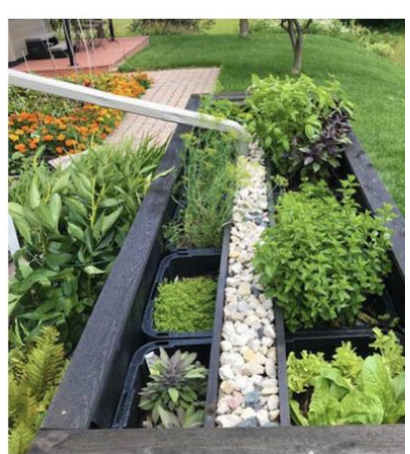


Sump Pump Discharge to Rain Garden Sizing Calculator for Homeowners

Kara Koch, PE, ENV SP | Senior Project Engineer



OUTLINE

01 | BACKGROUND

02 | DATA ASSEMBLY

03 | DESIGN / SIZING CALCULATOR

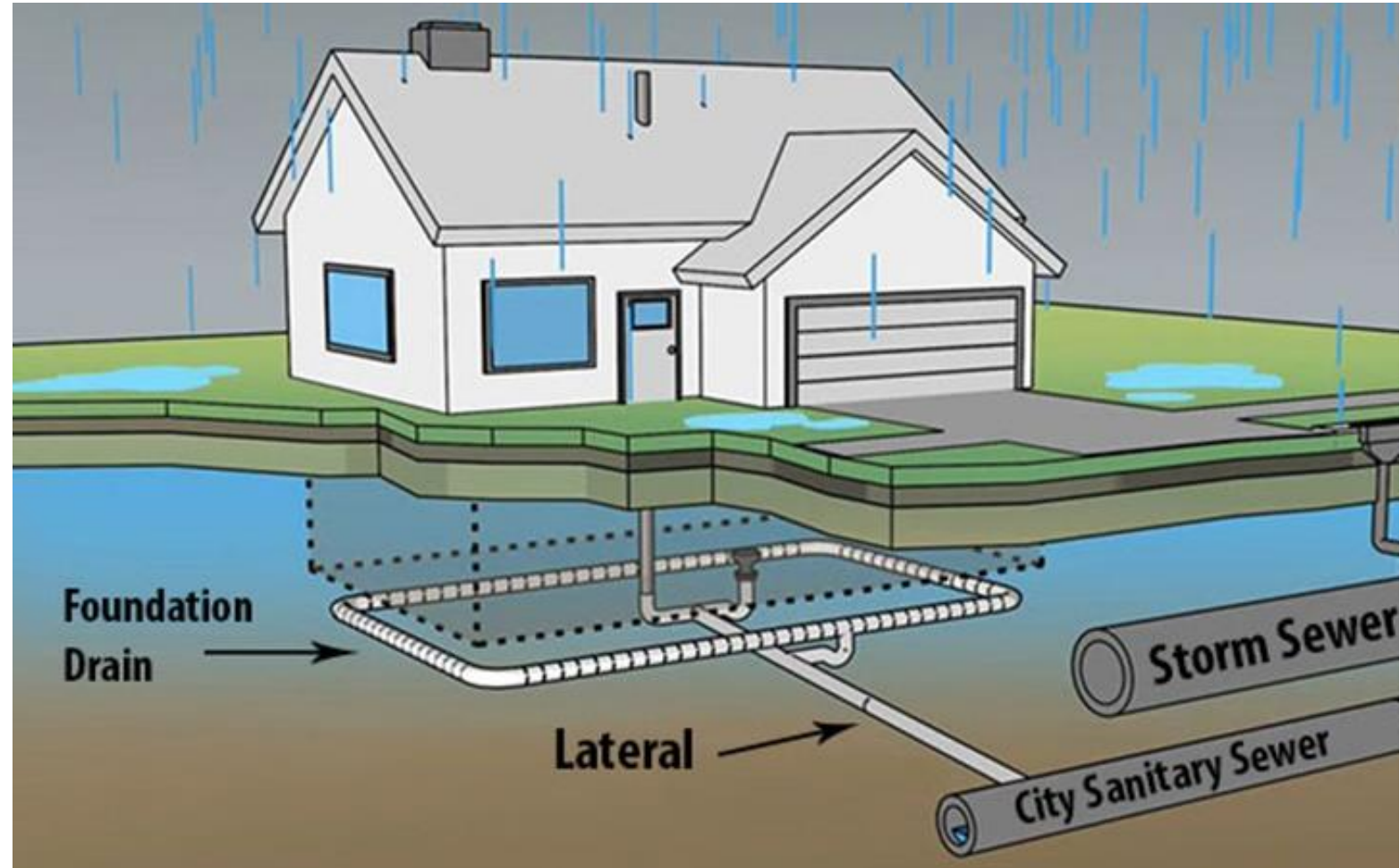
BACKGROUND

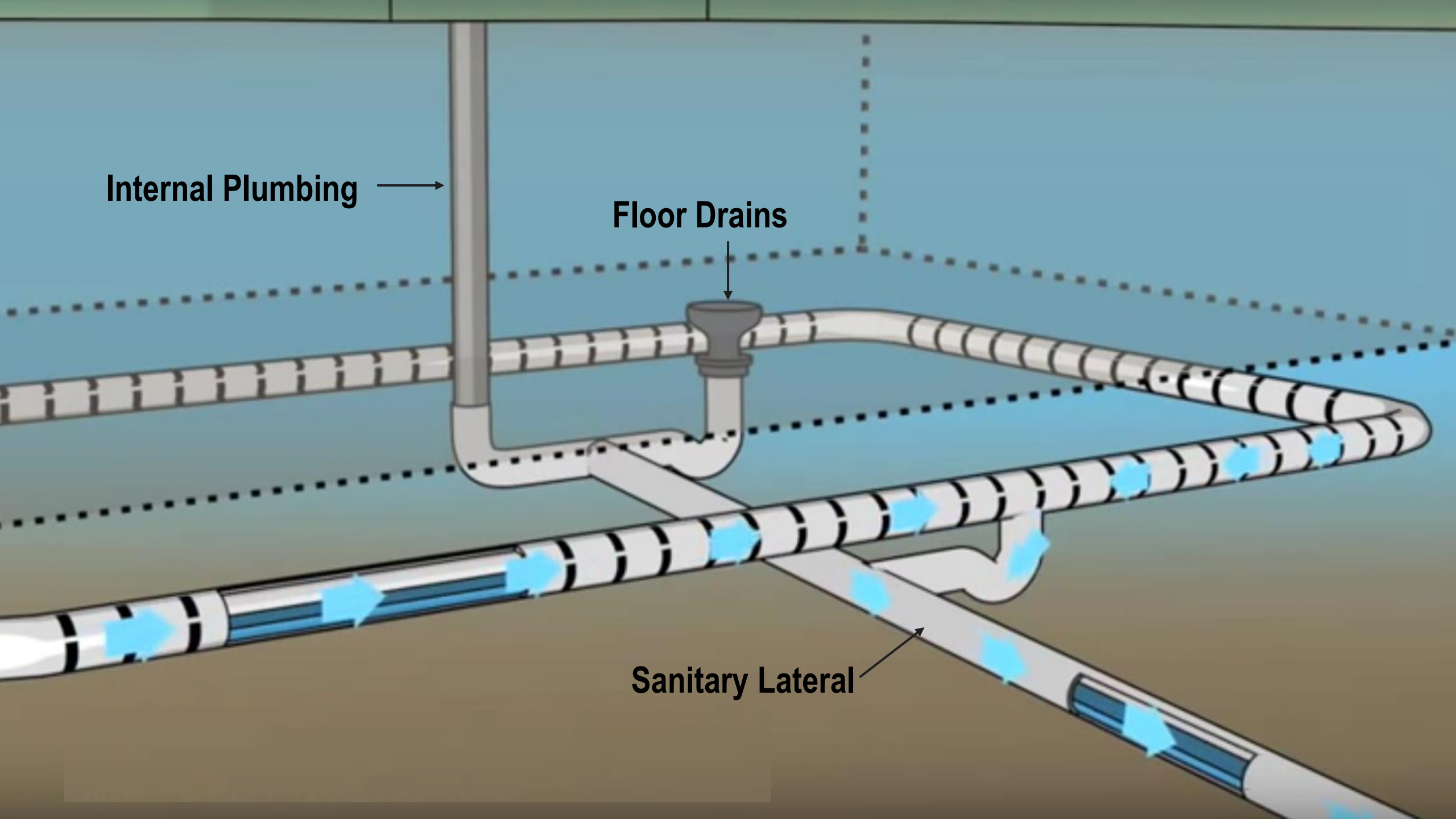
REMOVING SOURCES OF DIRECT INFLOW TO SANITARY SEWERS:

- Groundwater that enters the sanitary sewer through foundation drains and cracked laterals

WHY?:

- Reduce the risk of basement backups
- Reduce clean water from filling the sanitary sewer and being treated as sewage





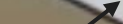
Internal Plumbing

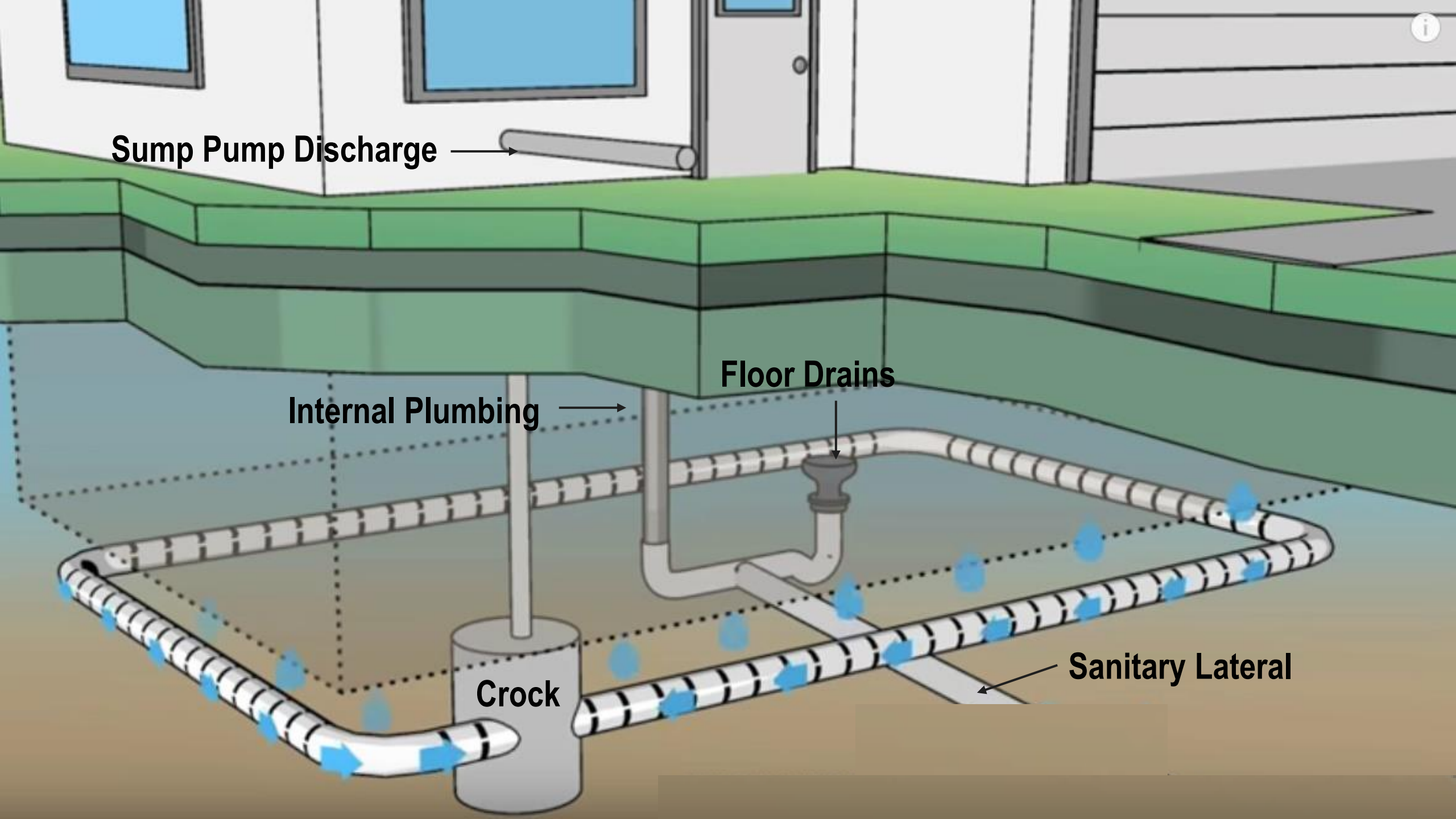


Floor Drains



Sanitary Lateral





Sump Pump Discharge

Floor Drains

Internal Plumbing

Crock

Sanitary Lateral

BACKGROUND



1 Icy Surfaces

Sidewalks and driveways get covered with ice during winter discharges

2 Soggy Yards

Discharges to the yard can cause over saturation

3 Illegal connections

Homeowners direct their discharge to drains/storm sewers

DATA ASSEMBLY

- **Monitoring Sump Pump Discharges: Methods and Test Results**
Draft Technical Memorandum Prepared for the Client
- **West Allis Sump Pump Monitoring**
Technical Memorandum Prepared for Client
- **Rain Gardens: A Guide for Homeowners and Landscapers**
Wisconsin Standards Oversight Council: WDNR
- **Rain Gardens: A How-to Manual for Homeowners**
UW Extension and WDNR
- **ILCA Contractor's Guide to: Small-Scale Rain Gardens**
Illinois Landscapers Contractor Association

DATA ASSEMBLY



DATA ASSEMBLY

SITE VISIT

- Designed by the City staff and Local Sewerage District
 - 70 sq-ft
 - 3" ponding depth
 - 6" engineered soils

50%



DATA ASSEMBLY



SITE VISIT

- Homes in the “Monitoring Sump Pump Discharges” technical memorandum
- No rain gardens
- Discharge to yard

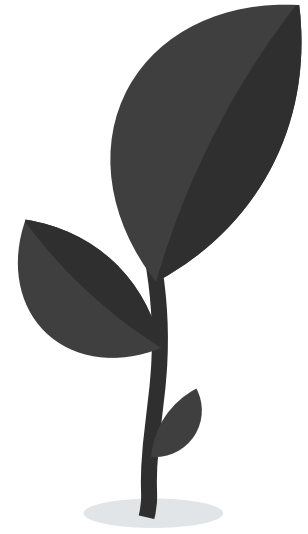
DATA ASSEMBLY



Zone of Influence
Area around the home managed by foundation drains



Volume Managed
30-40% of at minimum a 1-inch rainfall



Average Duration
FD flows average around 24 hours



Site Conditions
Soil moisture, elevation, age of house, grading, etc.

SIZING CALCULATOR

Instructions

Calculator not approved for Chapter 13 regulatory requirements.

The calculator is provided as a guidance to size a rain garden for residential dwellings. Use this sheet as a [printout](#) to assist in gathering information for the calculator.

Step 1 Calculate the drainage area for your rain garden
This step helps identify the area of the roof that will discharge rainfall runoff into your rain garden.

A) Total Roof Area
Approximate the area (in square feet) of the main part of your roof (does not need to be exact) Measure using a tape measure or an online tool, like Google Earth or the Milwaukee County Land and Information Office GIS Map (link below), to measure the **length** and **width** of your house.
<https://lio.milwaukeecountwi.gov/Html5Viewer/index.html?viewer=MCLIO-Map>

Length (feet) _____ Width (feet) _____

B) Number of Downspouts
Determine how many downspouts will be discharging into the rain garden. Also determine the total number of downspouts on the dwelling.

Number of downspouts directed to rain garden _____ Total number of downspouts on dwelling _____

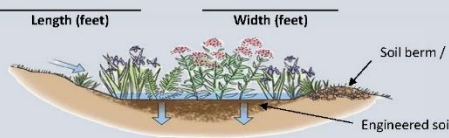
Step 2 (Optional) If you are interested in expanding your rain garden for sump pump discharge
Y | N
 If you have a sump pump, does it run at times when there is no rainfall?
If you answered yes, assume you have frequent sump pump discharge.
If you do not currently have a sump pump but planning on adding one, assume yes for the calculator.

Step 3 Design and Layout the Rain Garden
A) Rain Garden Location
When laying out the rain garden, always check the following items:



- 1) **Call Diggers Hotline** to get utilities located on your property
Wisconsin's one-call center: 811 or (800) 353-8511
<https://www.diggershotline.com/>
- 2) **Do not dig or place the Rain Garden over electrical, gas, water, or sanitary lateral lines**
- 3) Rain Garden should be a minimum of **10 feet away** from any basement foundation
- 4) Direct rain garden overflow path away from any basement foundation

B) Rain Garden Dimensions
Determine if your available space is adequate for the size of rain garden calculated. Measure the length and width of the area where you wish to install the rain garden, using measuring methods stated above (does not need to be exact).



C) Construction
Review the Wisconsin Department of Natural Resources (WDNR) rain garden guidance document for rain garden placement, construction, planting, and maintenance:
<https://dnr.wi.gov/topic/Stormwater/documents/RainGardenManual.pdf>

Site Evaluation

Note: Please provide requested project information in **Blue** boxes ONLY.

Home Area (feet)

- 25** Length of house (feet)
- 40** Width of house (feet)
- 1** Number of downspouts directed toward the rain garden
- 2** Total number of downspouts on the dwelling.



Rain Garden Size

Rain Garden Size for Downspout Connection
If you want only a rain garden for your downspout, continue to the **Design Details** Tab. If you would like to add a sump pump discharge to your rain garden, see calculation below

Rain Garden Area
79 ft²

Rain Garden Size with Sump Pump Discharge (Optional)

Rain Garden Size for Downspout Connection with Sump Pump Discharge
Yes | No
YES Do you want to manage sump pump discharge?
YES Do you have frequent sump pump discharge?

Updated Rain Garden Area
114 ft²

Design Details

General design, placement, and construction of a rain garden shall follow the DNR guidance for homeowners and landscapers. Additional alterations to the rain garden may be recommended as shown below.

Project Site Dimensions

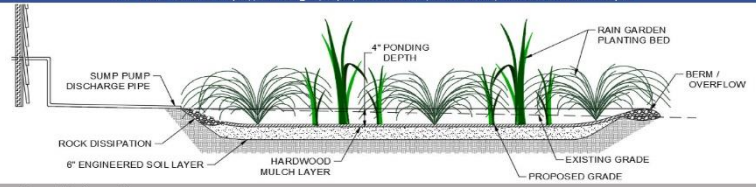
Measure the desired length of the rain garden area and enter the value in the **BLUE** box ONLY. The required width will be calculated for you based on the suggested volume and length.

Area for Rain Garden	Recommended Dimensions	Project Area Measured
114 ft²	15 Length (feet) 8 Width (feet)	10 Length (feet) - measured 12 Width (feet) - calculated

Do you have available space? **YES**

Rain Garden Construction Details

For more details: <https://dnr.wi.gov/topic/Stormwater/documents/RainGardenManual.pdf>



Sump Pump Discharge Pipe

To convey the sump pump discharge from the house to the rain garden, two options are available for the homeowner; (1) flexible pipe or (2) hard-buried pipe. Keep in mind to place the end of the discharge pipe at least ten feet from the house.

Option 1) Flexible pipe/house on ground surface sloped to rain garden

Option 2) Hard-buried pipe sloped to rain garden. Install a freeze protection air-gap as shown in the picture.

SIZING CALCULATOR

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Length (feet)

Width (feet)

B) Number of Downspouts

Determine how many downspouts will be discharging into the rain garden. Also determine the total number of downspouts on the dwelling.

**Number of downspouts directed
to rain garden**

**Total number of downspouts on
dwelling**

SIZING CALCULATOR

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- 3) Direct rain garden overflow path away from any basement foundation

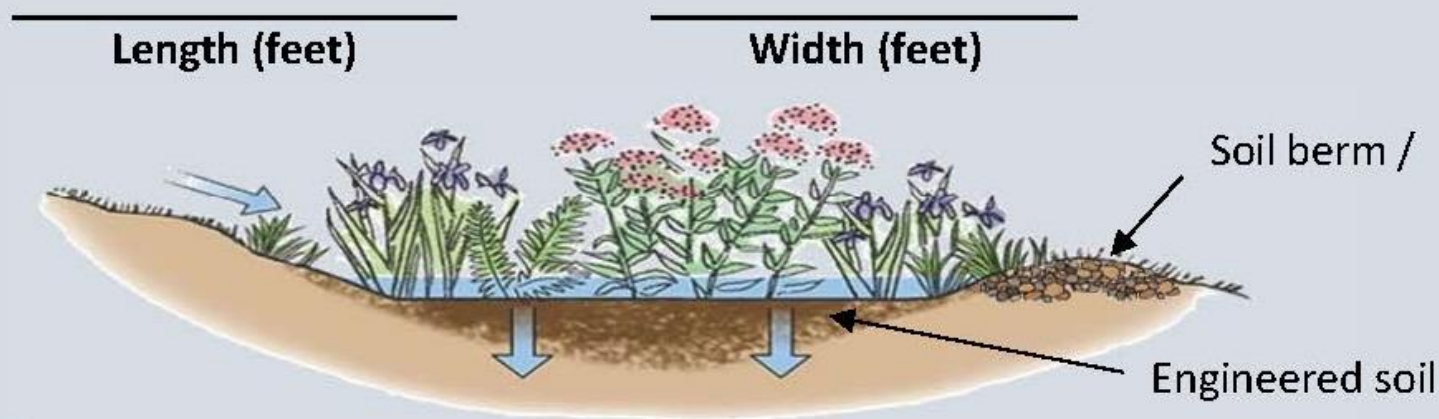


**Know what's below.
Call before you dig.**

SIZING CALCULATOR

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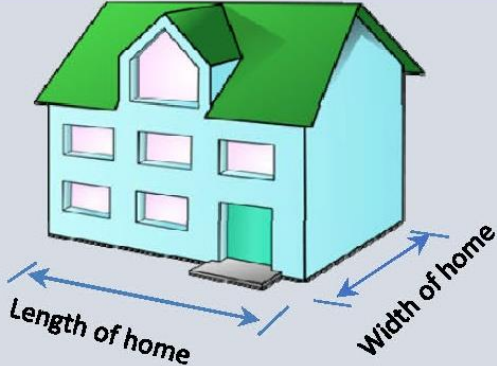
SIZING CALCULATOR

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Yes | No

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- Do you have frequent sump pump discharge?

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114 ft²

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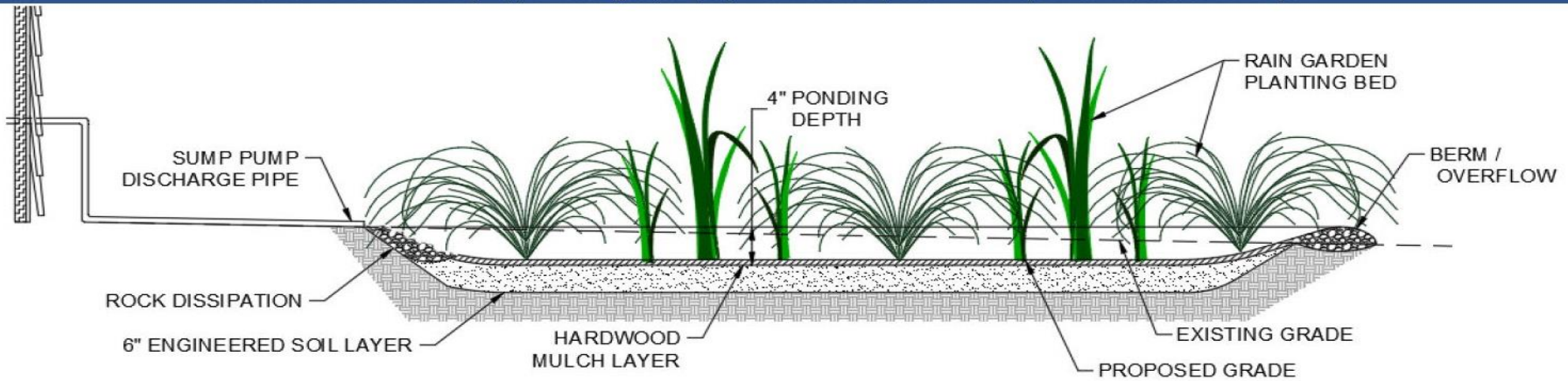
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<u>Area for Rain Garden</u>	→	<u>Recommended Dimensions</u>	<u>Project Area Measured</u>
114 ft ²		15 Length (feet)	10 Length (feet) - <i>measured</i>
		8 Width (feet)	12 Width (feet) - <i>calculated</i>

Do you have available space? **YES**

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SIZING CALCULATOR

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Freeze Protection Air-Gap

THANK YOU!



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