ILCA CONTRACTOR'S GUIDE TO : *SMALL-SCALE RAIN GARDENS*

CONTENTS

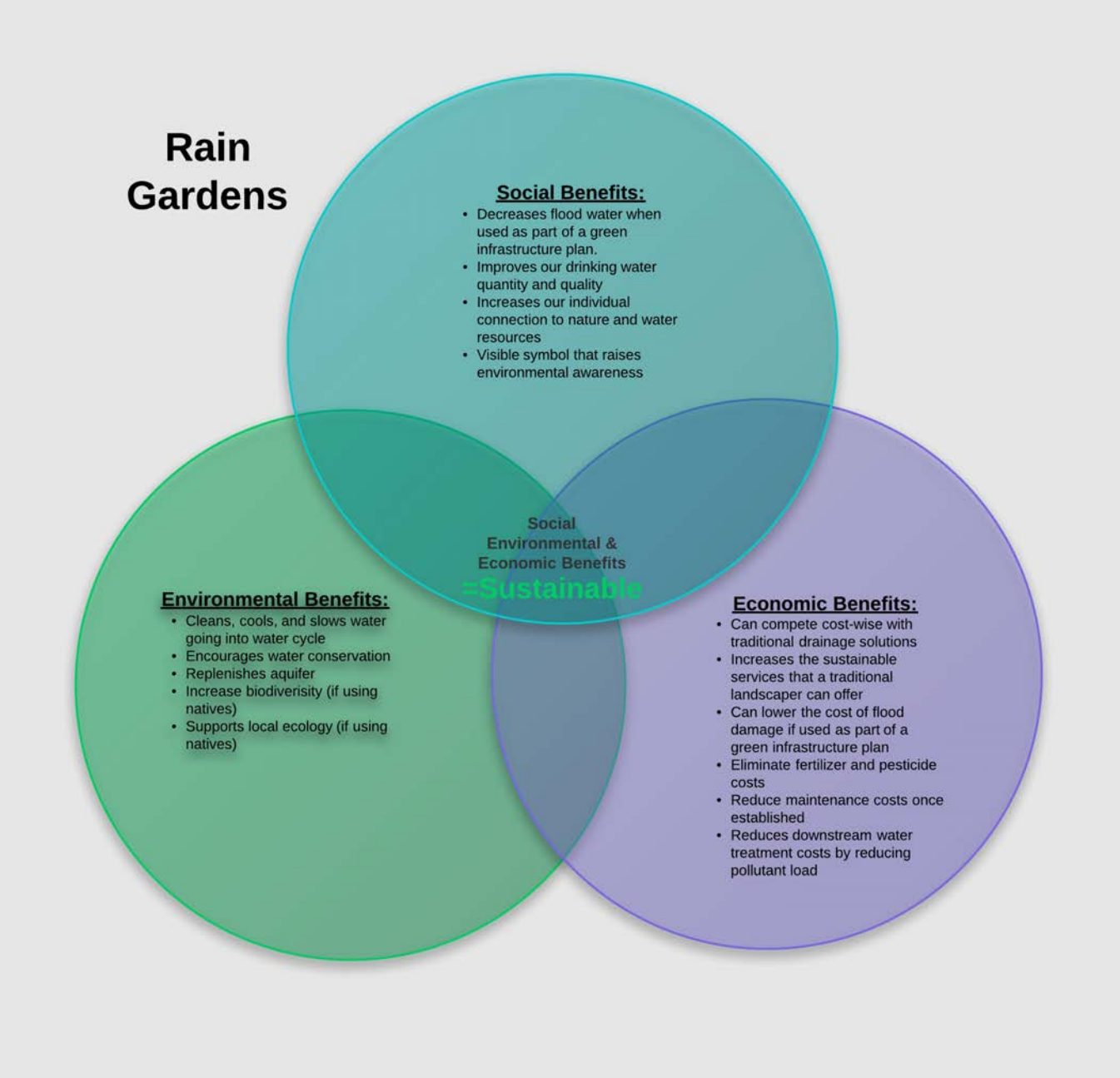
INTRODUCTION

The term “rain garden” has risen in popularity over the last decade. This catch-all term has been used to describe anything from a very expensive and highly engineered system designed to handle an exact quantity of volume, to a low-cost planting of water-tolerant species in a perennially soggy spot in the yard.

This manual will specifically cover the installation of a type of rain garden termed an “existing soil rain garden.” These are rain gardens whose original soils have been amended solely for healthy plant establishment. This is countered by the “engineered rain garden” whose existing soils have been replaced or heavily amended with a specified soil mix to a depth greater than 1’. With existing soil rain gardens landscapers look at rain gardens as “landscaping with rain.” These rain gardens work with the site conditions to design and install a garden that is primarily designed around rain.

ILCA is actively working with Chicagoland municipalities to facilitate the use of small-scale stormwater solutions in the built landscape. To that end, the ILCA Sustainable Landscape Committee presents this guide to equip our members with the information required for them to design, install, and maintain small-scale rain gardens.

BENEFITS OF A RAIN GARDEN



The Illinois Landscape Contractors Association does not use a specific definition of sustainability. Instead, ILCA examines three necessary attributes that must be in place for the system to be sustainable; social, environmental, and economic benefits. In short, the public must want the technology, it must have environmental benefits, and the contractor must be able to perform the work without subsidy. If any of these elements are missing, the system will likely not last. ILCA acknowledges that new technology may be introduced to address a deficient element over time.

RAIN GARDEN MYTHS

First: to dispel some myths an installer may encounter when dealing with a client or public official.

- A rain garden will bring mosquitos: A common concern when considering a rain garden are the presence of mosquitos in the rain garden. Mosquitos require 7-10 days in water before developing into adult mosquitos. A rain garden should not hold water beyond 2-3 days after the latest rainfall during the growing season.

- **A rain garden is a pond: A rain garden is not a pond.** An installer could potentially incorporate a pond element with a rain garden, but a rain garden is designed to drain water where a pond is made to hold water.

- **A rain garden should use only water-loving plants:** A rain garden can have all different water conditions depending on the site conditions and water supply. An installer cannot simply install water-loving plants because it is a rain garden. The installer needs to understand the conditions and select plants that prefer those water, light, and soil conditions.

- **A rain garden is a silver bullet for stormwater management:** Rain gardens are part of the overall solution to our stormwater issues, not a “cure-all.” Rain gardens play a small but important role in the larger green infrastructure approach.

- **Rain gardens require no maintenance:** A rain garden is a garden like any other. An installer or property owner will need to weed for the first couple of years and water to establish the new plantings. Weeding will be very minimal after the third year if the gardem is planted on 1’ centers.

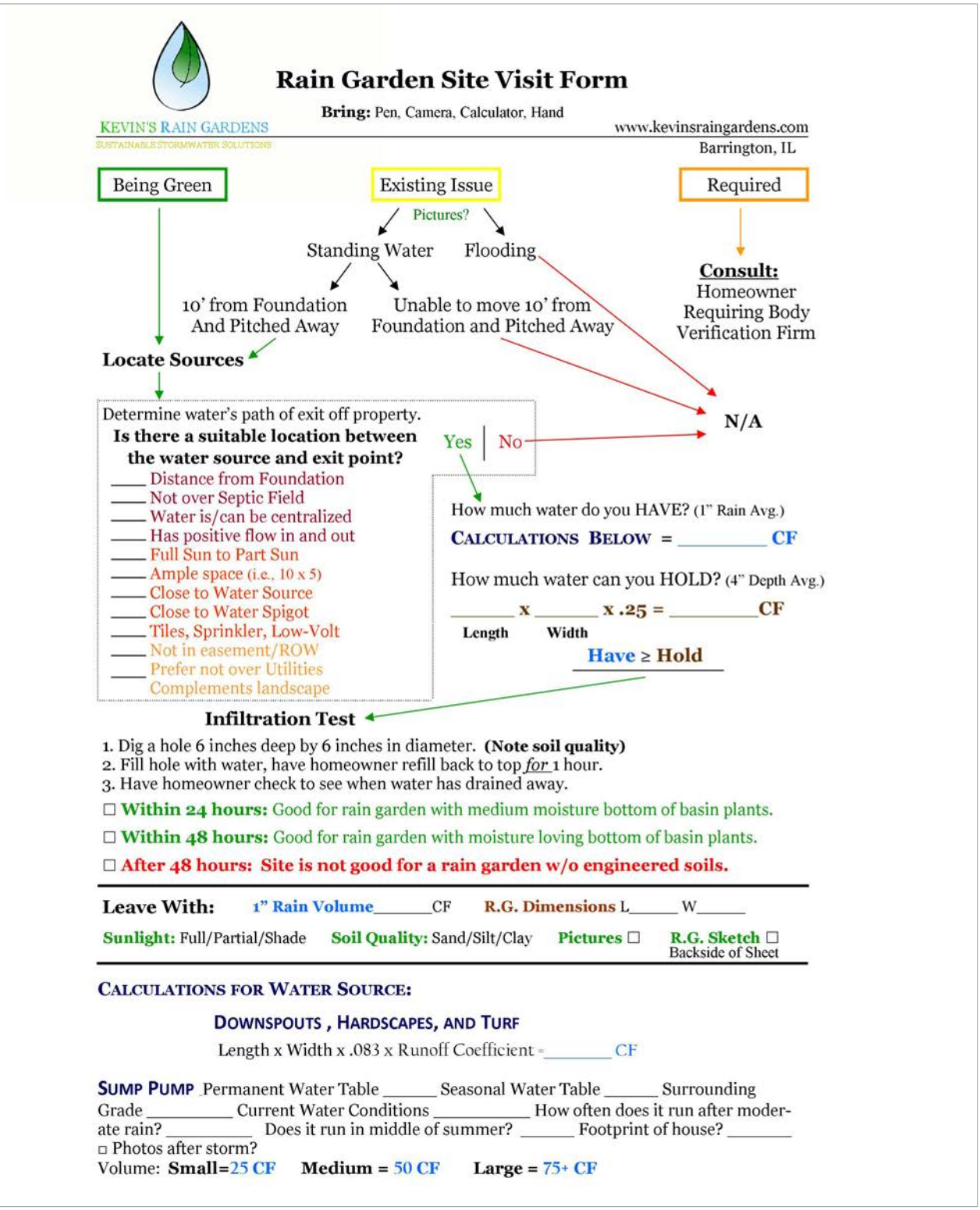
- **Rain gardens are expensive:** A small-scale rain garden will often run between $8-$15 per square foot. It is important to note that the costs to convey the water from the source to the garden may vary and will need to be factored in. Also, the cost of additional landscape elements will need to be added in as well.

SITE EVALUATION

The first step in your rain garden installation is a thorough and thoughtful site evaluation.

To help with this evaluation, a form has been included that can be used as a flowchart to evaluate potential rain garden sites. This form will take an installer through the site evaluation process. The installer should leave with all the information they will need to complete a design and estimate. This form is explained in detail throughout the chapter. There is also an example of the form being used that begins on page 23.

SITE VISIT FORM



Rain Garden Site Visit Form

Bring: Pen, Camera, Calculator, Hand

KEVIN'S RAIN GARDENS
SUSTAINABLE STORMWATER SOLUTIONS

www.kevinsraingardens.com
Barrington, IL

Being Green

Existing Issue

Pictures?

Standing Water — Flooding

10' from Foundation And Pitched Away

Unable to move 10' from Foundation and Pitched Away

Required

Consult:
Homeowner
Requiring Body
Verification Firm

Locate Sources

Determine water's path of exit off property.
Is there a suitable location between the water source and exit point?
Yes | No

N/A

____ Distance from Foundation
____ Not over Septic Field
____ Water is/can be centralized
____ Has positive flow in and out
____ Full Sun to Part Sun
____ Ample space (i.e., 10 x 5)
____ Close to Water Source
____ Close to Water Spigot
____ Tiles, Sprinkler, Low-Volt
____ Not in easement/ROW
____ Prefer not over Utilities
Complements landscape

How much water do you HAVE? (1" Rain Avg.)
CALCULATIONS BELOW = _____ CF

How much water can you HOLD? (4" Depth Avg.)
_____ x _____ x .25 = _____CF
Length **Width**

Have ≥ Hold

Infiltration Test

1. Dig a hole 6 inches deep by 6 inches in diameter. **(Note soil quality)**
2. Fill hole with water, have homeowner refill back to top *for* 1 hour.
3. Have homeowner check to see when water has drained away.

☐ **Within 24 hours:** Good for rain garden with medium moisture bottom of basin plants.

☐ **Within 48 hours:** Good for rain garden with moisture loving bottom of basin plants.

☐ **After 48 hours: Site is not good for a rain garden w/o engineered soils.**

Leave With: **1" Rain Volume**_____CF **R.G. Dimensions** L_____ W_____

Sunlight: Full/Partial/Shade **Soil Quality:** Sand/Silt/Clay **Pictures** ☐ **R.G. Sketch** ☐ Backside of Sheet

CALCULATIONS FOR WATER SOURCE:

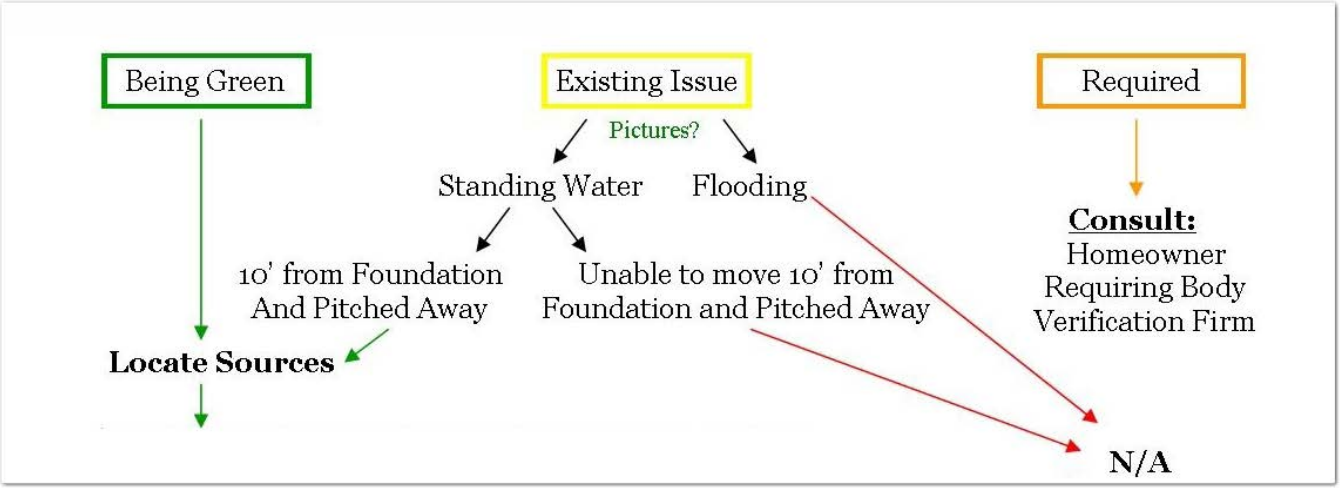
DOWNSPOUTS , HARDSCAPES, AND TURF

Length x Width x .083 x Runoff Coefficient = _____ CF

SUMP PUMP Permanent Water Table _____ Seasonal Water Table _____ Surrounding Grade _____ Current Water Conditions _____ How often does it run after moderate rain? _____ Does it run in middle of summer? _____ Footprint of house? _____
☐ Photos after storm?
Volume: **Small**=25 CF **Medium** = 50 CF **Large** = 75+ CF

Figure 1: Rain Garden Site Visit Form

TYPICAL RAIN GARDEN CLIENTS

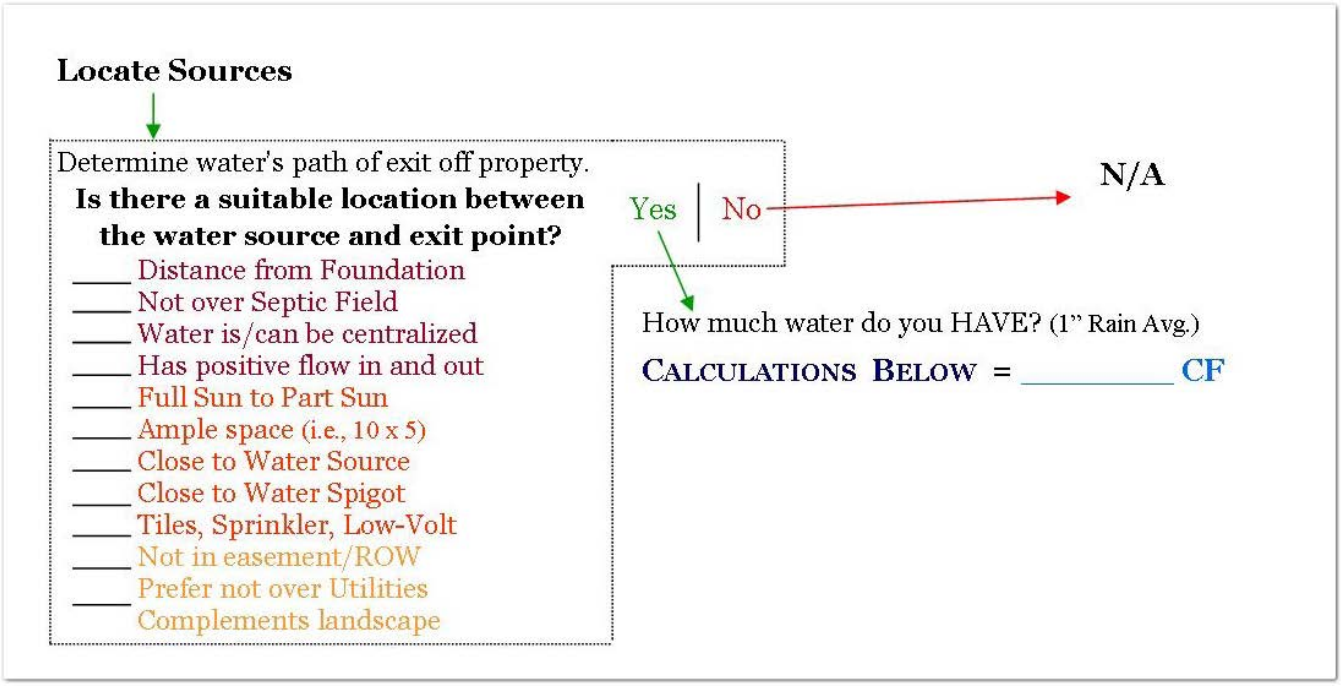


Being Green - These are the clients that want to do the right thing for the environment. If the client wants to install a rain garden and does not have an existing drainage issue, then the installer will want to use the downspout(s). A sump pump would also work as a water source.

Existing Drainage Issue - A rain garden can fix standing water but, generally speaking, it is not capable of solving issues on the level of flooding. If the client has standing water issues, be sure that the standing water is/can be moved roughly 10' from the house foundation and in a location where the water will be pitched away from any structures. If this can't be done, then a rain garden is not recommended. (Note: A bioswale property pitched away from the house can be brought right up to the foundation.) If the client has an existing drainage issue and wants to try to use a rain garden as a solution, the installer will need to use the water source(s) creating the drainage issue.

Required - If the installer is required to put in a rain garden it is more than likely being required by a municipality or other public body. The installer will likely be told which water sources he or she needs to use. This rain garden will most likely require third-party verification of capacity met. The installer may want to contact the third-party to see how the public body measures a rain garden for capacity.

SELECTING A RAIN GARDEN LOCATION



Note the water source, flow path, and exit point off the property. Placing the rain garden somewhere along this path will likely require the least amount of work and lower the cost of the installation. (Be sure to check with any local setback ordinances if you are discharging water near a property line.)

The flow of water on the property can best be observed during a rain storm but if the installer wants to try to figure out the path on a dry day he will need to rely on standing water indicators, or use a water level or transit to map the topography of the area. (Directions on how to make your own water level for under $25 can be found in the Build section.) A hose can also be used on hardscapes to quickly and easily see the water's path.

The installer should make notes of all the water sources, especially ones that are in the area where the property owner would like the rain garden installed.

There may not be a perfect location. Experience and creativity are invaluable when identifying a rain garden location.

LOCATION CHECKLIST

VERY IMPORTANT

Distance from foundation
Typically, if you are having water pool in your rain garden, you will want the place where water will collect to be roughly 10' away from a house with an 8' basement. If the house has a 4' basement, you can move to 7', and if it is on a slab you can move to 4' away from a foundation.

Is the location over a septic field?
The installer should not install a rain garden.

Water is/can be centralized
If the water is not coming out of a gutter or sump pump pipe, then it may require some grading or piping to centralize the water.

Has positive flow in and out
Positive flow into the rain garden location is preferred, although grading or piping can sometimes work around this. The installer will need to design for the water to go safely off the property after the water fills up the rain garden.

DESIRABLE

Full sun to part sun
The sunnier the better, but shady can be done. Shady plants will take longer to fill in. Bottom of the basin shady rain gardens may want to start with larger plantings.

Ample space (i.e., 10 x 5)
It is important to have enough space for rain garden, calculations will be made in next steps.

Close to water source
Piping or grading will raise the cost, and overland flow will be absorbed en route leading to less water than expected in the garden.

Close to water spigot
Rain gardens will need to be watered for the first year or two, potentially more if properly sited plants are not chosen.

PREFERABLE

Are there any underground drain tiles, sprinkler systems, landscape lighting, dog fence, old stumps, old foundations?
Some are easier to move or work around than others.

Not in easement/ROW
The installer may not want to, or be allowed to, put a rain garden in a public right-of-way. The installer should first check with the requisite authority.

Prefer not over utilities
Rain gardens do not affect utilities any more than a regular planting, just plant with caution.

Complements landscape
Typically the installer and homeowner will want the rain garden to blend in with the existing landscape.

CALCULATING YOUR WATER SOURCE(S)

CALCULATIONS FOR WATER SOURCE:

DOWNSPOUTS , HARDSCAPES, AND TURF

Length x Width x .083 x Runoff Coefficient = _____ CF

SUMP PUMP Permanent Water Table _____ Seasonal Water Table _____ Surrounding Grade _____ Current Water Conditions _____ How often does it run after moderate rain? _____ Does it run in middle of summer? _____ Footprint of house? _____

□ Photos after storm?

Volume: **Small**=25 CF **Medium** = 50 CF **Large** = 75+ CF

Figure 2: Standing water caused by sump pump.

One thing to keep in mind when calculating water sources is that the more accurate the measurements, the more accurate the design. That said, there are a number of variables at play so the installer should not get too focused on exact measurements. A year with either higher or lower than average rain will play a much larger role in the success of a rain garden than obtaining measurements down to the inch.

When measuring the water source, the installer will first need to decide the size of rainfall he'd like the rain garden to capture. This amount will vary depending on the source of runoff, the frequency and intensity of the rainfall and the type of soils found in the area. Also things like purpose, budget, and site conditions will shape the Design Volume. In the Chicagoland area, the installer will probably want to size a rain garden for a 1" rain as this is the most efficient sizing as explained below.

WHY DESIGN FOR 1” OF RAIN FALL

This size allows a rain garden to catch 87% of the total rainfall by volume on average. This can be seen in the graph below.

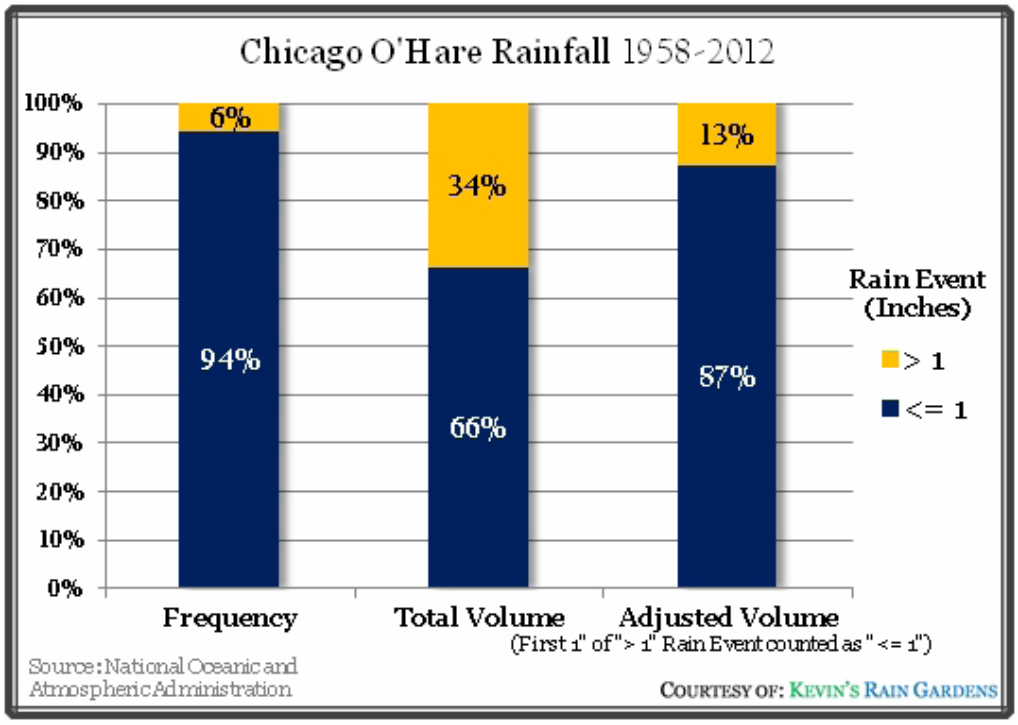


Figure 3: Chicago O’Hare rainfall chart

The Frequency bar shows that 94% of our rain events are 1” or less. The Total Volume bar shows that storms of 1”or less create 66% of our rainfall, while 34% comes down during a rain event greater than 1”.

The last bar labeled Adjusted Volume is the important one. If the first 1” from the rain events that are greater than 1” are removed and added to the 1” or less category, 87% of our total annual rain fall will be captured by a rain garden sized to capture 1” of rain.

The infrequent larger rain storms will not all get captured, but by using this sizing we create a rain garden that is very effective and cost efficient. And bigger isn’t necessarily better.

Small rain gardens have a proportionally larger impact on pollutants as most sediment and heavy metals are carried off in the “first flush,” or the first few minutes of a good rain as they are washed off impervious surfaces.

DOWNSPOUTS

Figure 4: Determining the surface area of the roof.

The installer will want to determine the area of the roof that is being collected by the gutters and into the downspout. There is no need to get out the ladder. One can find the length and width of the roof section by measuring the distances on the ground while walking along the roof.

Multiply the length by the width to get your area. Then multiply the area by the amount of rainfall the installer would like to capture (1”=.083’).

This number is the Design Volume and is in cubic feet. To simplify the math, do not include a runoff co-efficient for roofs and hardscapes. If exact numbers are needed then multiply by the corresponding runoff coefficient in figure 7.

HARDSCAPES

Figure 5: Determining the amount of runoff.

Typically runoff will come from grass and/or pavement. In each case the installer will want to find the area of the surface first. For pavements such as driveways or patios it can sometimes be difficult to decipher where the water is running off. A hose with a spray nozzle attached to the end of it can be used to sprinkle the pavement and see what water is draining where.

Once the installer has found the drainage boundaries he will want to multiply the length by the width to get the area. Next, he will need to multiply the area by the desired rainfall captured (1”=.083’). This provides the runoff volume for this area. If exact numbers are needed then multiply by the corresponding runoff coefficient [Figure 7].

TURF

Figure 6: Overland flow of rain off of a residential lawn.

Although vegetated, turf can produce a surprising amount of runoff in certain situations. A somewhat steep hillside with heavy clay soils beneath can shed nearly 100% of the rainfall once the soils become quickly saturated. Conversely flat areas with loamy to sandy soils will take a long time to reach saturation, and will be able to infiltrate the water quickly enough to keep up with a slow rainfall resulting in very little to no runoff during smaller rainstorms. Because of the wide variation of terrain, soils, and rain events, we use a standard runoff coefficient chart to estimate how much water we can expect from a given turf surface. Once you have measured the length and width of the turf area and multiplied it by the desired rainfall captured (1"=.083'), you will want to multiply this number by the runoff coefficient in figure 7 to find the Design Volume for this turf area.

EXAMPLE

If a lawn on heavy clay soils slopes about 2% and has a volume of 300 cubic feet coming off of it, the installer will multiply this volume by .18 according to the runoff coefficient chart. So then 300 x .18 = 54 cubic feet for the Design Volume.

RUNOFF COEFFICIENT

Character of Surface	Runoff Coefficient
Pavement	
Asphaltic and Concrete	0.70-0.95
Brick	0.70-0.85
Roofs	0.75-0.95
Lawns - sandy soil	
Flat, 2 percent	0.05-0.10
Average, 2-7 percent	0.10-0.15
Steep, 7 percent	0.15-0.20
Lawns - heavy soil	
Flat, 2 percent	0.13-0.17
Average, 2-7 percent	0.18-0.22
Steep, 7 percent	0.25-0.35

Figure 7: Runoff coefficient chart for various types of runoff surfaces.

As runoff travels across a surface, some of the water is lost through infiltration, evaporation, and surface tension. This water that is lost should be calculated into your volume by using the runoff coefficient of the surface. There are very detailed and specific runoff coefficients but below is a simplified list that should be sufficient for the average rain garden.

SUMP PUMP

Figure 8: Sump pump outlet causing standing water issues.

Sump pumps offer measured water at a consistent velocity, but they are not as straight forward to quantify as other water sources. They can contribute water long after a rain storm is done, especially in the spring, creating a wetter rain garden for a longer time. A sump pump might not contribute any water in the middle of summer after a 3″ rain creating a very dry garden for a few months of the year.

Despite these challenges, with more and more experimentation, sump pumps are being seen as a great opportunity for rain garden applications. Before an installer begins estimating sump pump output, he will have to verify that there are no chemicals polluting the potential water source.

The installer should check to make sure that the water softener or laundry machine is not releasing into the sump pump pit. If there are chemicals entering the sump pump pit, the homeowner should try to reroute the drain lines into a wash basin or floor drain that runs to the sanitary or septic line. If this cannot be accomplished for the water softener, the homeowner probably doesn't want to use this as a water source. Currently, there is no practical way to remove the salt from the water and salt will destroy the plants and the soil.

If the homeowner has a laundry machine that cannot be rerouted, it may be possible to use the water. These are called "greywater" gardens and are an emerging form of stormwater solutions unto themselves.

The installer will want to examine the conditions of the current sump pump outlet after verifying the water is chemical free.

First the installer will want to check if the outlet pushes water safely away or at least confirm the water is flowing away from the house before pooling at a safe distance. If the water is pooling close to the house it may be re-circulating the same water over and over again. This means the rain is traveling through the soil into the drain tile around the basement foundation and into the sump pit where it is being pumped up and onto the soil.

Another source of re-circulating water is from the downspouts. The installer should check to confirm the downspouts are connected and pushing water away from the house properly. If they are not, they must be fixed before proceeding.

If there is little to no water recirculating, then the installer can move on to calculating the sump pump's output.

The calculations for a sump pump rain garden rely on a combination of site observations, experience, homeowner knowledge, and measurements. Below is a scoring system that can be used to help with sump pump estimating. It should be used with some discretion as this is not an exact form of measurement.

How saturated is the area at the output compared to how much rain the site has gotten recently and in the current season?

Very Wet = +3
Consistent = +2
Dry = +1

Are there standing water indicators?

A lot = +3
Some = +2
None = +1

Does the sump pump run even in the driest times of summer?

*Yes = +3
Sometimes = +2
No = +1
*Yes = The site may potentially have a high permanent water table

Where is the High Seasonal Water Table? (This information can be found at the Web Soil Survery: http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm)

Within 3' for over 4 months = +3
Within 3' for 3 months = +2
Within 3' for 2 months or less = +1

How large is the footprint of the house in proportion to the average house?

Large = +3
Medium = +2
Small = +1

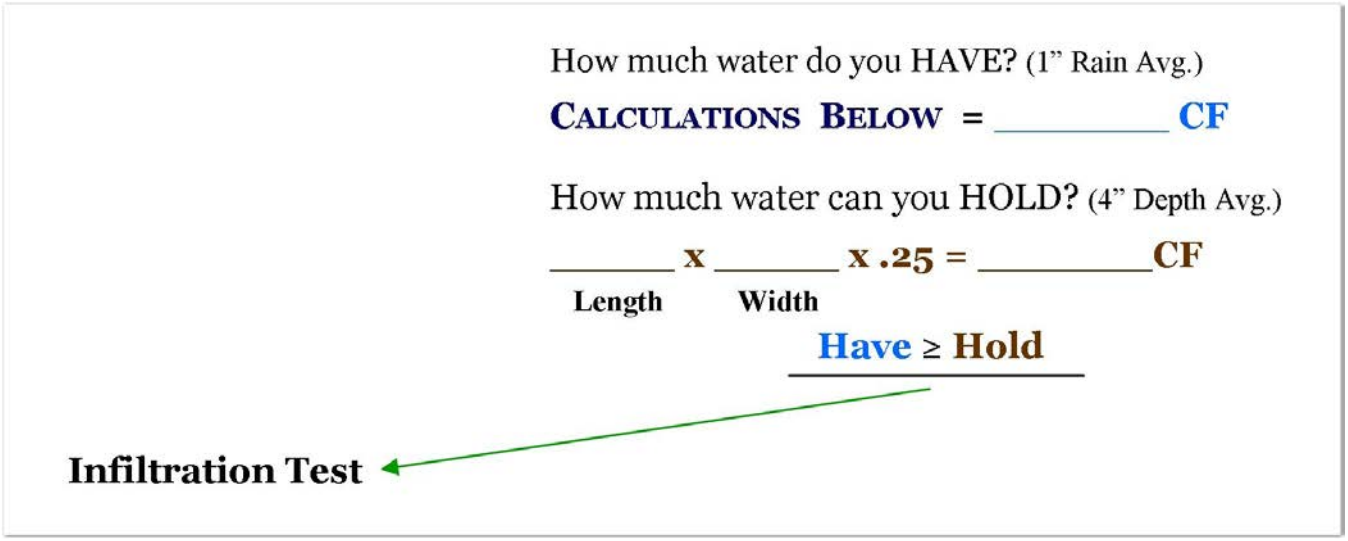
Do you have any photos of the water conditions after a big rain? (Late-Winter/ Spring expect more water, Summer/Fall expect less)

A lot of water = +3
Some water = +2
Little to no water = +1

Total Points = Sump Pump Design Volume:

7-11 Points= **25 Cubic Feet**
12-16 Points = **50 Cubic Feet**
17-21 Points = **75 Cubic Feet**

MATCHING CALCULATIONS WITH LOCATION



At this point the installer should have the most ideal location selected and the water source calculations completed. Now the installer will want to quickly qualify the location as a spot that has enough space for a rain garden that holds a 1" rain fall.

By taking the length and width of the rain garden location and multiplying it by .25, the installer will have a good estimate of what a rain garden that is on average 4" deep, will hold.

If you HAVE more water than you can HOLD, this is okay, but you are losing out on the overall effectiveness of the rain garden as the HAVE number gets larger than the HOLD number.

If you HAVE less than you can HOLD, then you are building a rain garden that is too large and could be built more efficiently. You can minimize the surface area or depth to match up the calculations.

Once you have determined that the site has good potential for a rain garden, the last step you will want to complete evaluates a site's soil drainage.

ESTIMATING DRAINAGE/INFILTRATION TEST

Estimating a site's drainage can be accomplished with a soil probe, site observations, and/or with the aid of an infiltration test for those wanting more empirical information.

Soil Probe:

Figure 9: A soil probe can hollow out a core sample 12" at a time.

A soil probe can give you a sample of the soil profile up to 18" deep or more. This will help to understand your soil profile within minutes without any digging.

Site Observations for Drainage:

Is the site at the low point for the surrounding hundred feet or so, or maybe a small plateau area on a large hillside where the downhill water slows, stops, and soaks in?
Water from runoff is probably collecting in this area. There also may be water seeping from the hillside as well.

What kind of turf is growing and how well is it doing?
Bentgrass means a sunny wet location. This feature signifies great rain garden potential.

Are there ruts from mowers in the turf?
This signifies the site is wet for some period even if currently dry.

What kind of vegetation, shrubs, and trees are growing?
There are probably saturated soils if Willows, Cottonwoods, Bald Cypress, Phragmites, or Cattails are growing on the site.

Is the site close to any surface waters like a lake, river, stream, or creek?
This surface water can help show the localized water table.

Infiltration Test:

The installer should:

1. Dig a test hole 6 inches in diameter and 6 inches deep. (Make note of soil quality)

2. Fill the test hole with water. The installer or homeowner should refill back to the top for 1 hour as needed to maintain a full level [Figure 11, 12].

3. The installer or homeowner should check to see when the water has drained away. [Figure 13]
   - Within 24 hours: Good for rain garden with medium moisture bottom of basin plants.
   - Within 48 hours: Good for rain garden with moisture loving bottom of basin plants
   - After 48 hours: Site is not good for a rain garden without engineered soils.

Figure 10: Dig test hole.

Figure 11: Fill up the test hole with water.

Figure 12: In summertime, the test hole may drain quickly, the installer or homeowner must refill every 15 minutes for 1 hour to accommodate for different seasonal soil moisture conditions.

Figure 13: After the 1 hour fill cycle is completed, start tracking the time that is required to drain the test hole completely.

Noting Soil Quality

In general, the higher the clay content, the slower the rain garden will drain. This will mean a wetter rain garden that remains wet for a longer period of time. If the clay content is above 50%, it is recommended to mix in some organic matter like compost to help with plant establishment.

SITE EVALUATION FINAL NOTES

Leave With: **1" Rain Volume**_____CF **R.G. Dimensions** L_____ W_____

Sunlight: Full/Partial/Shade **Soil Quality:** Sand/Silt/Clay **Pictures** ☐ **R.G. Sketch** ☐ Backside of Sheet

The installer should have all the information needed to fill out the last section titled "Leave With:" Section at the bottom of your site visit form. The installer should remember to take a lot of pictures and draw a sketch of the site on the back. This information will be useful during the design process.

EXAMPLE SCENARIO WITH SITE VISIT FORM

A contractor gets a phone call asking them to come and look at an area of a backyard that has seasonally standing water on the grass in the spring.

The contractor should ask where he believes the water is coming from, and if there have been any changes in the local structures or topography. The homeowner says it is probably from the downspouts of the new addition they put on a couple years ago.

Next, the contractor asks the homeowner if he has any pictures of the area with standing water, and if so, can he either send them to him via email, or have them available in person for a site visit.

As the contractor drives to the site he should pay attention to the local topography and stormwater systems.

Once at the site, the contractor should walks the property, ideally with the homeowner, and surveys the possible water sources and topography. Using these observations along with the pictures, the contractor makes sure that the standing water is minor, and not more along the lines of flooding which is not easy solved with a rain garden. The location is about 15' away from the house, which is good. The location of the standing water should ideally be at distance of 10' or greater, or in a location where the water can be moved via grading or piping to further away location.

Next, the contractor will begin to look for a possible location for a rain garden. The current location is in partial shade and right in the path of foot traffic. There is a fairly large sunny location that is part of an existing landscaped bed. It is about 10' from the existing standing water location, but still only about 25' from the downspout. This sunny location is also sloped towards the side of the properties where there is a drainage swale. The contractor can use a piping system to convey the water from the downspouts and to the better sunny location, thus drying up the existing standing water turf area.

The contractor asks the homeowner if he knows if there are any underground utilities. There are none that the homeowner knows of. The contractor says that he thinks he can use this space, but will call JULIE to mark out the location. The contractor asks the homeowner if he will send him pictures once the area is flagged and spray painted.

The contractor then goes to calculate the water coming off the section of the medium pitched asphalt roof he hopes to capture in the rain garden. He measures the length and width of the roof lines from the ground. It is 25' by 15'. The contractor then calculates the amount of water he can expect from a 1" rain.

HAVE

25' x 15' x .083' x .85 = 26.5 Cubic Feet

He then checks to see if his location has enough space to hold this volume. The location is 20' by 15'.

HOLD

10' x 15' x .25 = 37.5 Cubic Feet

26.5 is not greater or equal to 37.5

This is good news. The location can hold more water than he has coming off the root. The contractor can make rain garden measurements smaller to match his water source calculations. If the contractor wanted a 6" deep (3" on average), he only needs a basin that is roughly 10' by 11' to capture his 26.5 Cubic Feet.

Now that the contractor has found a location, he will try to estimate the site's drainage. He takes note of the surrounding vegetation, the topography, and soil samples if he has a soil probe. Next, if he desires, he can conduct an infiltration test. He digs his hole, checks out the soil, and instructs the homeowner to keep the water filled for 1 hour, and then let him know when the water has drained away.

Before the contractor leaves, he takes pictures of the section of house he is collecting the water from, a picture from the location to the downspout, from the downspout to the location, and one photo in each direction while standing in the rain garden location. The contractor will want to make sure that he has marked down his water source calculations, rough rain garden dimensions, sun light conditions, and soil quality, and may want to take a sketch of the rain garden on the back of his site visit form. Any other personal notes form the homeowner should also be noted on the backside of the form.

The contractor will want to follow up over the next couple of days with the homeowner to see how the site drained and gather the photos if JULIE marked utilities in the proposed rain garden location.

After getting this final information, the contractor has all that he needs to move onto the design stage of his rain garden project.

DESIGN

There is no one template for a rain garden design.

Any garden that is designed to capture rain water and soak it up with thriving plants and existing soils within 48-72 hours is a productive rain garden.

Rain gardens revive a form of gardening that designs to the Earth, rather than designing the Earth to us. We do this through a better understanding of climate, site, soils, and plant material. All of this starts with a thorough site evaluation, which has already been completed. Now this information can be used to formulate the rain garden's shape, size, and plants.

RAIN GARDEN DIMENSIONS AND PLANTS

There can be large variations in the dimensions and plant selections of a successful rain garden, even in the exact same location. All of the different variations can work as long as designers understand, and design to, the water sources and site conditions.

To help with this design process, a Design Cheat Sheet is included below and discussed in the following pages. This Design Cheat Sheet can be used to formulate the rain garden dimensions and plant choices.

KEVIN'S RAIN GARDENS

SUSTAINABLE STORMWATER SOLUTIONS

Step 1:

Use your water source's frequency of occurrence as your starting point on the plant's water requirement list

- RARE -> MED-DRY
- INTERMITTENT -> MED
- CONSISTENT -> MED-WET

Plant Water Requirement List

DESERT
VERY DRY
DRY
MED-DRY
MED
MED-WET
WET
VERY WET
AQUATIC

Step 2:

Move Up (+1) or Down (-1) the plant water requirement list depending on soils and sun

SOIL DRAINAGE	FAST	MEDIUM	SLOW
	+1	0	-1
SUN LIGHT	FULL	PARTIAL	SHADE
	+1	0	-1

Step 3:

Balance rain garden dimensions with final plant water requirements

AVAILABLE SURFACE AREA: _____

_____ CU.FT. / _____ SQ.FT. = _____

DESIGN VOLUME SURFACE AREA PONDING DEPTH

PONDING DEPTH	0" - 4"	4" - 8"	8" - 12"
	+1	0	-1

Ponding Depth	
.08'	1"
.16'	2"
.25'	3"
.33'	4"
.42'	5"
.5'	6"
.58'	7"
.66'	8"
.75'	9"
.83'	10"
.92'	11"
1'	12"

Note: This Design Cheat Sheet should be used as a guide. It can be difficult to quantify all of the variables that can be found at a site. The experience of the user should be factored into its results.

Figure 14: Design Cheat Sheet

Below are some suggestions on how an installer might interpret and transfer the Water Source Occurrence, Soil Drainage, and Sun Light from the Site Evaluation to the Design Cheat Sheet, as well as a specific example situation.

STEP 01

Use your water source's occurrence as your starting point on the plant's water requirement list

RARE -> MED-DRY
INTERMITTENT -> MED
CONSISTENT -> MED-WET

Water Source Occurrences Examples

Rare –> Downspouts in the desert. Could be a sump pump in any climate.
Intermittent –> Downspouts in the Midwest and Northeast. Potentially a sump pump in all locations
Consistent –> Downspouts in the Pacific Northwest. Potentially a sump pump in all locations

STEP 02

Move Up (+1) or Down (-1) the plant water requirement list depending on soils and sun

Soil Drainage	Fast	Medium	Slow
	+1	0	-1
Sun Light	Full	Partial	Shade
	+1	0	-1

Plant Water Requirement List

Desert
Very Dry
Dry
Med-Dry
Med
Med-Wet
Wet
Very Wet
Aquatic

Soil Drainage

Fast –> Sand soils, loam soils on a hill
Medium –> Sand soils in a low spot. loam soils, clay soils on a hill
Slow –> Loam soils in a low spot. clay soils

Sunlight

Full –> 6+ Hours of Sun
Partial –> 3-6 Hours of Sun
Shade –> 0-3 Hours of Sun

STEP 03

Balance rain garden dimensions with final plant water requirements

AVAILABLE SURFACE AREA: _____

_____CU.FT. / _____SQ.FT. = _____
DESIGN VOLUME SURFACE AREA PONDING DEPTH

PONDING DEPTH	0" - 4"	4" - 8"	8" - 12"
	+1	0	-1

Ponding Depth	
.08'	1"
.16'	2"
.25'	3"
.33'	4"
.42'	5"
.5'	6"
.58'	7"
.66'	8"
.75'	9"
.83'	10"
.92'	11"
1'	12"

For step 3 the installer will want to transfer over the Design Volume and Available Surface Area information from the site evaluation. With this information, the installer can use the equation to test different surface areas, ponding depths, and plant water requirements.

Keep in mind the installer can utilize multiple ponding depth zones in the rain garden. To do this, the installer should insert only the portion of the design volume he wants for that ponding depth zone into the formula. The installer should verify that all the portions add up to the total Design Volume.

EXAMPLE SCENARIO WITH DESIGN CHEAT SHEET

For this example we will design a rain garden in a Chicago suburb with clay-loam soil. The rain water will come from the runoff of the roof. The rain garden is in a relatively flat area, not on the top or bottom of a hill, and gets sun from about 10am-5pm each day in the summer. The Design Volume is 50 Cubic Feet, and the available surface area is 300 square feet.

Step 1: the installer looks at the Water Source Occurrence, and with the downspouts he determines he has an intermittent water source. This means he would start at MED on the "Plant Water Requirement List."

Step 2: with clay-loam soils and no real elevation changes around, the installer would most likely select "Slow" for Soil Drainage. This will move him down one level to MED-WET in the "Plant Water Requirement List."

Step 3: Continue down to Sunlight, the site location gets sun for seven hours, so this would put the site in the Full Sunlight category. This would move the rain garden back up one level to MED on the "Plant Water Requirement List."

At this point, the installer should note where he is on the "Plant Water Requirement List." The installer will utilize this information during Step 3.

Step 3 encompasses all of the variables designers have control over: Design Volume, Surface Area, Ponding Depth, and Plant Requirements.

The choices made for one of these variables directly affect the others, and step 3 allows the installer to experiment with these interactions. The installer can try multiple combi-

nations to come up with different shapes, sizes, and looks to the rain garden. For this example, let's start by transferring the "Available Surface Area" and "Design Volume" from the Site Evaluation Form (300 square feet and 50 cubic feet).

Next the installer will want to start with the desired Surface Area for the rain garden. We have 300 square feet available, let's try that first:

50/300 = .16

The Ponding Depth will be in a decimal, which can be matched up on the chart to the right of the formula.

.16 = 2"

This would mean the site requires a rain garden that is 2" deep. This may be good for some locations that drain very slowly with constant water sources, but for the site in this example, the installer could make the surface area of the garden a little smaller by making the ponding depth a little deeper.

Now, the installer could try 100 square feet as the Surface Area for the rain garden.

50/100 = .5

.5 = 6"

For an intermittent water source, 6" would be a more appropriate depth.

The Basin Dimensions are 100 square feet by 6" deep. This Ponding Depth information will allow us to make our final move up or down on the "Plant Water Requirement List."

Because this 6" Ponding Depth falls in between 4" – 8", the rain garden will not move up or down on the Plant Water Requirement List. The installer will use the current location on the "Plant Water Requirement List" of MED-WET.

So with this information, the installer will want to put in a rain garden that is roughly 100 square feet by 6" deep, with the plants in the bottom of the basin requiring Full Sun, Med-Wet moisture, and clay soils, while also selecting MED plants for higher locations in the garden.

By designing to the site conditions, the installer can create a beautiful and sustainable rain garden that requires minimal resources and labor to achieve.

CONVEYANCE

Figure 15: This pop-up emitter releases water into the rain garden.

In most cases, the rain garden water source and the rain garden location will not be in the same spot. This will require moving the water from the water source to the rain garden location, a process known as conveyance. Conveyance can be one of the most challenging parts of installing a rain garden, but also offers some of the biggest design opportunities. The addition of rain water can bring movement and life to a usually static garden.

The conveyance system will usually be dictated by the water source and/or site and will probably consist of one or more of the following three methods:

1. **GRADING**
2. **SWALES**
3. **PIPING**

GRADING

Figure 16: Grading water into the rain garden.

Let's start with the most straight forward method - grading.

Grading is usually the most efficient, economical, and low maintenance option to convey rain water, but it cannot be used in all situations.

Some example situations where grading can be used are when a property has a small hump that keeps water from draining where it once did, a depression from the house or settling lawn, or a low spot from lawn mower tracks that worsens over time.

Grading can focus surface run-off into one stream or push along the water for a down-spout or sump pump outlet to the rain garden. You will usually want to have at least 3" of drop, over 10' of run, to keep the water moving overland. A water level or transit can be invaluable in grading work. Be sure to lightly compact the soil every 2"- 3" of depth as you build up an area.

For maximum efficiency, and when appropriate, the installer can use the soil he removes while shaping the basin to grade the area. The installer should make sure that the soil is relatively dry as wet soil does not grade well.

In most cases the best quality soil will be the uppermost soil. If the soils drastically change from good to very poor soils, it would be beneficial to set aside the good upper soil and haul out the lower poor soils, then return the good upper soils back into the rain garden.

SWALES

A swale is a flattened out, “U” shaped, earthen channel used to convey water from one place to another with a constant slope from start to finish.

If a swale is placed in an area coming from the house, it is especially important to make sure that the swale is constantly pitched away from the house for at least 5’ to 10’ depending on the basement depth. If not, the water will sit too close to the house and be picked up by the sump pump drain tile around the house’s foundation.

A swale can be covered with many different materials, but is typically covered with rocks, turfs, plants, or a combination of these.

The pros and cons of each swale material are covered below:

ROCKS/GRAVEL

Considerations

- Needed for high velocity sources (dissipates energy of flow)
- Low-risk of erosion (when rocks are properly sized for force of flow)
- Adds aesthetic value
- Require little maintenance
- Moderate material costs
- Moderate to high labor to install
- May not be desirable aesthetically or economically across long distances

PLANTS (BIOSWALE)

Considerations

- Should be planted close together (i.e. 12”-15” centers) to crowd-out weed growth
- Good for medium and, if designed correctly, high velocity sources
- Adds aesthetic value
- Adds wildlife value (if natives are used)
- Plants add absorption and filtering of rain water
- Moderate to high product cost
- Moderate maintenance needed
- Moderate to high labor needed to install
- May not be aesthetically desirable or economical across long distances

TURF

Considerations

• Blends into most landscapes across long distances
• Good for medium to slow velocity water sources
• Easy to install
• Low cost material
• Adds valuable play space for smaller lots when dry
• Economical for long distances
• Easy to maintain (if sited correctly as not to stay too wet)
• Cannot handle consistent water source (sump pump)
• Must be used in a sunny location, with slopes greater than 3” over 10’ preferred to prevent soggy turf conditions

GRAVEL GRASS

Considerations

- Blends into most landscapes over long distances.
- Good for medium and potentially high velocity sources
- Solid underfoot in shady or low sloped areas
- Adds valuable play space for smaller lots when dry
- Easy to maintain
- Moderate labor to install
- Moderate material costs

PIPING

Piping is a great option of conveyance when you want to move water over relatively large distances. This option can be a little more expensive in materials and labor, and require a higher level of expertise, but this system allows the transfer of water from the source to the garden, hidden entirely from view. When piping water you will need an inlet, pipe, and outlet. These are all covered individually below.

INLET

Figure 17: Sump pump line to the left directed into PVC pipe with foam filter. Downspout in the upper right that is directed into leaf filter.

Inlet options range from a catch basin to a 90 degree PVC elbow and riser pipe, or, in the case of a French drain, the holes in the pipe itself.

With the exception of the perforated pipe, the installer wants to be sure to maintain a 2-3" air gap between the water source and inlet. This is especially important for a sump pump.

The installer should never directly connect a sump pump outlet pipe permanently to any outdoor pipe. In the winter the pipe can clog and freeze shut, forcing the water in the basement to rise up above the sump pump pit and flood the basement.

The installer and homeowner will want to keep as much debris as possible out of the inlet with some type of filter. The most commonly used filter is the slotted grate.

For additional filtration, the installer can locate the grate a few inches below the grade, place landscape fabric 1' around the grate over the surrounding soil, and then cover the entire area with gravel larger than the grate slots.

PIPE

This section covers the two categories of pipe material and the two categories of pipe styles.

Materials

Polyethylene (PE) -> A plastic pipe with flexible, corrugated inside walls.

Considerations

- Relatively inexpensive
- Handy in steep elevation changes over short distances
- Typically easier to install
- Changes directions easily
- Weaker than PVC
- Flexibility makes it harder to identify poor trench work
- Higher likelihood of debris build-up in corrugated ridges of inner walls
- Loose connections don’t seal out debris and allow tree root intrusion
- Typically a lower life-span for installation.

Polyvinyl chloride (PVC) -> A green/white/grey plastic pipe with rigid, smooth inside walls.

Considerations

- Stronger than polyethylene
- Rigid pipe shows errors in trench work
- Smooth inside walls do not hold debris
- Addition of clean-out allows for snaking, flushing, or other cleaning method
- Connections are water tight and keep out debris
- Need to plan out direction changes with designated angle fittings
- Costs about 50% more than polyethylene, but still relatively inexpensive
- Transportation can be difficult due to inflexibility of 10′ sections

Pipe Styles

Solid – (Both pictures above are solid pipe)

Considerations

- Used to convey water from one location to another.
- Can be used in combination with perforated pipe

Perforated

Considerations

- Used to capture water in the soil through openings in the pipe.
- PE has slits around the entire circumference of the pipe
- PVC has ½" holes drilled out on one half of the pipe
- Clean and proper installation largely responsible to the success of either material
- Pipe is surrounded by gravel and either a filter fabric, filter sock, both, or none.

Outlet

The last part of the piping system is the outlet into the rain garden. A good choice for this task is a pop-up emitter that opens to release water and then closes when the water stops flowing. This helps keep debris from infiltrating the pipe.

Something to be mindful of with a pop-up emitter is that the installer will want to place the top of the pop-up emitter - the part of the emitter where the water flows out of - above the overflow of the rain garden by at least one inch. This helps to prevent water in the rain garden from freezing over the pipe opening during an overnight freeze after a daytime rain.

The installer will also want to surround the bottom of the PVC elbow of the pop-up emitter with loose gravel which drains away any water left in the pipe after it has finished moving the rain. This prevents water freezing in the pipe.

If possible, it is preferred to have the drain tile end laterally and pour the water directly into the rain garden. This offers a great effect and creates movement in the garden while greatly reducing any chance of freezing. It is important to construct the piping so that the bottom of the inlet pipe is higher than the overflow by at least an inch or so. This will allow the water to exit out of the rain garden before the ponding height reaches the level of the inlet pipe. A mistake could potentially back-up water in the pipe that could freeze the pipe closed in the winter.

This practice of having the pipe pour out laterally is illustrated below where an old clay tile is attached onto the end of a PVC pipe. This feature gives the look of a farmer's tile surfacing in the garden as seen below.

OVERFLOW

The rain garden's cost-to benefit ratio is maximized by designing the rain garden to capture most, but not all, of the rain that could potentially fall.

This practice of economically sizing the rain garden will mean that there will be times that there is more water entering the rain garden than can be held inside the rain garden basin. This excess water, or overflow, needs to be accommodated for at the design stage with a safe and long-lasting path out of the rain garden, or outlet.

There are two main types of overflow outlets:

- Direct
- Indirect

DIRECT OVERFLOW

Figure 18: The installer and homeowner must decide where overflow water goes so that it has safe path off the property.

With direct overflow design, the excess water flows directly out of the rain garden basin overland, preferably on to the existing stormwater system. This would most likely be used in a residential or small-scale commercial setting where the overflow would travel into a side yard drainage swale, ditch, stormwater basin, or street. Direct overflow outlets should be covered with gravel, sedges, or other erosion preventing material.

INDIRECT OVERFLOW

Figure 19: Indirect overflow can connect into the municipal storm drain.

With an indirect overflow design, excess water flows into a riser pipe inlet that is located inside the rain garden basin below the elevation of any other point of the rain garden basin sides. This passes along any rain water beyond the rain garden's designed capacity to another location.

This is a good option if there is no direct path from the rain garden basin to the stormwater system, (i.e. center of yard, backyard). This could also be used when it is not desirable/ possible to have the excess water flow onto adjust land. A rain garden should never overflow onto a neighbor's property, although a drainage swale along the property line is acceptable. Indirect overflow should also be used if the design volume could potentially be much larger than the capacity of the rain garden (i.e. small-lot residential, parking lot island, commercial developments).

Direct or Indirect?

A direct overflow outlet is typically the preferred method and will usually meet the needs of a rain garden in residential settings. The costs of the piping needed for an indirect overflow outlet makes this option restricted to a need-only basis.

MULCH: ORGANIC AND INORGANIC CONSIDERATIONS

Mulch is an important part of any garden, but rain gardens add a degree of difficulty as traditional organic mulches tend to wash away. Each type of mulch has its own advantages and disadvantages depending on the situation, and should be selected depending on the site.

If the plants are installed on 1' centers the aesthetics of the mulch will mostly be hidden by the plants themselves.

Below is a list of the pros and cons of different mulches in your rain garden:

MULCHING MATERIALS

GRAVEL/ROCKS

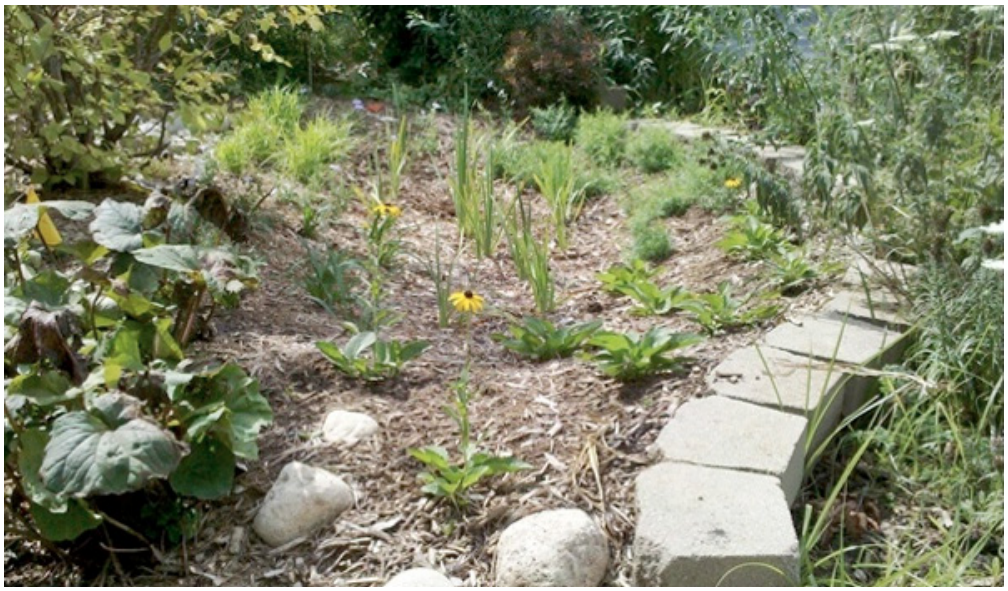
Benefits

- Doesn't float
- Walkable/weedable when wet
- Prevents compaction
- Prevents soil erosion
- Moderate to good weed suppression
- Adds moisture retention
- Moderate help against frost heave

Drawbacks

- Very difficult to weed
- Medium/high labor install
- Permanent/non-organic
- Not desirable to some clients

WOODCHIPS (HARDWOOD MULCH)



Benefits

- Organic
- Somewhat walkable/weed-able when wet
- Prevents compaction
- Prevents soil erosion
- Good weed suppression
- Adds moisture retention
- Strong help against frost heave
- Mycorrhiza network will help hold some mulch together in time
- Low/medium labor install

Drawbacks

- Will float initially
- Will require nitrogen to break down
- Fresh woodchips are not recommended
- Not good for higher velocity water

NOTHING

Benefits

- Higher reseeding rate from parent plants
- No costs
- No labor

Drawbacks

- Not walkable/weedable when wet
- Rain can compact soil
- Prone to soil-erosion
- No weed suppression
- No moisture retention
- No help against frost heave

LEAF MULCH

Benefits
- Organic
- Somewhat walkable/weedable when wet
- High reseeding rate
- Prevents compaction
- Prevents soil erosion
- Good weed suppression
- Adds moisture retention
- Strong help against frost heave
- Helps improve organic topsoil layer
- Mycorrhiza network will help hold some mulch together in time
- Low/medium labor install
- Does not take nitrogen from plants when decomposing
- Considered best product for use in perennial beds by many in industry

Drawbacks
- Will somewhat float
- Breaks down relatively quickly, may benefit from small additions of leaf much in certain spots, but not necessary.

MULCHING TIPS

Below are three tips that will help with mulching the rain garden, regardless of the mulch that is selected :

- Mulch first
- Only 1” of mulch
- Only mulch one time

Mulch first

If the contractor first installs small delicate plants on 1’ centers across 200 square feet, it will result in a very cumbersome mulch application. By mulching first and then planting through the mulch the installer will save himself hours of work. This also prevents accidental damage to the plant material during the mulching application.

Only 1” of mulch

There are recommendations of 3”, 4” sometimes 6” of mulch in some rain garden guides. It is suggested to only apply 1” of mulch. The 1” of mulch will turn into 2” of mulch once the mulch is moved aside for the plantings. This is plenty of mulch to provide the desired benefits. Additionally, if the mulch is organic and floats, the deeper mulching will shift during a rain storm and smother plants.

Only mulch one time

The installer should only need to mulch one time. By the third year, the closely installed plants will have filled in enough to supply many of the benefits that mulch delivers in the early stages of the rain garden’s development. Over this time, organic matter from the plants in the rain garden, as well as from surrounding leaves being blown in, will have begun to create a layer of organic matter that will continue to supply the benefits of the original mulch. The installer may need to touch up certain places during establishment, but there should be no need to redress the entire garden.

PLANT SELECTION

Once you understand and design your rain garden, you will want to match up the plants to the conditions that you believe will be present. This may require some trial and error. Although there is no list of "rain garden plants" but rather plants that prefer a certain moisture condition that may also be present in a rain garden, below is a list of native plants that are sorted by their moisture requirements.

PLANT PALETTE (THESE LISTS ARE NOT ALL-INCLUSIVE)

Sunny Med-Wet
Asclepias incarnata
Aster novae-angliae (cut this plant back to 6-8" in mid-May)
Eupatorium maculatum (though tall)
Euthamia graminifolia
Liatris pycnostachya
Liatris spicata
Pycnanthemum virginianum
Rosa palustris
Rudbeckia speciosa var Sullivantii
Zizea aurea

Grasses/Sedges/Rushes:
Carex vulpinoidea
Juncus effusus

Sunny Med-Dry
Asclepias tuberosa (conditions need to be well drained)
Aster laevis
Coreopsis palmata
Dalea purpurea
Echinacea pallida
Geum triflorum
Heuchera richardsonii
Parthenium integrifolium
Zizea aptera

Grasses/Sedges/Rushes:
Carex vulpinoidea
Panicum virgatum
Schizachyrium scoparium
Sporobolus heterolepis

Part Shade Med-Wet
Allium cernuum
Chelone glabra
Eupatorium purpureum
Iris virginica
Lobelia siphilitica
Mimulus ringens
Penstemon digitalis

Grasses/Sedges/Rushes:
Carex comosa
Carex grayi
Carex lupulina
Carex muskingumensis

Part Shade Med-Dry
Asarum canadense
Aster shortii
Geranium maculatum
Polemonium reptans
Sedum ternatum
Solidago flexicaulis
Zizea aptera

Grasses/Sedges/Rushes:/Ferns
Athyrium filix-femina
Carex pensylvanica
Carex cephalophora
Diarrhena americana

ADDITIONAL DESIGN ELEMENTS

The installer has now completed the design of the basin dimensions, plant selection, conveyance system, overflow outlet, mulch, and plants.

Now that the basic requirements have been met, the installer can decide if there are any additional landscaping elements he wants to include in rain garden. These may include a gravel or brick path, small wooden bridge, or even some other plants that could augment the rain garden in some way. The possibilities are endless as long as the basic requirements have been met.

BUILD

As with most landscape installations, how a rain garden is constructed will vary greatly from contractor to contractor, and from site to site. Because of this, in this section we will only cover general guidelines for a typical small-scale, existing soil, rain garden installation, as well as include a tutorial for building a water level - an important tool in finding elevation changes.

TOOLS USED:

Right to left

- Soil probe
- Tape measure
- Surveyor's wheel
- Short-handled shovel
- Manual sod cutter
- Planting trowel
- Pick axe
- Metal rake

EXAMPLE BUILD

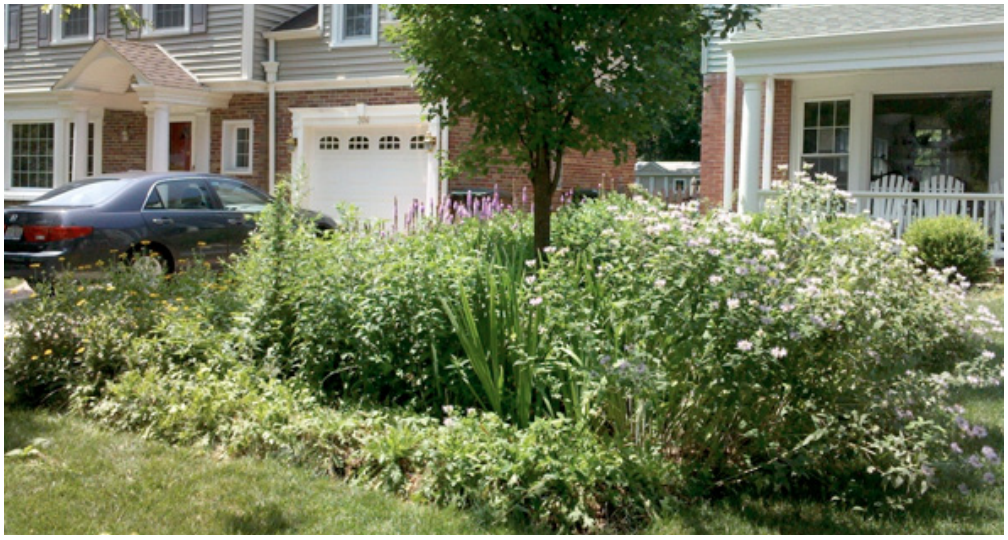
• Call JULIE to locate utilities. Excavate to find utilities (if applicable)
• Temporarily divert water (if applicable)
• Outline rain garden location with paint or hose
• Apply a herbicide to the turf (optional)

• Create an edge for the rain garden
• Scalp the sod if not herbiciding (optional)
• Cut the sod, or clear the land of plant matter
• The installer should take care to minimize compaction during the construction of the rain garden basin (don't work on wet soils).
• The sod may be flipped over to build an outer berm for containment purposes.
• Use cut and fill techniques to construct the basin so that no/minimal soil needs to be removed

• Mulch
• Install the plantings

1st Year

2nd Year



3rd Year

DIY: $25 WATER LEVEL

An important part of the building process is the ability to figure out elevations in and around the rain garden. There are a few different ways to figure this out, but most often this is done with the assistance of an expensive laser level. This can also be done with the use of a very inexpensive tool known as a water level. Anyone can build one for under $25 in about one hour. This includes the 30 minute trip to the hardware store. To do this, one will need:

1 - 20' clear tube 3/8" inner diameter and 1/2" outer diameter

2 - Snow markers (stick)

2 - Meter rulers (metal)*

6 - 6" zip ties

2 - 1/2" rubber stoppers

*** The metal meter rulers are preferred. If they do not come with three holes drilled in them, you will need to drill them yourself. There should be one on each end and one hole in the middle.**

STEP 01

Run the zip ties through the openings in the meter stick and close each one slightly, allowing plenty of room for the snow marker and tubing.

STEP 02

Slide the snow marker through the zip ties on the backside of the meter sticks, allowing about 3-4” of the snow marker stake below the meter stick.

STEP 03

Pull the tubing up through the zip ties on the front side of the meter sticks

STEP 04

Tighten the zip ties so that the tubing and snow marker are secured. Do not over tighten so that the snow marker can be moved up and down slightly, this will allow some movement depending on how firm or soft the soils are at the location.

STEP 05

Fill the tubes up with water until both meters read 18” when held exactly even with each other. Be sure to remove all the air from the tubing.

STEP 06

Cap with rubber stopper for storage and transportation of water level when not in use.

Figure 20: Water level In use.

MAINTENANCE

Figure 21: Before and after a rain garden fall clean-up.

Rain Garden maintenance is not much different than ordinary maintenance for landscaped beds. Below is a general maintenance schedule for a rain garden.

RAIN GARDEN MAINTENANCE SCHEDULE

KEVIN'S RAIN GARDEN
MAINTENANCE SCHEDULE

POST INSTALLATION CHECK-UP

After 1st Moderate to Heavy Rain

WATERING (NATIVES)	WEEDING & INSPECTION	FALL/SPRING CLEAN-UP
1st Year - Regularly	**1st Year** - Every 1-2 Months	**1st Year** - Light
2nd Year - Dry Weather Only	**2nd Year** - Every 2-3 Months	**2nd Year** - Moderate
3rd + Years - Drought Only	**3rd + Years** - Every 4-5 Months	**3rd + Years** - Heavy

ADDITIONAL NOTES

Temporary Flooding - You may get a concerned phone call from the homeowner wondering if their plants are drowning following the first big rainfall after you have installed the garden. Standing water for 24 -48 hours during the growing season is the goal, and as long as the correct plants are chosen, they will be able to survive the temporary flooding. It is best to make the clients aware of this ahead of time.

Mulch-in Debris - After the plants in the garden have become hardy and deep rooted, probably the end of year two or three, I like to use my lawn mower with the chute covered by a bagging attachment and mow down all of the plants. I make about two or three passes, and may rake some clumps around after if necessary, but this will eliminate lots of waste and work, and add some quality organic matter.

Grass Seed - If you install grass seed in an area that drains into your rain garden, you may wash some seed into your planting area. Sometimes this cannot be avoided, but diligence and care to not overwater and produce runoff when watering the seeded area, can help reduce this issue. Grass in the garden is best addressed early on while the grass sprouts and surrounding plantings are young so that hand pulling is more easily accomplished, or collateral damage from herbiciding is minimized.

Mulch Washout - Organic mulches may be washed out during larger rain events, especially in the first year. If washouts are reoccurring, some design changes may need to be made such as using gravel/ rocks at the entrance to slow the water down and/or at the overflow to prevent erosion, or the rain garden basin may need to be enlarged. The debris from a washout can be cleaned up quickly and cleanly with a blower, and this is more easily done when the materials are dry.

Plant Replacement - With the extreme conditions typically present in an unestablished rain garden coupled with the high density of plants, you should expect to lose about 10%-20% of your plantings by year two, especially if plugs are used. It is important to evaluate why they failed. If it was due to some abnormal inundation of rain, especially in the spring, or an extended drought, do not immediately replace with a different species if, once established, that species will thrive. Do not be afraid to try again with the same species. If only a couple of plants need to be replaced, this can usually be done by dividing plants of the same species in the rain garden.

Seed Harvesting - If native plants are used, make a log of species and their corresponding harvest times. Then harvest seed throughout the year during your maintenance trips. Use seeds to grow your own plants, or donate to your local conservation groups.

Figure 22: Sample rain garden maintenance schedule.

DON’T FORGET

• Be sure to set clients’ expectations for a large and vibrant garden, if this is your design.

• Remind the homeowners that even though it is a rain garden, they will probably need to water the plants for at least the first year.

• Check up on the rain garden after the first significant rainfall to see how the water drained and if there is any washout, or ask the customer to send pictures/videos.

• A weeding program is the key to a rain garden’s success and a lack of one is a primary downfall for many failed gardens.

ABOUT THE AUTHOR

Kevin Hebert is a rain garden designer and consultant located in the Northwest Suburbs of Chicago. He has over 15 years of experience as a landscape contractor and has installed or consulted on over 35 rain gardens. He uses the skills and knowledge he gained in traditional landscaping and applies them to the sustainable services he now offers. His aim is to create functional rain gardens that improve water quality while appealing to his clients aesthetically. Kevin also authors and maintains an active and well-followed blog on his website www.kevinsraingardens.com.

Kevin Hebert

Email: kevinsraingardens@gmail.com
Website: www.kevinsraingardens.com

THANKS AND ACKNOWLEDGEMENTS

My loving and supportive family

My mentor Mike Behrens

The ILCA – Sustainable Landscape Committee

Scott Grams, Executive Director, ILCA

Brandon Losey for his help editing this document

Trish Beckjord for her contributions to the native plant recommendations

Jeff Swano and Trish Beckjord for reviewing and adding their expertise to this manual