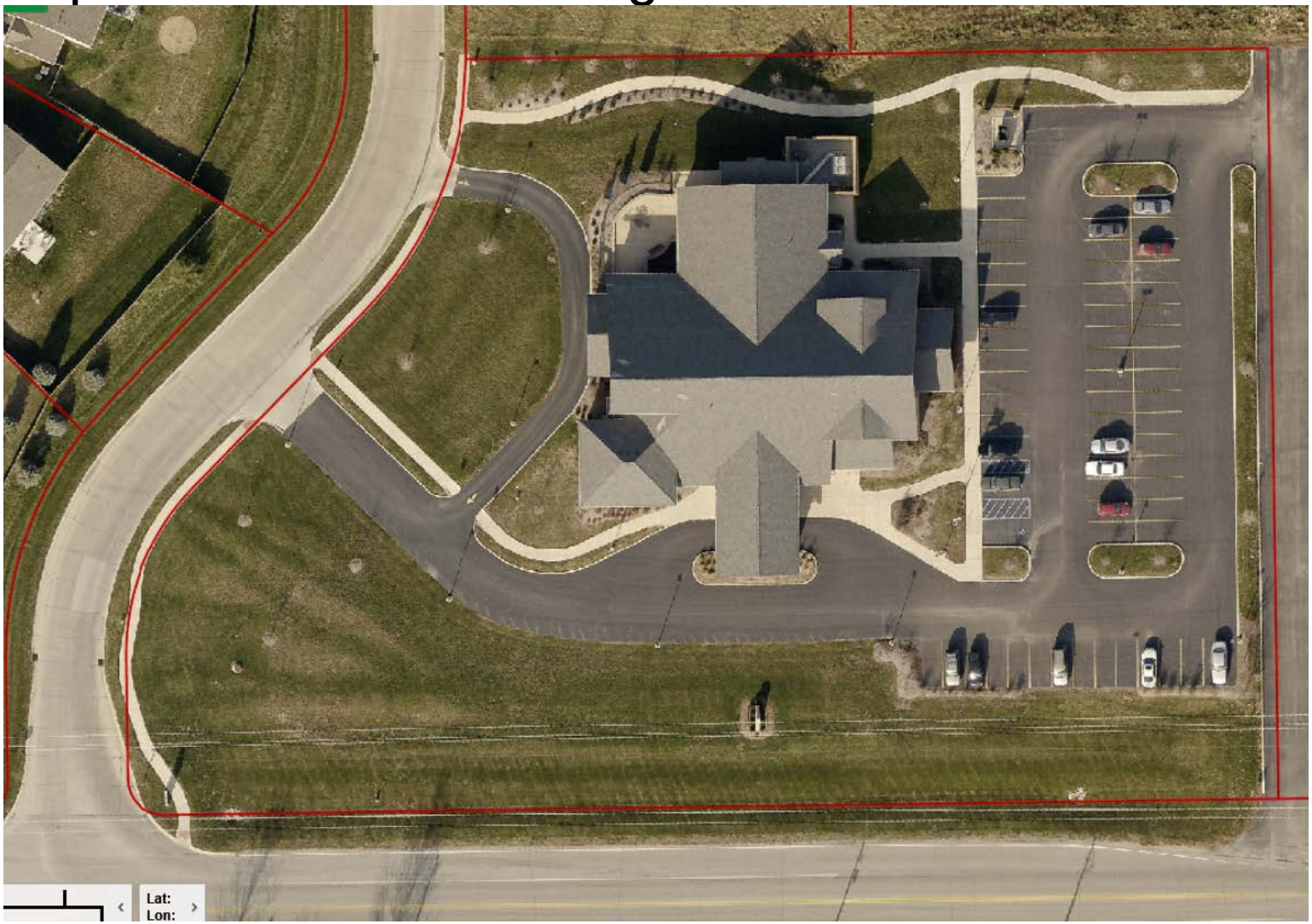
Example 3: A Public Building



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Review

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What Do You Think of This Location?

Photo provided by Jason Donati, Muncie Sanitary District

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Site Selection and Analysis

What Size Should a Rain Garden Be?

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Decide How Big to Make Your Rain Garden

- There is no single “right” size
- Other resources provide other options

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Two Parts to Sizing

1. Determine depth

2. Determine area

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How to Determine Depth

Water must drain from a potential site in 24 hours

- Many plants can only withstand “wet feet” for a day or less
- Mosquito eggs need more than 24 hours to hatch

Photo provided by Jason Donati, Muncie Sanitary District

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How Much Water Can Infiltrate in 24 Hours?

- Depends on the soil's:
  - oTexture (sand, silt clay)
  - oStructure
  - oSubsoil layers
- How can you find out more about a site's soil?

Soil Surveys — USDA-NRCS

- The USDA-Natural Resources Conservation Service mapped all soils in the continental United States
- The online Web Soil Survey is the “official” to access the soil survey

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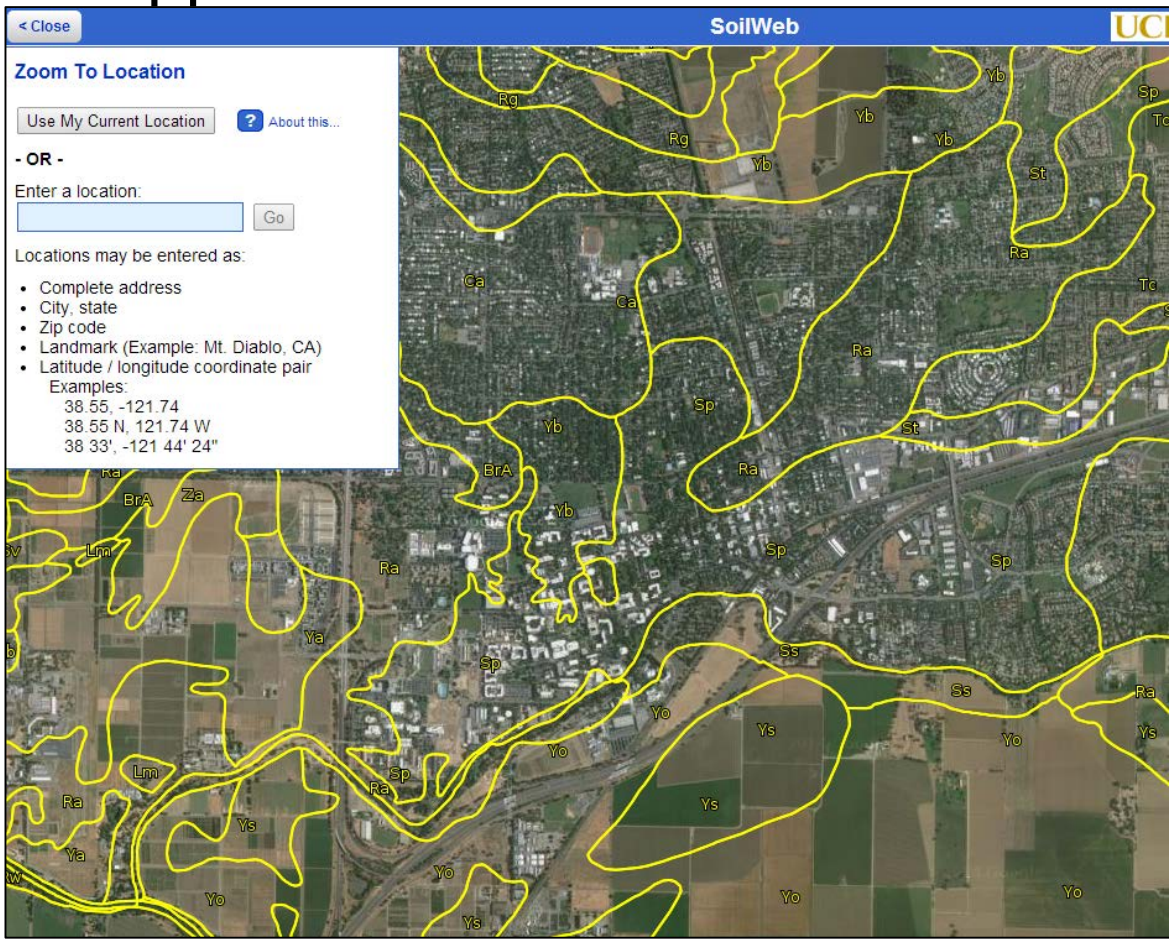
Soil Surveys — SoilWeb Apps

- University of California-Davis developed easy-to-use apps that use USDA-NRCS data
- Available for Google Earth or Google Maps (web)
- Also available on Android or iPhones



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Measure Yourself — Infiltration Test

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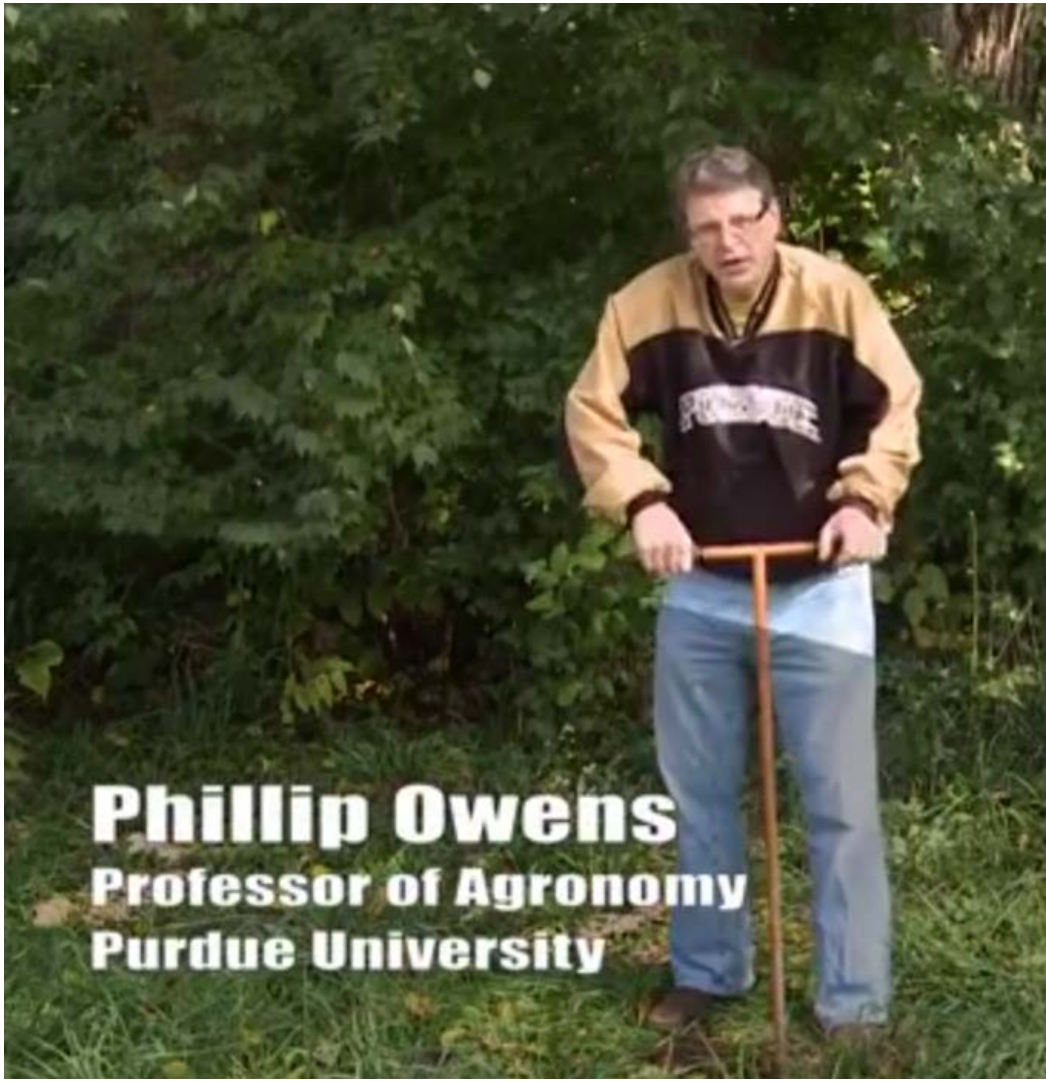
Measure Yourself — Infiltration Test

An infiltration test provides more information about the soil at your site than a soil survey



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Example: Calculate Infiltration

Time	Depth Below Marker	**Infiltration Rate** (since start) (Decimal Depth/Time)
1 hour	1 inch	
2 hours	2 inches	
3 hours	No measurement	
4 hours	3 inches	

Overall Rate:

Depth of Infiltration in 24 hours:

HIDDEN SLIDE — Example: Calculate Infiltration

Time	Depth Below Marker	**Infiltration Rate** (since start) (Decimal Depth/Time)
1 hour	1 inch	1 inch/hour
2 hours	2 inches	1 inch/hour
3 hours	No measurement	
4 hours	3 inches	0.75 inch/hour

Overall Rate: 0.75 inch/hour

Depth of Infiltration in 24 hours: 18 inches

Example: Calculate Infiltration

- For a rain garden to drain in 24 hours at this site, the depth must be 18 inches
- Do you want to make the depth 18 inches?

What depth would you choose?

Photo provided by Jason Donati, Muncie Sanitary District

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Examine Soil Properties

- Examine soil properties down several feet
- Be sure to consider soil texture, too

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How to Determine Rain Garden Area

- Smaller rain gardens fit more easily in many yards (they're also less expensive)
- Larger rain gardens capture more water
- A common recommendation: Aim to capture **1 inch of rainfall**

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How Much Is 1 Inch of Rain?

Calculating the rain garden area you need to capture 1 inch of rain is simple:

Area of the roof in square feet ÷ Depth of the rain garden in inches = Area of a rain garden in square feet

Example: How Much Is 1 Inch of Rain?

- The Watermans' roof is 1,200 square feet
- Their rain garden is 10 inches deep
- What should the area of their rain garden be?

$$1{,}200 \div 10 = 120 \text{ square feet}$$

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How Do You Calculate Roof Area?

1. Determine the portion of the roof that will flow to this area
2. Measure the area of the roof section
3. Mark the dimensions on a sketch or aerial photo

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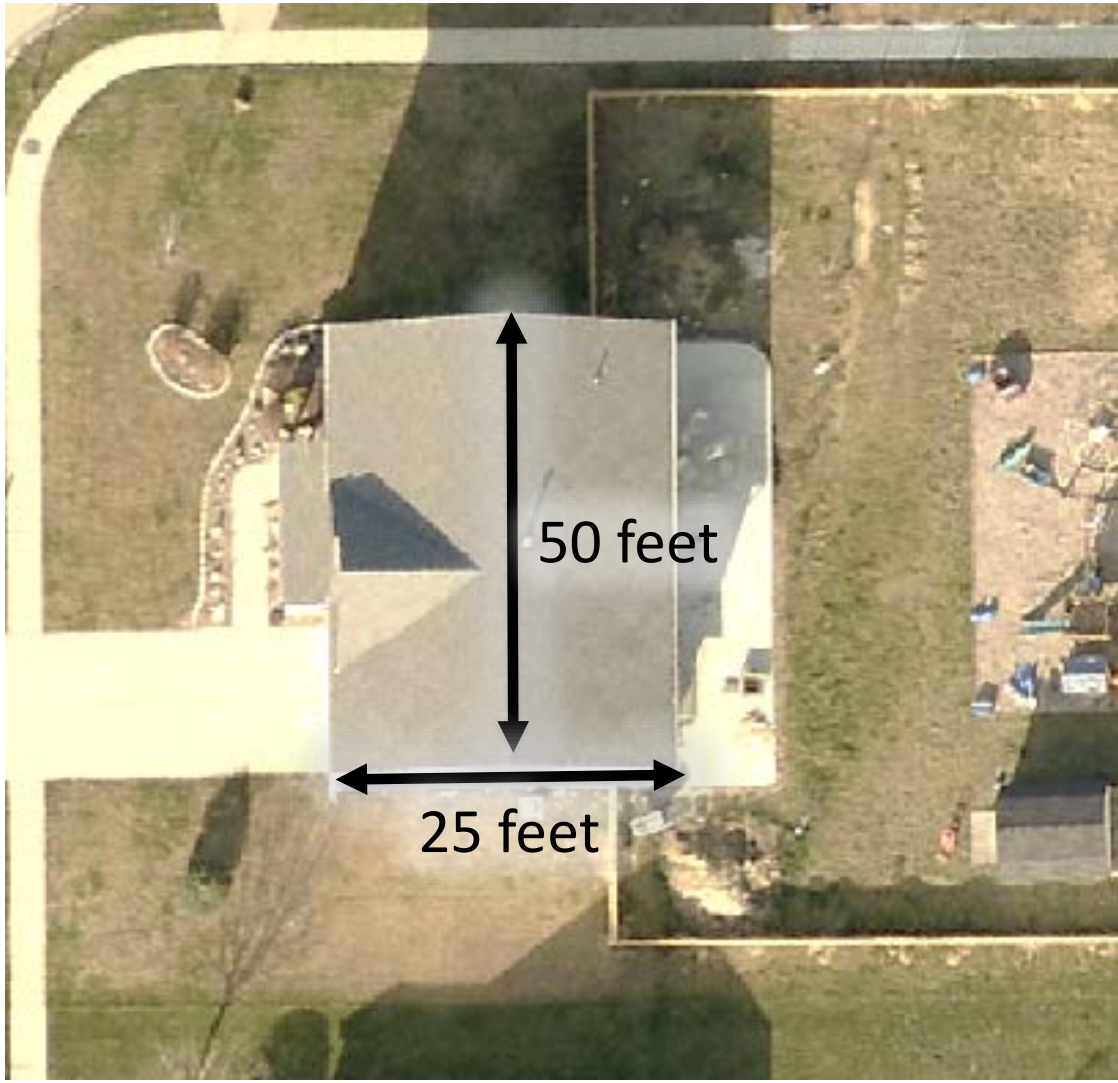
Your Turn: How Do You Calculate Roof Area?

1. Calculate the area that flows to the downspout in the SW corner

2. If the rain garden is 10 inches deep, what should its area be to capture 1 inch of rain?



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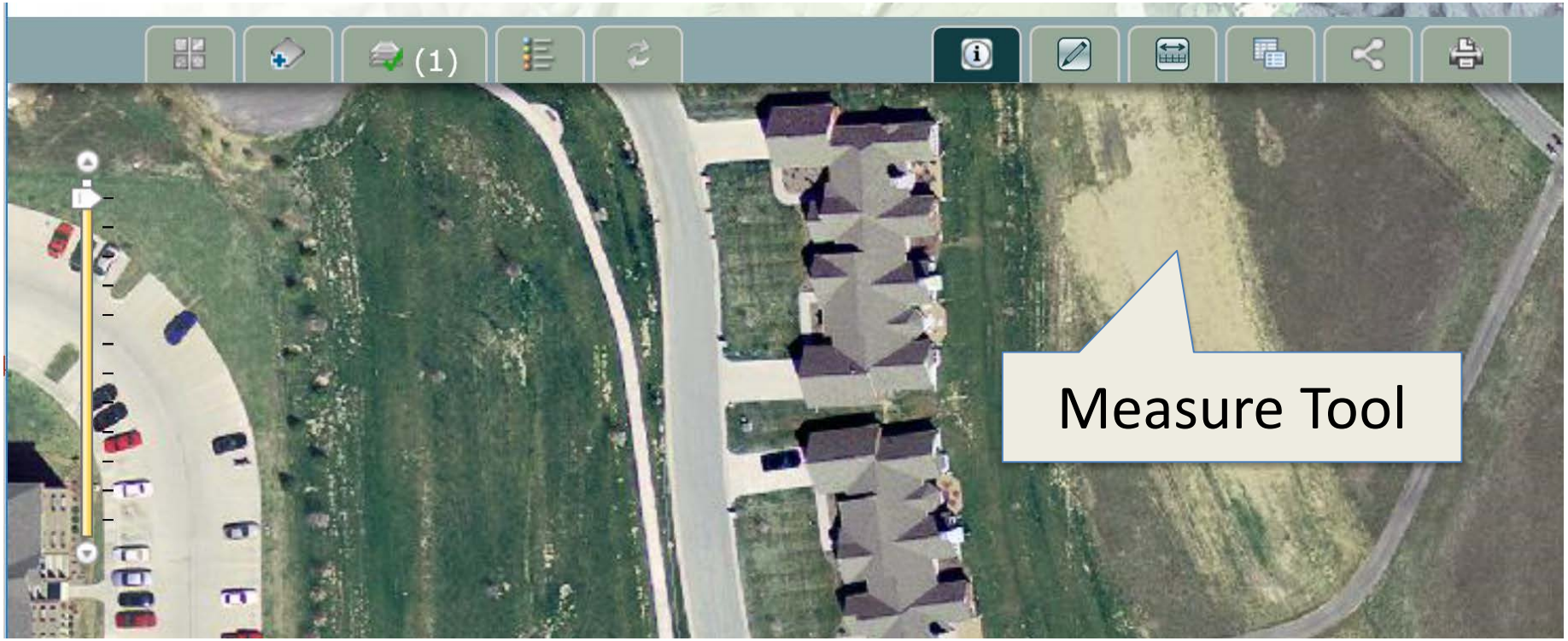
Using Online Aerial Photos

Google Maps



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Discussion

- Is this method clear?
- Do you feel comfortable sizing a rain garden?

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Site Selection and Analysis

How to Determine Inlets and Outlets

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Rain Garden Inlets

Inlets convey water to rain gardens

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Rain Garden Inlets

Rain garden inlets are often corrugated pipe

Rain Garden Inlets

- Grading the land can convey water to rain gardens
- Most useful for diffuse runoff

Photo provided by Kevin's Rain Gardens

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Rain Garden Inlets

- Swales are flat channels that convey water
- They are often lined with grass, mulch, or rock (“creek bed”)

Photos provided by Kevin’s Rain Gardens

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Rain Garden Outlets

- Rain gardens need safe outlets
- Gardens can't hold water from all rainfall events

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Rain Garden Outlets

Plan an outlet for storms that produce more than 1 inch

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Summary

1. Understand what makes a good site for a rain garden
2. Select a site in various landscapes
3. Determine the appropriate size for a rain garden
4. Understand options for inlets and outlets