PARTERRE

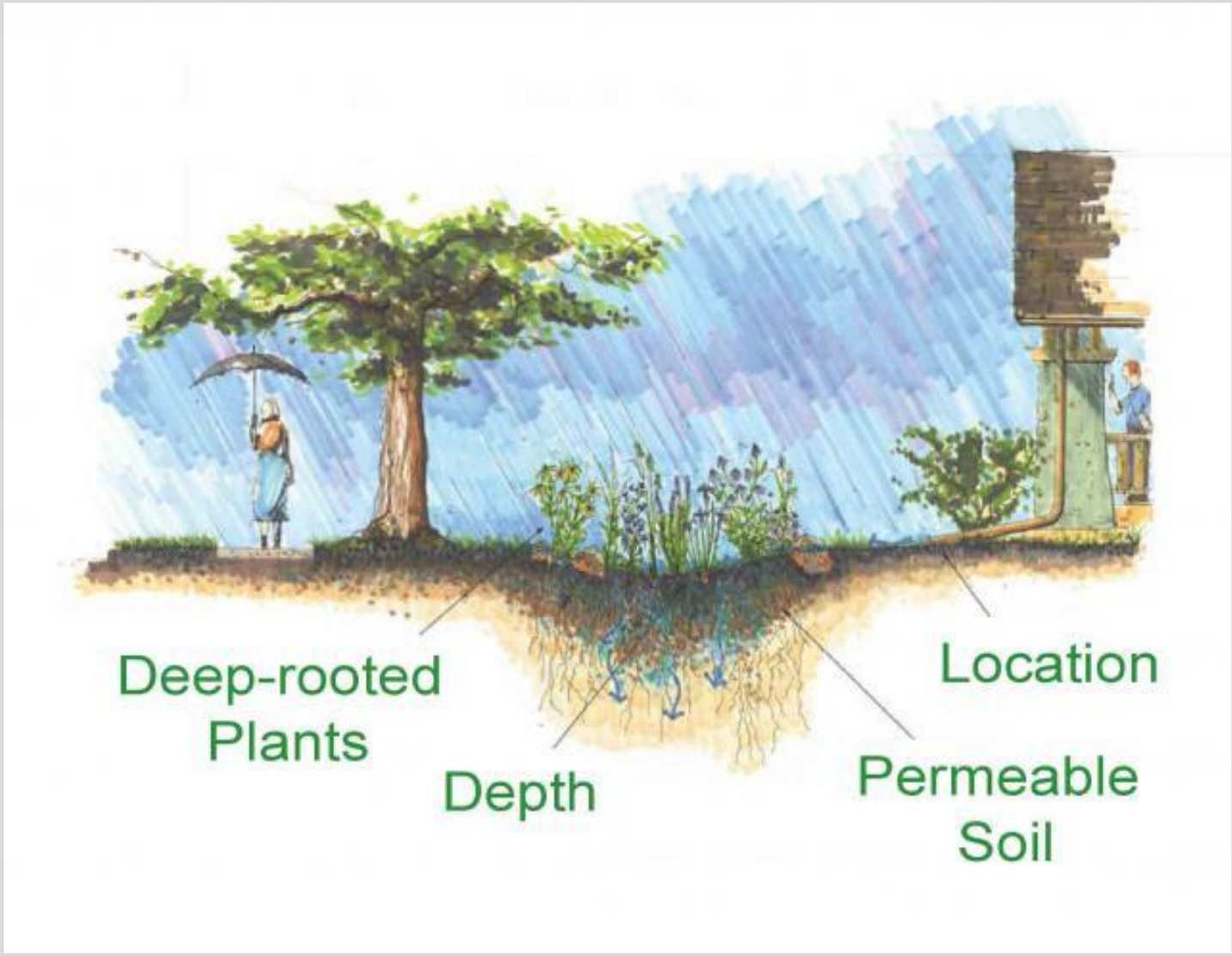
ECOLOGICAL

What are Rain Gardens?

Rain Gardens are shallow depressions in the landscape designed and implemented to capture and infiltrate storm water with permeable soils.

Rain Gardens are designed to reduce the amount of storm water runoff that carry pollutants into streams and rivers.

Rain Gardens are designed with deep rooted native plants well adapted to the unique conditions they present.



Ecological Benefits of Rain Gardens

- Reduce stormwater runoff volume, flow rate and temperature of water
- Increases infiltration and recharge of groundwater
- Provides local flood control
- Provides increased wildlife habitat
- Enhances the beauty of residential or commercial sites
- Treats stormwater runoff

Ecological Benefits of Rain Garden

Pollutant Removal

•Pollutants such as bacteria, nitrogen, phosphorus, heavy metals, oils can be retained, degraded and absorbed by vegetation and soil structure.

•According to CRWA rain gardens are effective at removing:

Suspended Solids: 23% - 81%
Phosphorus: 38% - 72%
Nitrate: 8% - 80%
Lead: 62% - 91%
Zinc: 63% - 76%
Copper: 53% - 65%

Rain Garden Design and Installation

Design Considerations

Location Constraints

•Rain gardens should not be installed in areas that retain water for long periods.

•Rain gardens should not be installed closer than 10 feet from a structure, 15 feet from septic systems, or 25 feet from drinking well.

•Rain gardens should not be placed near bedrock or under tree ‘drip’ lines.

•Rain gardens should not be installed on steep slopes.

Design Considerations

Location Constraints

•Identify, protect and preserve existing native plants during construction.

•Call 811before you dig.

•Determine property lines and any easements.

•Identify any local ordinances or bylaws.

Design Considerations

Infiltration Rates

Standard infiltration rates of soil types;

Sandy Loam: 1 inch/hour

Clay Loam .15 inches/hour

Silt Loam: .5 inches/hour

An ideal Rain Garden soil mix should be 50% sand, 25% topsoil loam, and 25% compost

Design Considerations

Determine site suitability by conducting a perc test:

1. Dig a hole 12” deep in the area you have selected

2. Fill the hole with water and place a measuring tape.

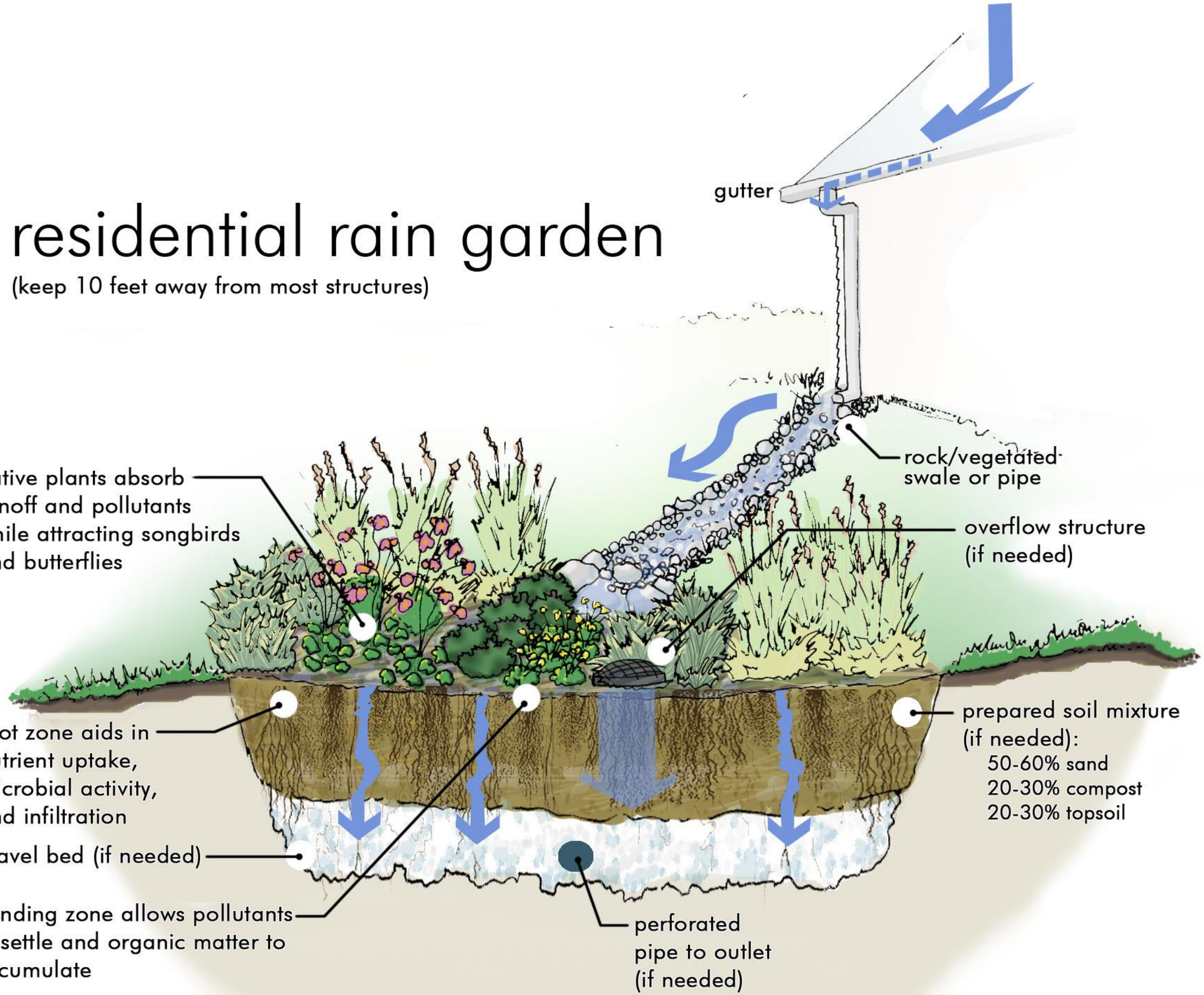
3. After 8 hours if there is not water in the hole the soils have suitable infiltration rates

4. If it takes 8-24 hours to drain, the soil will require amendments

5. If water is still standing after 24 hours consider a different site

residential rain garden

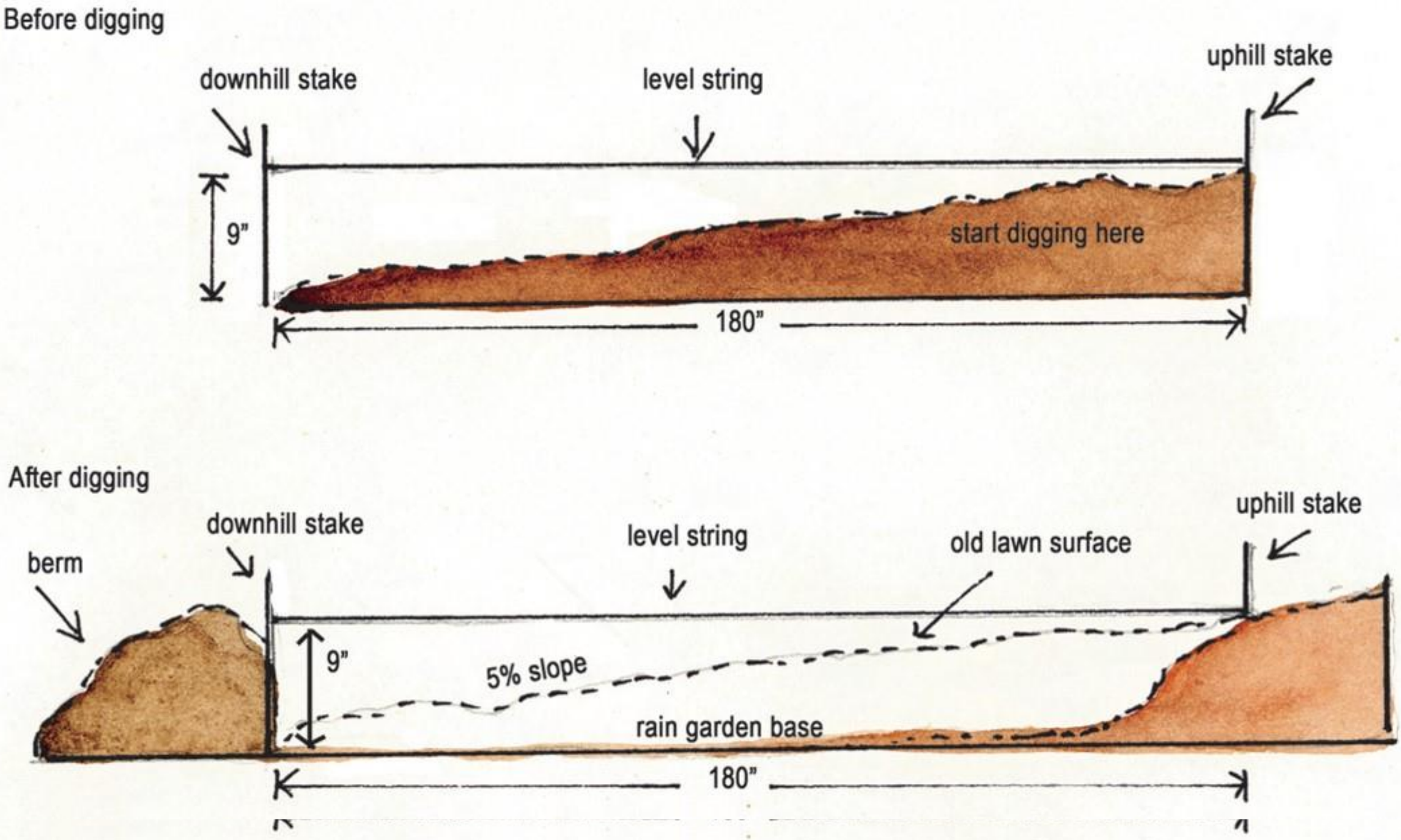
(keep 10 feet away from most structures)



Determine Slope

Slope = Rise/Run **.9”/180”=**

.005(100)=5% slope



Sizing a Rain Garden

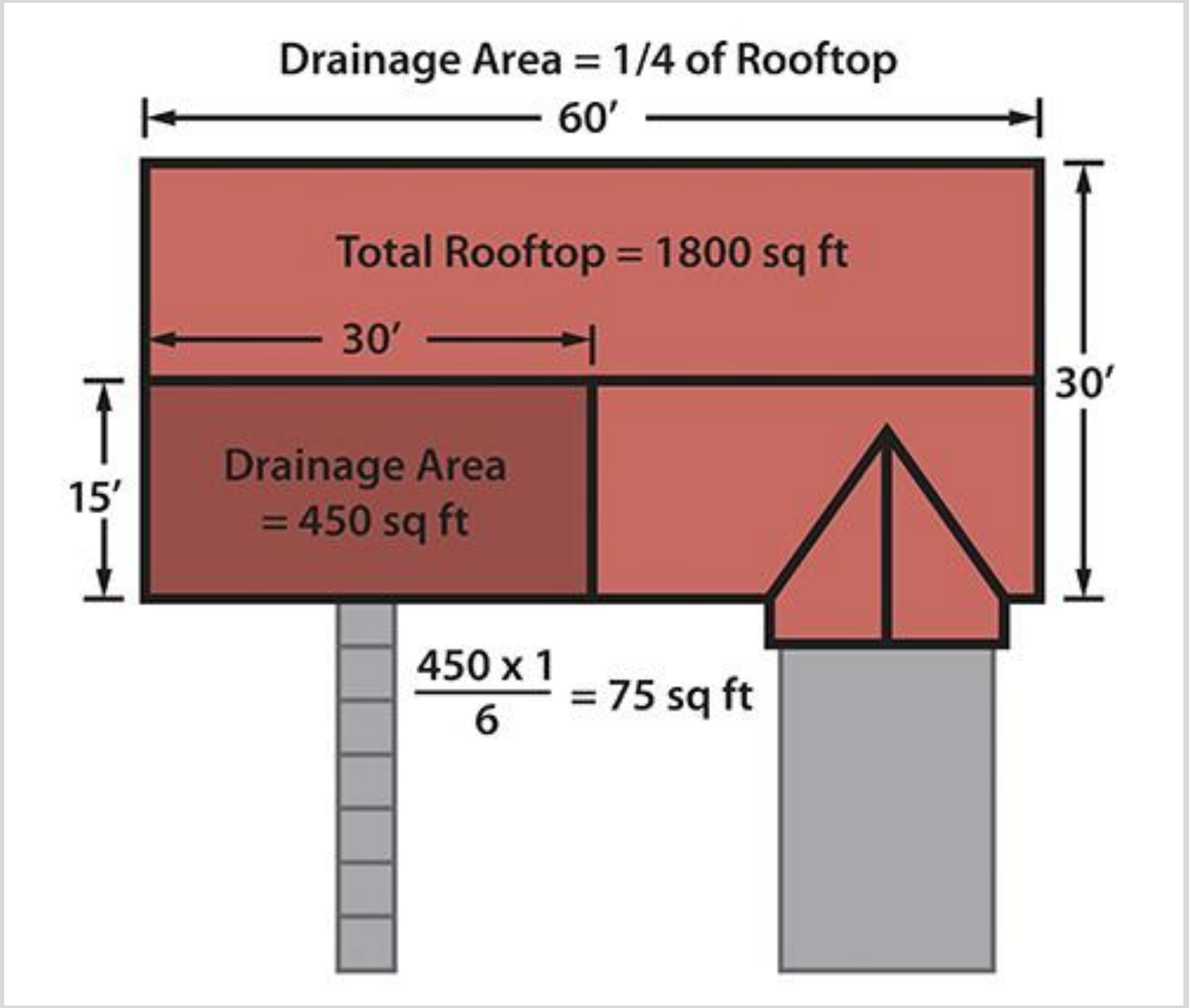
Drainage Area

Calculate the square footage of impervious area in the natural drainage: rooftop, driveway, patio, walkway, compacted lawn areas

1. Calculate the total impervious surface area draining to rain garden by multiplying width by length.

2. Multiply the area by the amount of average rainfall (lets assume 1”).

3. Divide by the depth of the rain garden (typically 6”).

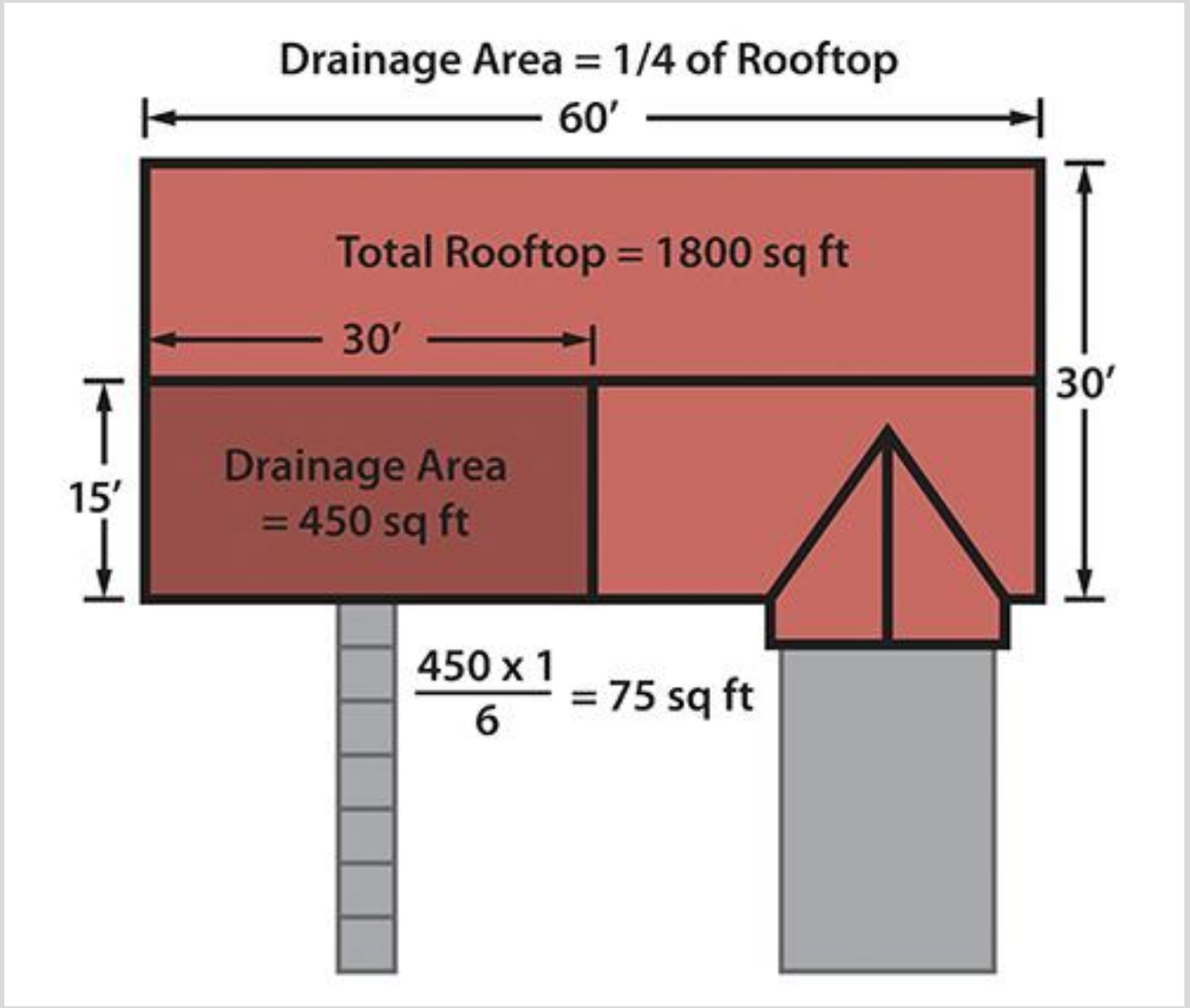


Sizing a Rain Garden

Drainage Area

Here's the calculation:

Total Impervious Area x Average Rainfall/Depth of Rain garden = Size in square feet.



Native Plants

To mitigate stormwater runoff and create meadow habitat we seed and plant a diverse selection of native wet meadow species;

Asclepias incarnata , Swamp Milkweed

Eupatorium fistulosum Joe Pye Weed,

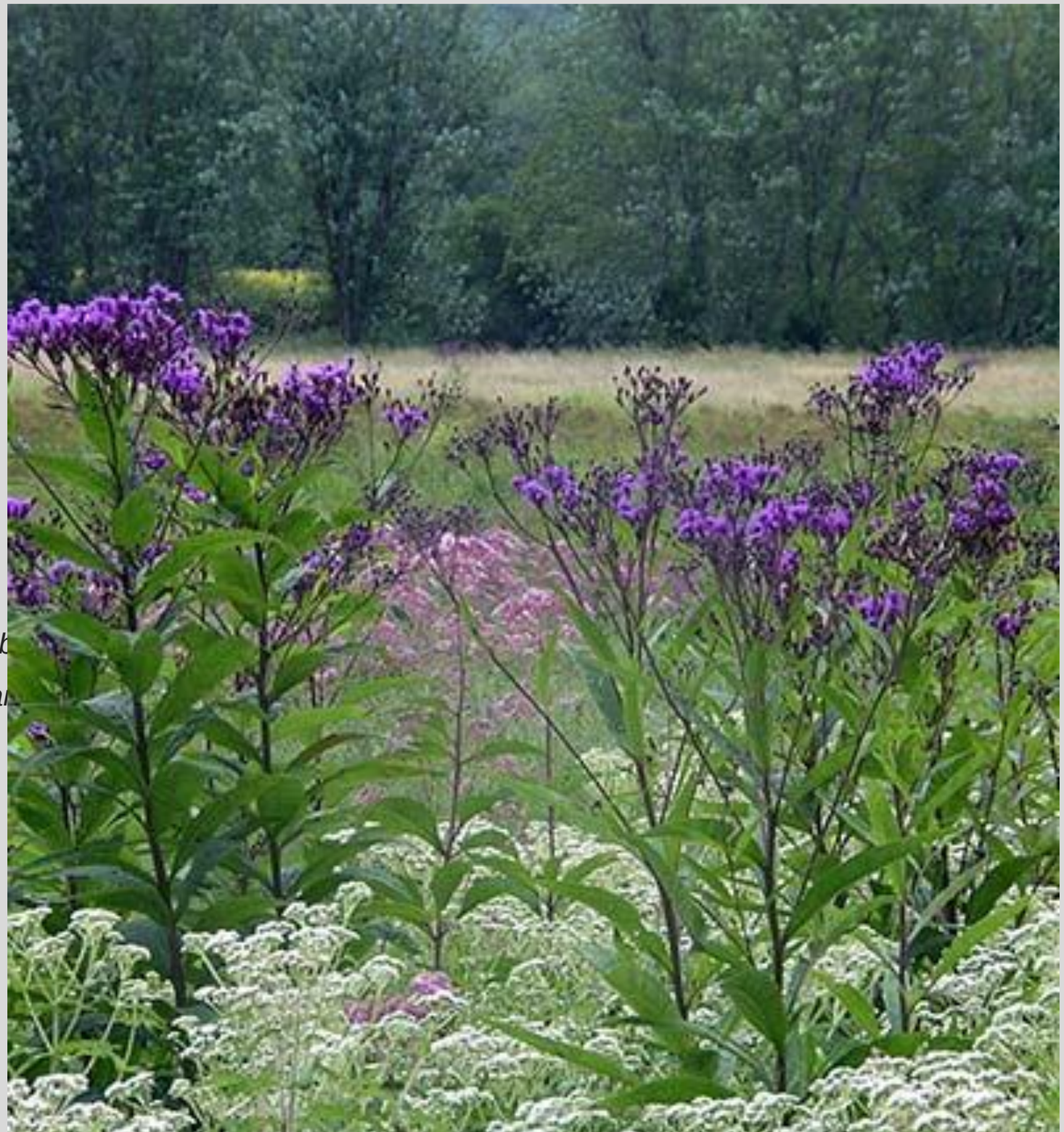
Eupatorium perfoliatum, Bonset

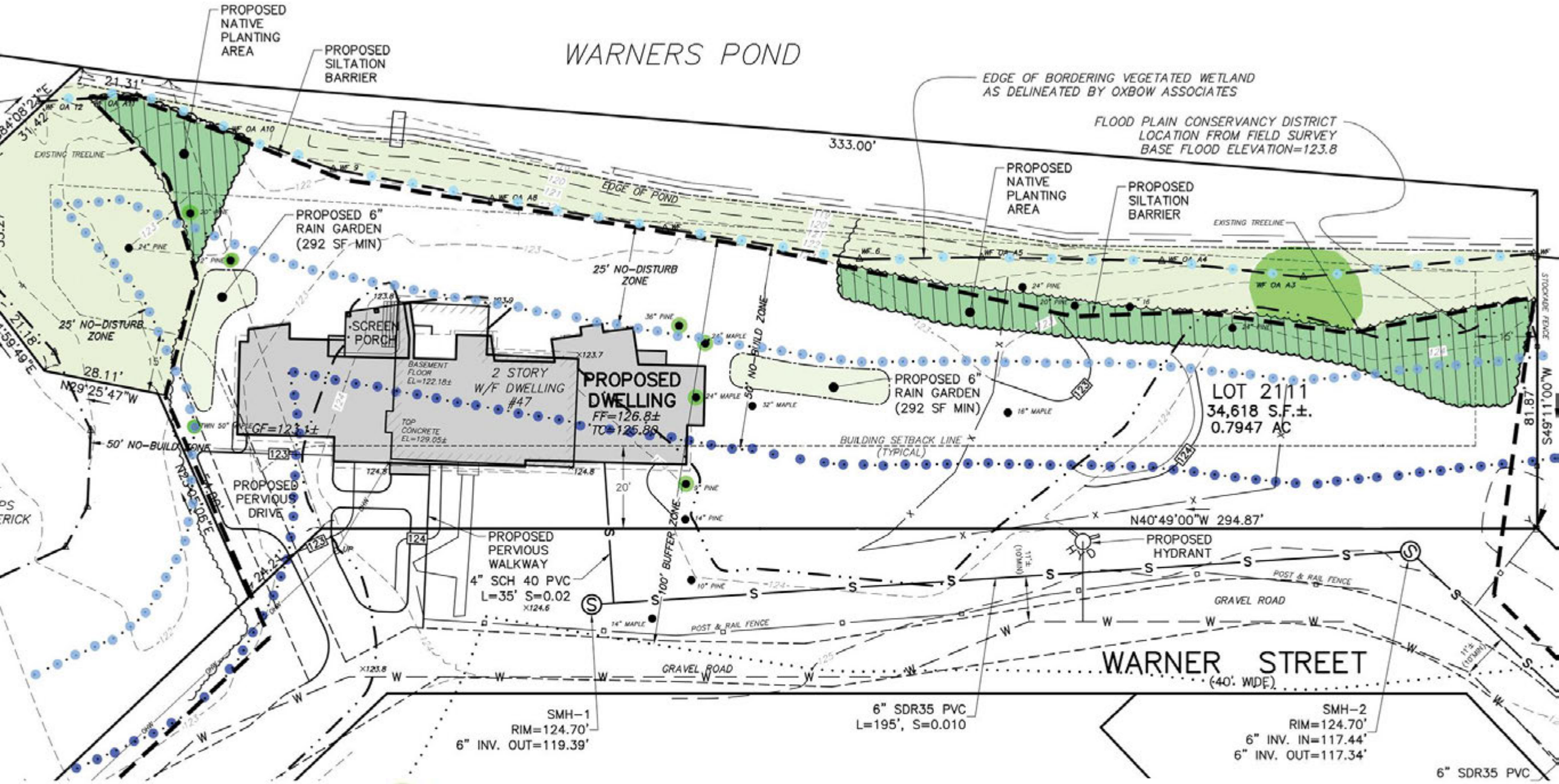
versicolor, Blue Flag Iris

cardinalis, Cardinal Flower *Verb*

Blue Vervain *Vernonia gigan*

Ironweed

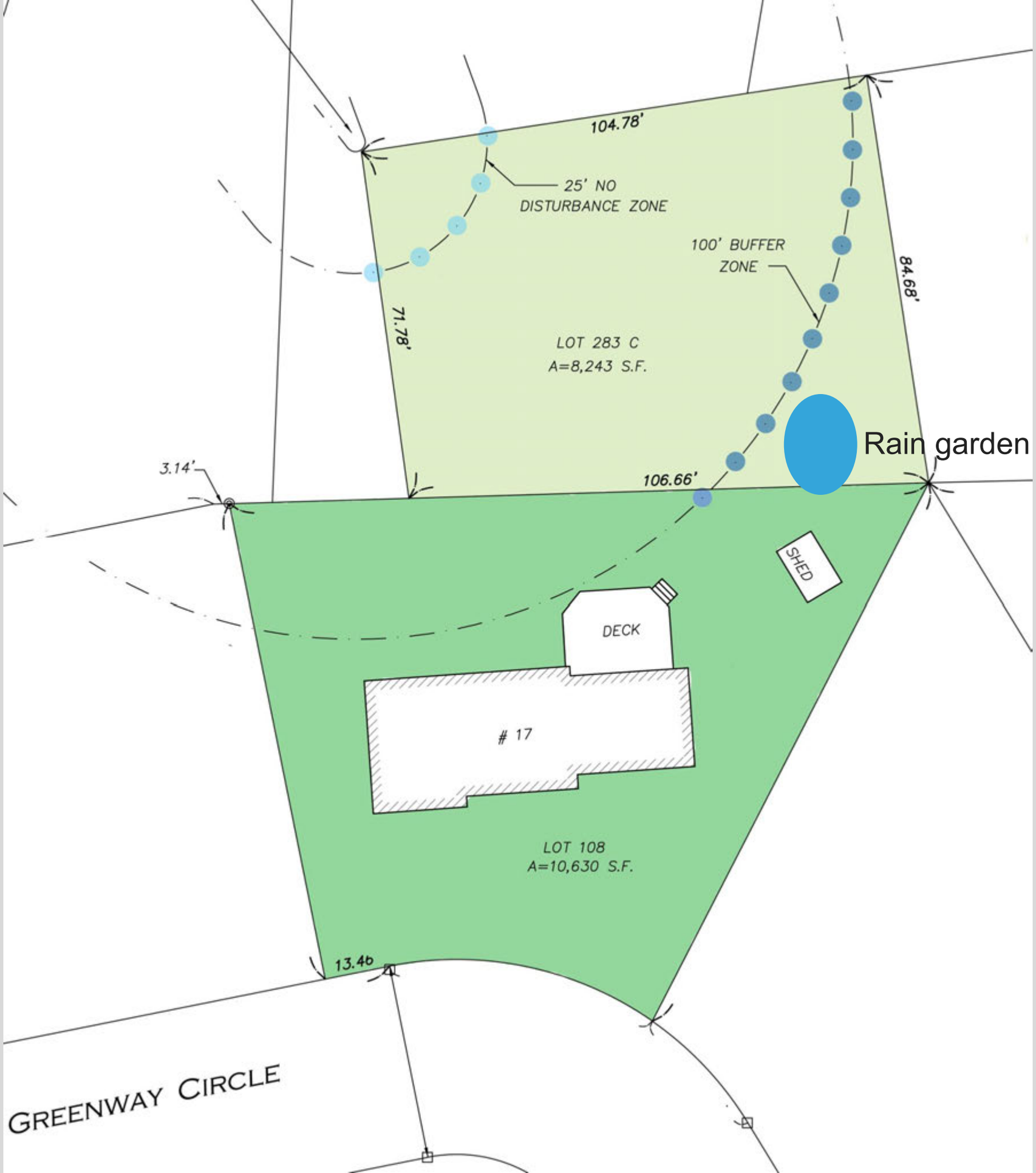




- Proposed Area for Invasive Plant Management and Native Restoration
- Proposed Area of Existing Lawn Replacement to Native Plant Species
- Proposed Tree Removals
- Proposed Rain Gardens
- Edge of Bordering Vegetated Wetland
- 25' 'No Disturb' Buffer Zone
- 50' 'No Build' Buffer Zone

Native Plants for Aesthetic Gardens

Amsonia hubrichtii, Blue star
Asclepias incarnata, Swamp milkweed
Caltha palustris, Marsh Marigold
Carex appalachia, Sedges
Echinacea purpurea, 'Magnus'
Eupatorium maculatum, Joe Pye Weed
Geranium maculatum, Wild Geranium
Iris versicolor, Blue Flag Iris
Lobelia cardinalis, Cardinal flower
Monarda fistulosa, Beebalm


104.78'
25' NO
DISTURBANCE ZONE
100' BUFFER
ZONE
84.68'
71.78'
LOT 283 C
A=8,243 S.F.
Rain garden
3.14'
106.66'
SHED
DECK
17
LOT 108
A=10,630 S.F.
13.46
GREENWAY CIRCLE


BAY STAT


BAY STAT

Rain Garden Maintenance

Needs and Frequency:

After heavy rain events:

•Check drainage issues, percolation rates, bank erosion

•Remove sediment and debris from spillways

•Clean and repair inlets

•Maintain vegetation

•Replace mulch as needed

Constructed Wetlands

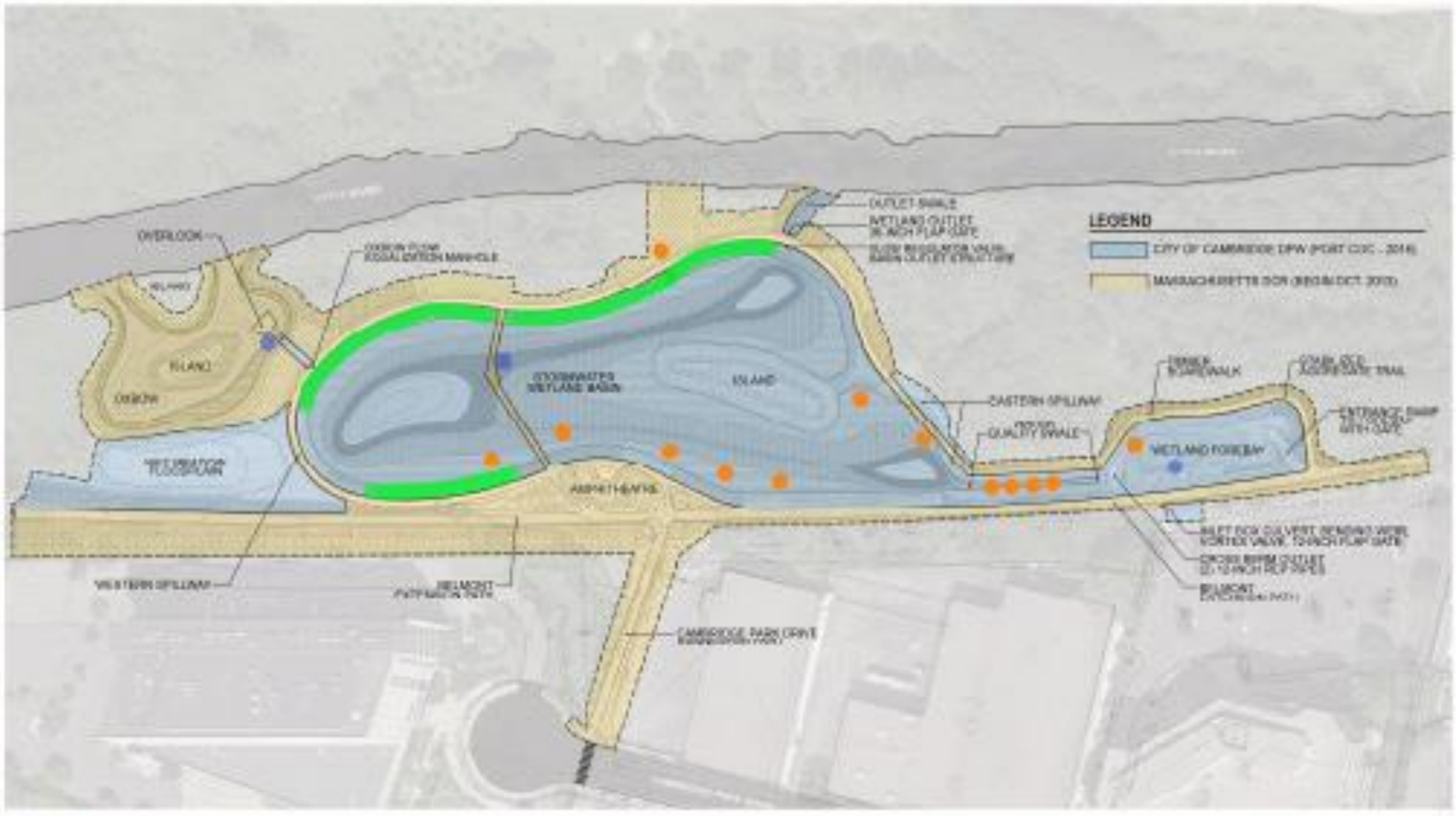

MAIN BASIN
PERIMETER PATH
BOARDWALK
OVERLOOK
OVERLOOK ISLAND
LITTLE RIVER
MAIN OUTLET TO LITTLE RIVER
OXBOW
ELEV -2.00
ELEV -2.00
ELEV -1.00
FORE BAY
BIKE PATH
BIKE PATH
UPLAND PENINSULA
WATER QUALITY VEGETATED SWALE
DISCHARGE / INTAKE STRUCTURE
OVERLOOK WITH SIGNAGE
CROSS BERM INLET
OVERFLOW STORAGE
BENCHES
BIKE RACKS
AMPHITHEATER
INFORMATION KIOSK
CAMBRIDGEPARK ROAD ACCESS
LEGEND


WARNING
AVISO

SUMMARY OF WORK ACTIVITIES THIS MONTH:

This was our first maintenance visit, and with it being so late in the season, there were many maintenance tasks to attend to. After the initial meeting and writing of the Initial Site Visit Report, we began each weekly visit with litter-pick up and taking wetland hydrology observations in the Forebay, Wetland Basin and Oxbow. We then hand-pulled annual and perennial weeds, invasive plant material, removed storm damage from walkways and used electric string trimmers to cut tall turf areas along pedestrian walkways. In the Wetland Basin *Phragmites* is present, so we began by removing flower heads before seed matures, and utilized cut & dab herbicide treatments according to Special Condition 26 from Order of Conditions file #123-263, City of Cambridge MA.

DOCUMENTATION OF WORK FOCUS AREAS



- Herbicide use on *Phragmites* population in Wetland Basin
- Grass trimming Tall Turf areas using electric weed trimmer
- Wetland hydrology observations
- Invasive plant management using manual hand pulling methods

Linear Sidewalk Curb Biobasins

Open, gently sloped, vegetated channel designed for treatment of stormwater runoff.

Bioswales located along road with required curb cuts that direct flow to them.

Underdrain and overflow grate for large storm events.

Linear Sidewalk Curb Biobasins

A detail of the granite shows a “V” shaped curb cut.

This detail has been modified due to sediment and trash getting trapped in small opening.

Back of Sidewalk Bioretention Basins

A detail of the granite shows a “V” shaped curb cut.

This detail has been modified due to sediment and trash getting trapped in small opening.

Back of Sidewalk Bioretention Basins

Back of Sidewalk Bioretention Basins

Plant Control Methods:
The methods to be used for a particular site will depend upon existing conditions. The use of herbicide treatment (initial and follow up spot treatments) is recommended as the primary control method. Glyphosate-based herbicides (Aquaneat®) are the most effective method of control. Small isolated populations can be controlled using a concentrated cut and dab method to individual plants. Larger populations with dense stands can be controlled using a foliar application.Herbicides are best applied in late summer after the plant has flowered, before seed matures.

Plant Habitat:
Phragmites grows best in disturbed wetland areas, such as degraded coastal and interior marshes, freshwater bogs, fens, streams, lakes, ponds, roadside ditches and other low wet areas. Typically *Phragmites* prefers the wetland-upland interface, though it can be found in dru upland areas. A dense stand of *Phragmites* is usually an indicator of a wetland ecosystem that is out of balance.

Plant Description:
Phragmites is a perennial reed that can grow to over 15 feet in height and form dense stands. The plant reproduces through wind dispersal of seeds and vigorous vegetative reproductive growth through rhizomes. A single plume flower at the tip of each reed forms in late July into August, producing thousands of seeds. Below ground, *Phragmites* forms a dense network of rhizomes which can thrive several feet in depth. The plant spreads horizontally by sending out rhizome runners which can grow 10 or more feet in a single growing season if conditions are optimal.

Phragmites australis,
Common Reed

PROMOTING GREEN INFRASTRUCTURE

PEABODY SQUARE


ONLY


NOW OPEN

Benefits to Residential Home Owners

Collateral Benefits:

Increase in property value due to well designed and functional landscape.

Maintenance and energy costs are reduced over time by reducing mowing, fertilizers, herbicide use, irrigation and other costs.

Higher aesthetic and wildlife value by planting a diverse native garden.

Benefits to Municipalities

Collateral Benefits:

Improved regional water quality and ecological function in watersheds.

Street improvements can be lowered when total infrastructure including pipes, catchment basins, curbs and gutters are reduced.

Decrease in stormwater treatment loads and operating costs.

Increased open green space.

Improved street aesthetics and safety.

Miles Hilton Connors

Parterre Ecological

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