Rain Garden Design Exercise

Soil Analysis: 8” Topsoil, then Sandy Loam with some silt and clay mixed in down to 4’

Water Flow: Currently the water from gutters on the left side of the photo drain almost directly onto the driveway (via a sloped grass strip) and down to the street and nearby storm drain. The right side enter a flatter broad lawn area and most probably percolates into the ground. The property is in the Cobbs Creek Watershed and downhill neighborhoods have experienced flooding in very heavy rains.

Drainage Area: About half of both of the 2 roof sections drain to the downspouts on the left side.

Slope: Soil left of the house has some slope toward the front yard also. The slope of the front yard is about 2%, but then falls off more quickly near the sidewalk.

Percolation Rates/Soils: Homeowner reports that water drains quickly after a storm. This is borne out by an accelerated percolation test that places it between the two best infiltration categories in our design chart.

Location: Homeowner is interested in capturing water from the front and back downspouts on left side of the photo if possible and might be willing to pipe the water or use a swale dug into the soil to direct it into a rain garden in the front lawn.

Sun/Shade: Front lawn gets FULL SUN most of the day with some early/late shade.

Interest: The homeowners maintains their yard and landscaping and is excited about having a rain garden.

Owner: _____ **Address**: _____

Phone: _____ **Email**: _____ **Site #**: _____

Residential Rain Garden Preliminary Assessment/Scoring				
Criteria	**Description/Explanation/Comments**	**Rating (1-3)**	**Weight**	**Score (R x W)**
1. Visible to Community?	3=Very 2=Partially 1=Not Visible		x 5	
2. Stormwater currently enters storm sewer directly or via runoff and garden will remove water from system.	3 = Yes, removes water from storm sewer 1 = No, water will not be removed from the storm sewer system		x 5	
3. Soil Suitability by Soil Type or drainage check (1'deep – 6 "water drains in):	3= Sandy or loamy 2= Sandy/Loamy at 2' deep 1= Hard packed or clayey soil		x 4	
4. Square Footage (sq ft) Impervious Runoff Proposed to be Diverted to Garden?	3=>1000 sq ft 2= 400-1000 sq ft 1=<400 sq ft		x 3	
5. Garden Location / Slope/Drainage towards Neighbor Houses?	3= >10 ft, Slopes Away from Houses 2= >10 ft, Flat Slope or Can be Redirected by Hand grading 1= <10 ft or Slopes toward houses (***FLAG***)		x 3	
6. Area Free of Standing Water After a Heavy Rain is over?	3= Drains Almost immediately 2= Drains Within an hour 1= >1 hr to Drain		x 2	
7. Ease of Redirecting Runoff into area by moving soil or a new drain pipe?	3=Naturally Flows to Area; 2=Flows with Simple Modification (e.g., extend drain, rock trench); 1=Difficult (e.g., need underground drain)		x 3	
8. Does the Garden have a good overflow location that will not negatively affect neighbors?	3= Flows to current drainage path or large buffer area, away from house/neighbors; 2= Altered drainage, but adequate buffer 1= May negatively affect houses (***FLAG***)		x 2	
9. Homeowner has the ability and initiative to maintain the garden.	3 = Is an avid gardener 2 = Maintains yard currently 1 = Has a landscaper maintain their yard.		X4	
TOTAL SCORE				

Date of Assessment: _____

Volunteers present for assessment: _____

Comments:

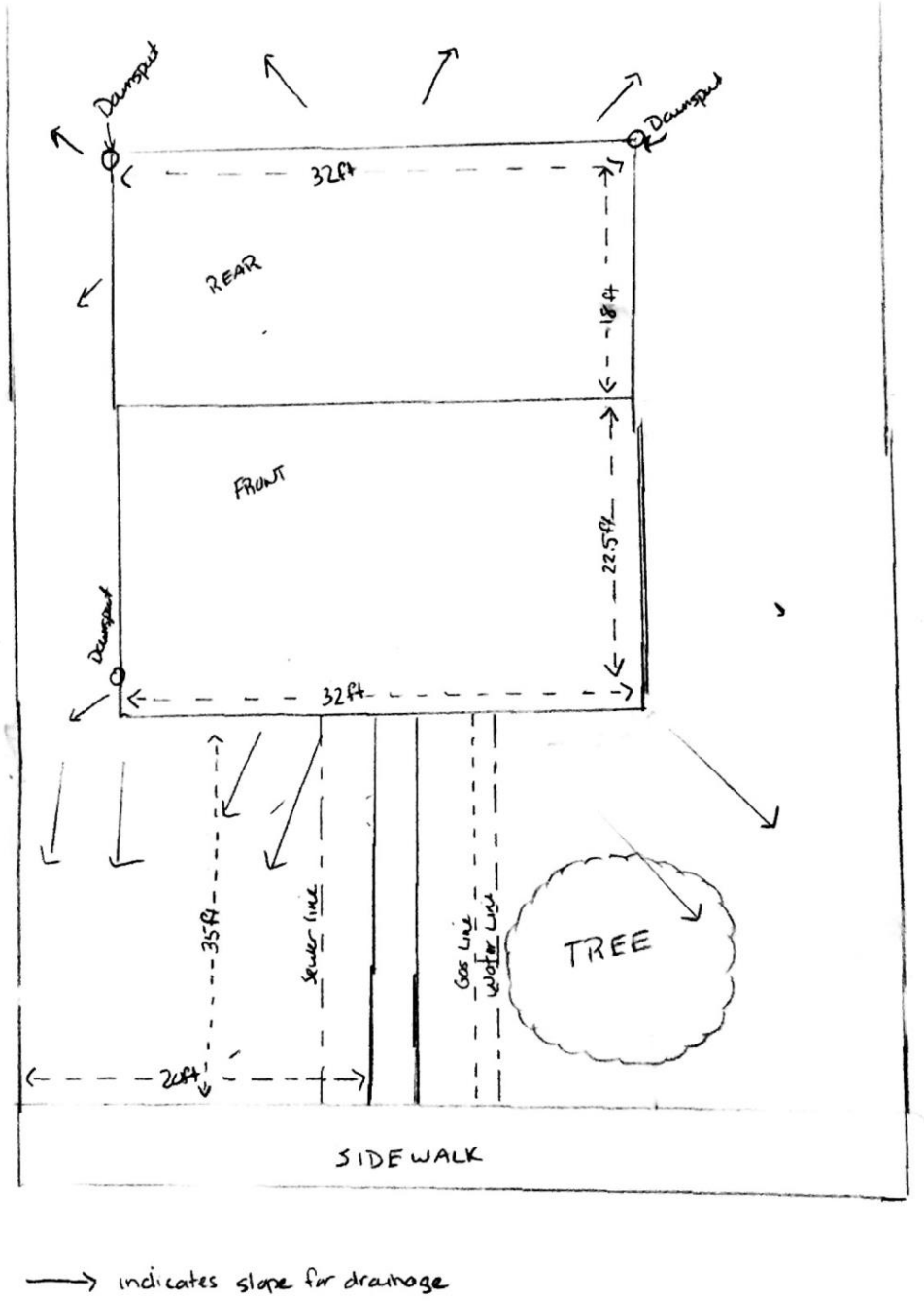
Property Sketch:

Calculate Roof area that will be redirected to Rain Garden (the whole Front Roof and ½ of Rear):

Review the next 2 pages, then use the table in Step 4 to estimate the size of the garden.

Then rough sketch the garden area on the graph paper provided, using the flatter part of the front yard. Use a scale of 1" (4 squares) per Foot

You may also sketch a cross section showing how you will cut the soil on the uphill side, level the bottom and put a berm on the downhill side to retain the water in the



entire garden area.

4 Steps to Designing and Sizing a Rain Garden

Step 1: Drainage Area

To calculate the drainage area (the area that will drain to the rain garden) from a roof, parking lot, sidewalk, or other impervious surface, multiply the length by the width.

(Length) x (Width) = _____ ft^2 (drainage area)

Add together the drainage area of multiple roofs.

Combine your roof runoff with a neighbors'.

Rain gardens can capture stormwater from a drip-line just as well as from a gutter system.

Estimating the stormwater that runs off streets, sidewalks, and parking lots can be tricky. It is best to visit the impervious area during a rain event to clearly see the extent of the drainage area.

Step 2: Soil

To determine if the soil type is suitable for a rain garden, first perform a simple pit test:

1. Dig a 6" deep hole and fill with water.
2. Choose a new location if the water is still standing after 24 hours.

After conducting the pit test, identify the soil type as sand, silt, or clay. Sandy soils have the fastest infiltration; clay soils have the slowest. Since clay soils take longer to drain water, they require a larger rain garden area. You can determine your soil type by performing the ribbon test:

1. Grab a handful of moist soil and roll it into a ball in your hand.
2. Place the ball of soil between your thumb and the side of your forefinger and gently push the soil forward with your thumb, squeezing it upwards to form a ribbon about ¼" thick.
3. Try to keep the ribbon uniform thickness and width. Repeat the motion to lengthen the ribbon until it breaks under its own weight. Measure the ribbon and evaluate below:

Courtesy of North Dakota State University

The ribbon formed here depicts a clay soil because it is greater than 1.5" in length.

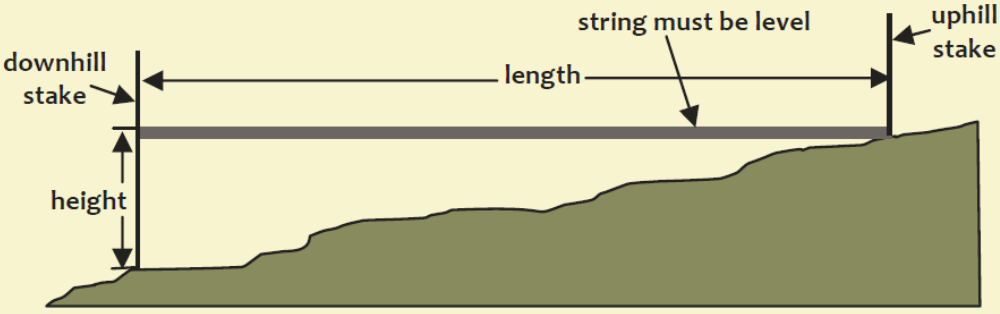
SAND: Soil does not form a ribbon at all.
SILT: A weak ribbon < 1.5" is formed before breaking.
CLAY: A ribbon > 1.5" is formed.

Step 3: Slope

Calculate the slope to determine the rain garden's depth:

1. Place one stake at the uphill end of the rain garden and another at the downhill end as illustrated in Figure 1.
2. Level the string between the two stakes.
3. Measure the total length of the string and the height of the string at the downhill stake in inches.
4. Divide the height by the length and multiply the result by 100. This is the slope.
5. Use Table 1 to determine the recommended rain garden depth.

Table 1	
Slope	**Depth**
< 4%	3-5 in
5-7%	6-7 in
8-12%	8 in+



Adapted from Rain Gardens: A How-to Manual for Homeowners, UWEX

Figure 1: Determine the slope of the landscape.

Step 4: Size

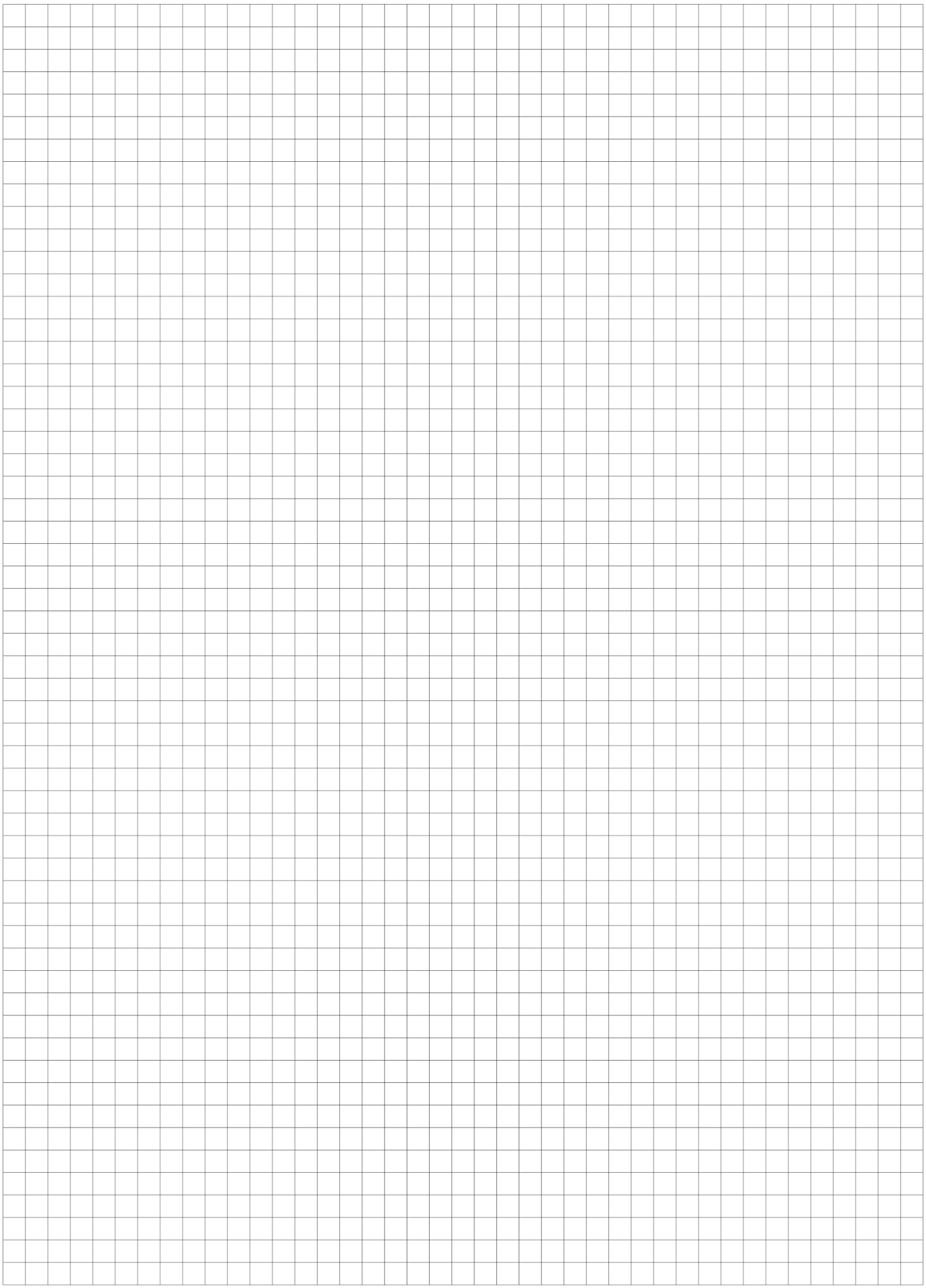
Finally, determine the rain garden's size:

1. Use Table 2 to determine the size factor.
2. Multiply the size factor by the drainage area. This is the recommended rain garden size.

Table 2	Depth		
Soil Type	**3-5 in**	**6-7 in**	**8 in +**
Sand	0.19	0.15	0.08
Silt	0.34	0.25	0.16
Clay	0.43	0.32	0.20

Size Factor X **Drainage Area** = **Rain Garden Area**

Note: If the rain garden is > 30 ft away from the drainage area then the area of the rain garden can be a half size smaller than calculated above. This is because a large amount of stormwater will be absorbed along the pathway that leads to the rain garden.



nal Flower	3-4 feet	Red	Full Shade, Part Sun	Moist, wet soil, average-moist
h fern	3-4 feet		Full Shade, Part Sun	Moist, wetlands, well-drained
lm	3-5 feet	Red	Full Sun, Part Sun,	Well-drained, average-moist
ergamot	2-5 feet	Purple	Full Sun, Part Sun	Dry-Moist, drought tolerant, well-drained
mon fern	2-5 feet		Full Shade, Part Sun	salt tolerant, wet soil
grass	2-3 feet	Red	Full Sun, Part Sun	Average-Moist, salt & drought tolerant, well-drained
grass	3-5 feet	wheat	Full Sun, Part Sun	Average-moist, salt & drought tolerant, well-drained
n phlox	18-24	White	Full Sun	average moisture, salt tolerant
n phlox	4-5 feet	Pink	Full Sun, Part Sun	average-moist, well-drained
ing phlox	6-10 inches	Purple	Full Shade, Part Sun	Average-moist, drought tolerant, well-drained
ent plant	3 feet	Light Pink	Full Sun	Average-Moist, well-drained
eyed susan	2-3 feet	golden yellow	Full Sun, Part Sun	Average, drought tolerant, well-drained
eyed susan	2-3 feet	yellow	Full Sun, Part Sun	Dry-Moist, drought tolerant, well-drained