Infiltration Landscapes

THOMPSON ENVIRONMENTAL
PLANNING & DESIGN LTD.

Native Plant Source


Stormwater Runoff

Contaminants in Storm Water

1. Sediment -Total Suspended Sediment
   - Phosphorus
   - Trash
2. Nitrogen (microbial process)
3. Metals and Phosphorus (chemical reactions)
4. Pathogens (e coli) and Oil & Grease (Sunlight Drying and microbial processes.

Water Quality

Water Quantity

Increased Volume of Storm Water

1. Reduced Infiltration
2. Increased Peak Discharge 2 to 5 times Predevelopment
2. Faster Flush Times –Time Taken to Reach Streams
3. Increased Level of Flooding
4. Increased Frequency of Flooding (Natural over the banks every 2 years)(After Development over the banks 3 to 4 times per year)

Increased Volume of Storm Water (con't)

5. Reduced Base Stream Flow
6. Higher Stream Flow Velocity

16th Century Ontario


IXURZ

20th Century Sudbury

21st Century Ontario

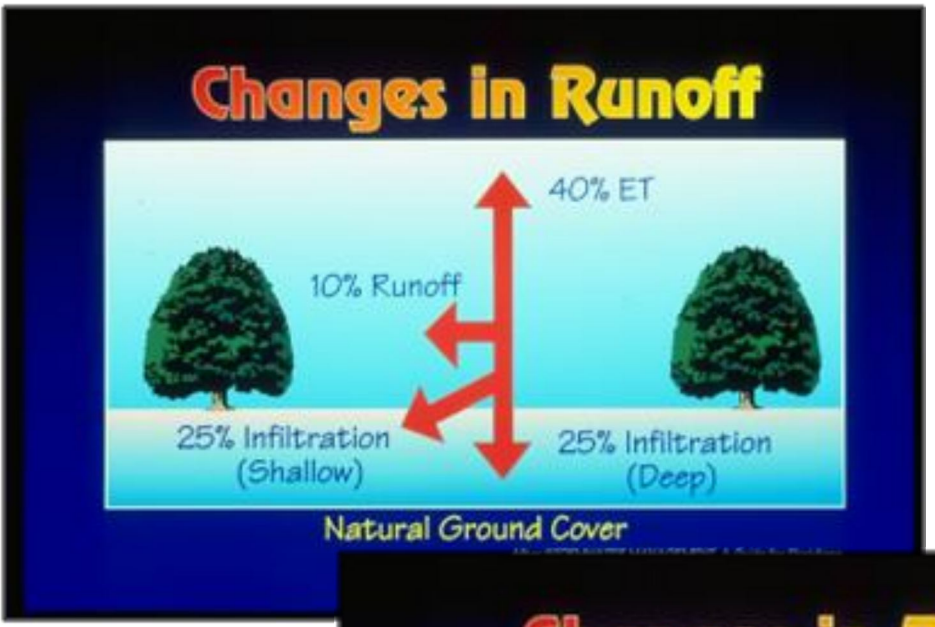
Increased Runoff

Flooding

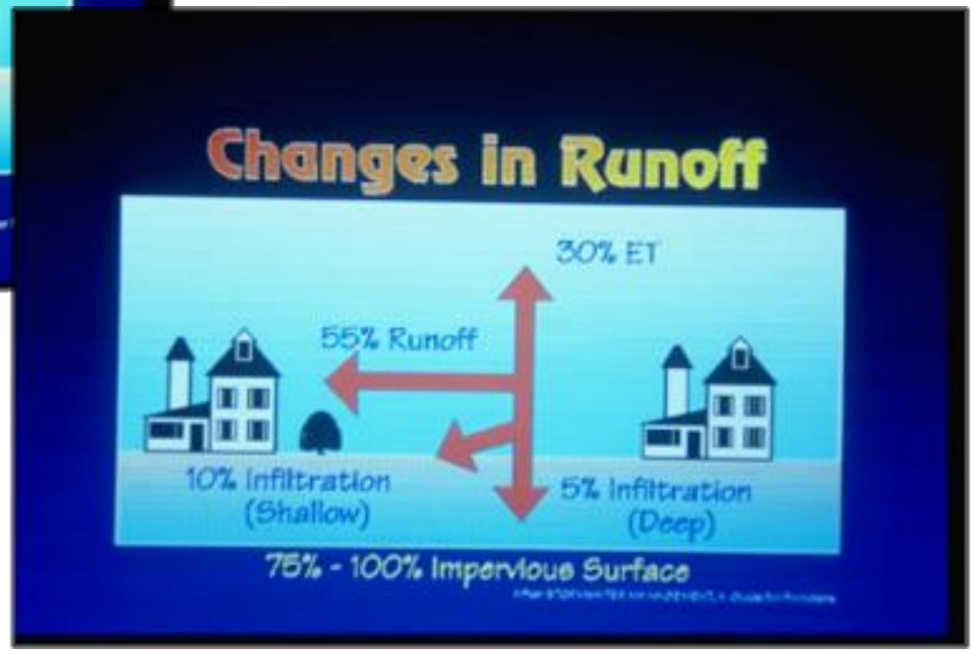
Pollution

Problem With Decrease Quality of Storm Water

1. Excessive Algae and Aquatic Weeds
2. Depleted Dissolved Oxygen
3. Taste & Odor Problem
2. Fish Kills
3. Toxins
4. Lost Potential for Recreation
5. Increased Cost for Water Treatment


Changes in Runoff
40% ET
10% Runoff
25% Infiltration
(Shallow)
25% Infiltration
(Deep)
Natural Ground Cover


Changes in Runoff
35% ET
30% Runoff
20% Infiltration
(Shallow)
15% Infiltration
(Deep)
35% - 50% Impervious Surface


Changes in Runoff
30% ET
55% Runoff
10% Infiltration
(Shallow)
5% Infiltration
(Deep)
75% - 100% Impervious Surface

NEWS
PAPER

Pollutants In Our Stormwater

Pet Waste

Sediment

Fertilizers

Detergents and Paint

Yard Waste

Motor Oil and Antifreeze

-Rain Garden-

Collects runoff from roof, paved areas and yard, keeping it out of stormwater drainage system.

Allows pollutants to be filtered out and decreases localized flooding.

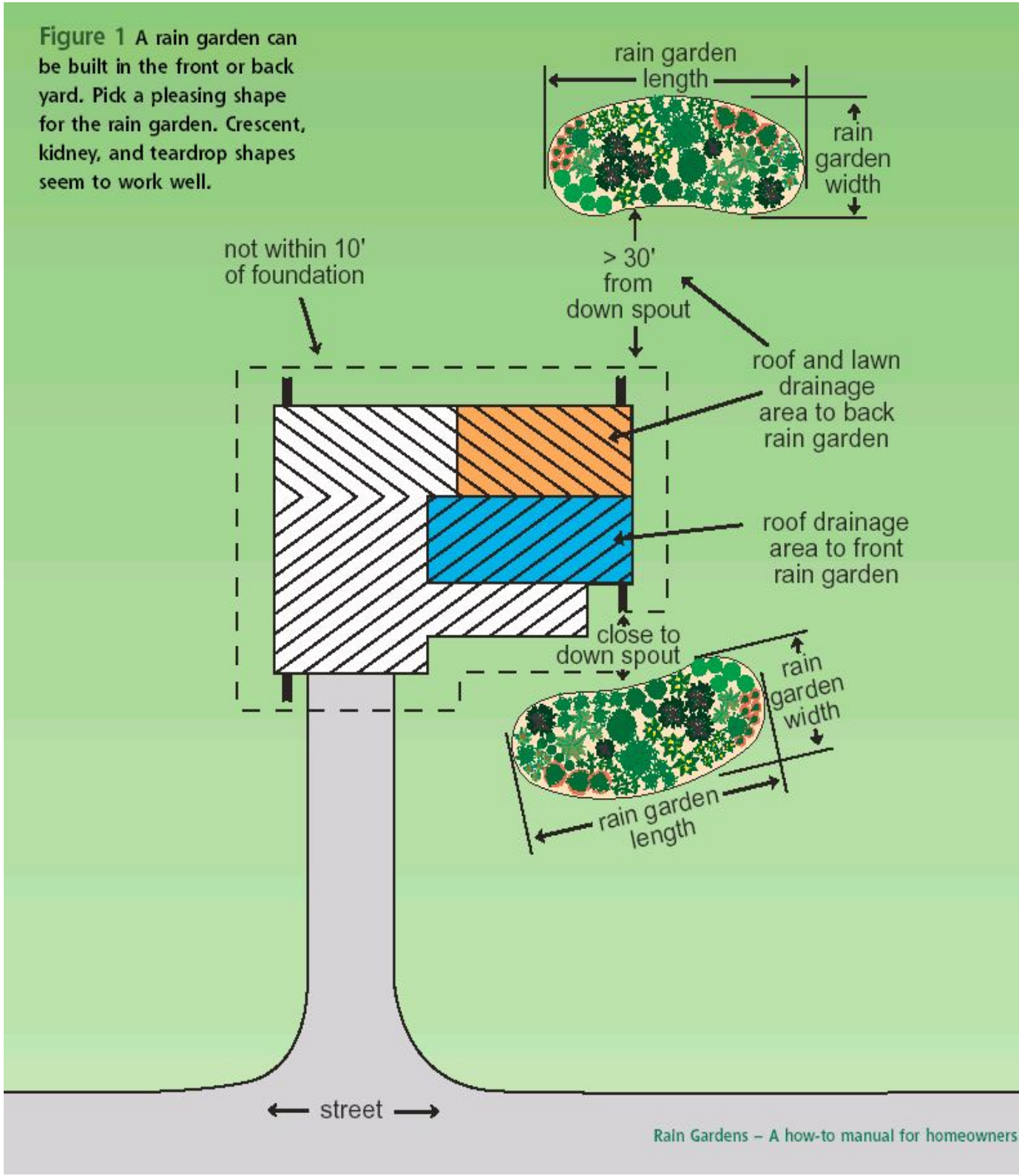
Rain Garden is a planted depression or a hole that allows rainwater runoff from impervious urban areas, like roofs, driveways, walkways, parking lots, and compacted lawn areas, for the purpose of infiltration. This reduces rain runoff by allowing storm water to soak into the ground overtime.

Unlike bog or wetland gardens, Rain Gardens hold water for only 1 to 2 days.

Compared to a conventional lawn, a Rain Garden can double the amount of water soaking into the ground. (40,000 liters) Rain Gardens are also wonderful habitat for wildlife and can be an attractive asset to any property.

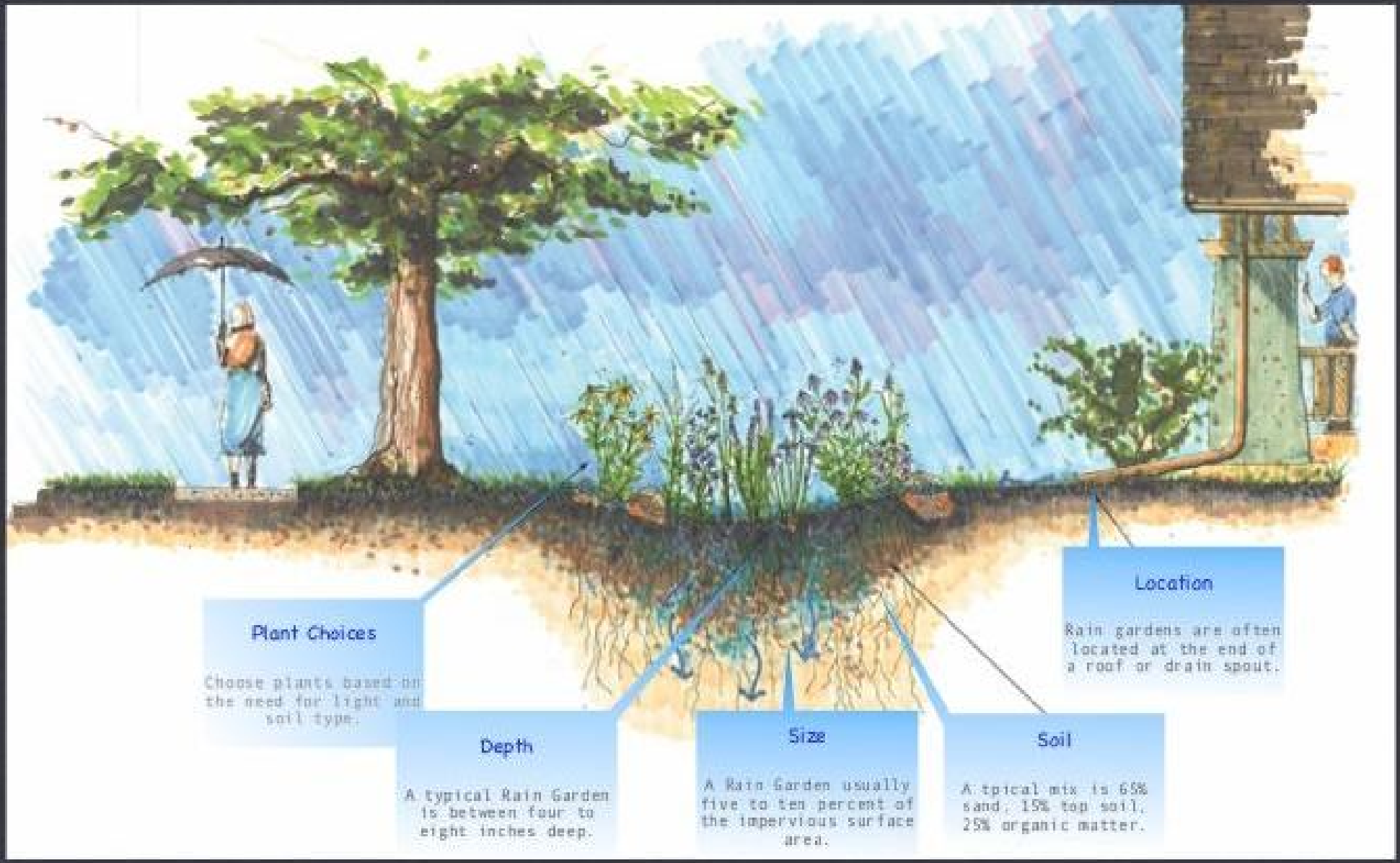
Site Selection

- How large
- Foundation
- Property lines
- Downspouts
- Overflow
- Location of trees
- Locate utilities



Design & Plant Selection

- Front or back yard
- Formal or natural
- Full sun or shade
- Native plants, shrubs, grasses
- Wet and dry conditions



Rain Gardens

- Bioswales are landscape elements designed to remove silt and pollution from surface runoff water. They consist of a swaled drainage course with gently sloped sides and filled with vegetation, compost and/or rock. If the water is meant to move it is a Bioswale

Depth Required For Specific Pollutants

• Total Suspended Sediment	-No minimum depth
• Total Nitrogen	-1 meter media depth
• Total Phosphorus	-60 cm media depth
• Pathogens	- No minimum depth
• Metals	-45 cm media depth
• Temperature	-1 meter media depth

Calculating Rain Garden Size

1. Dig a hole and fill it with water.
2. Let it Drain and fill it again.
3. Calculate the amount of time to clear
4. Record the time and Measure the depth of hole.
5. Example 10 cm deep hole cleared in 4 hours.
6. $\frac{10\text{ cm}}{4\text{ hours}} \times \frac{24\text{ hours}}{\text{day}} = 60\text{ cm}$

Rain Garden Mixture

- 30% Topsoil
- 30% Sand
- 30% Hardwood Wood Mulch or Compost

- Rain is Naturally Acidic (pH 5.6)
- Plant Life need (pH 6.5 – 7.5)
- Pine Mulch (pH 4.8)
- Hardwood Mulch (pH 7.0)

Pore Space

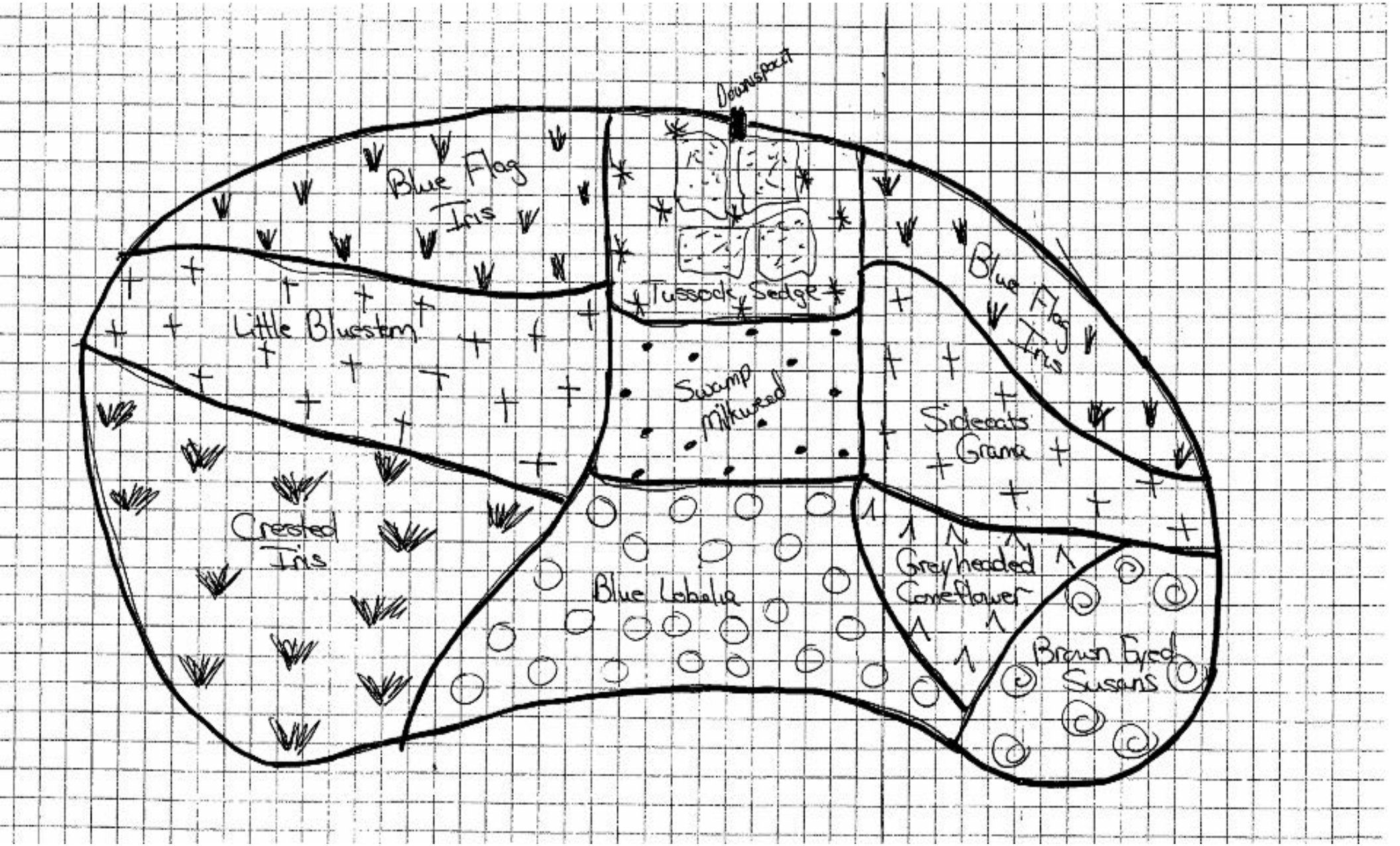
- Using this Rain Garden Mixture a maximum pore space is 30%

- In a 60 cm deep Rain Garden anticipate volume of water is 20 cm
- 10 m x 15 m x 60 cm deep =90 cubic m
- 30 cubic meters of water = 30,000 Liters

Rain Garden
Industrial Site Mississauga

Design

Plant species



Construction

- 1-1.5 meters deep
- Flat bottom
- Man or machinery
- Amend poor soils

Source: Rain Gardens – A how-to manual for homeowners

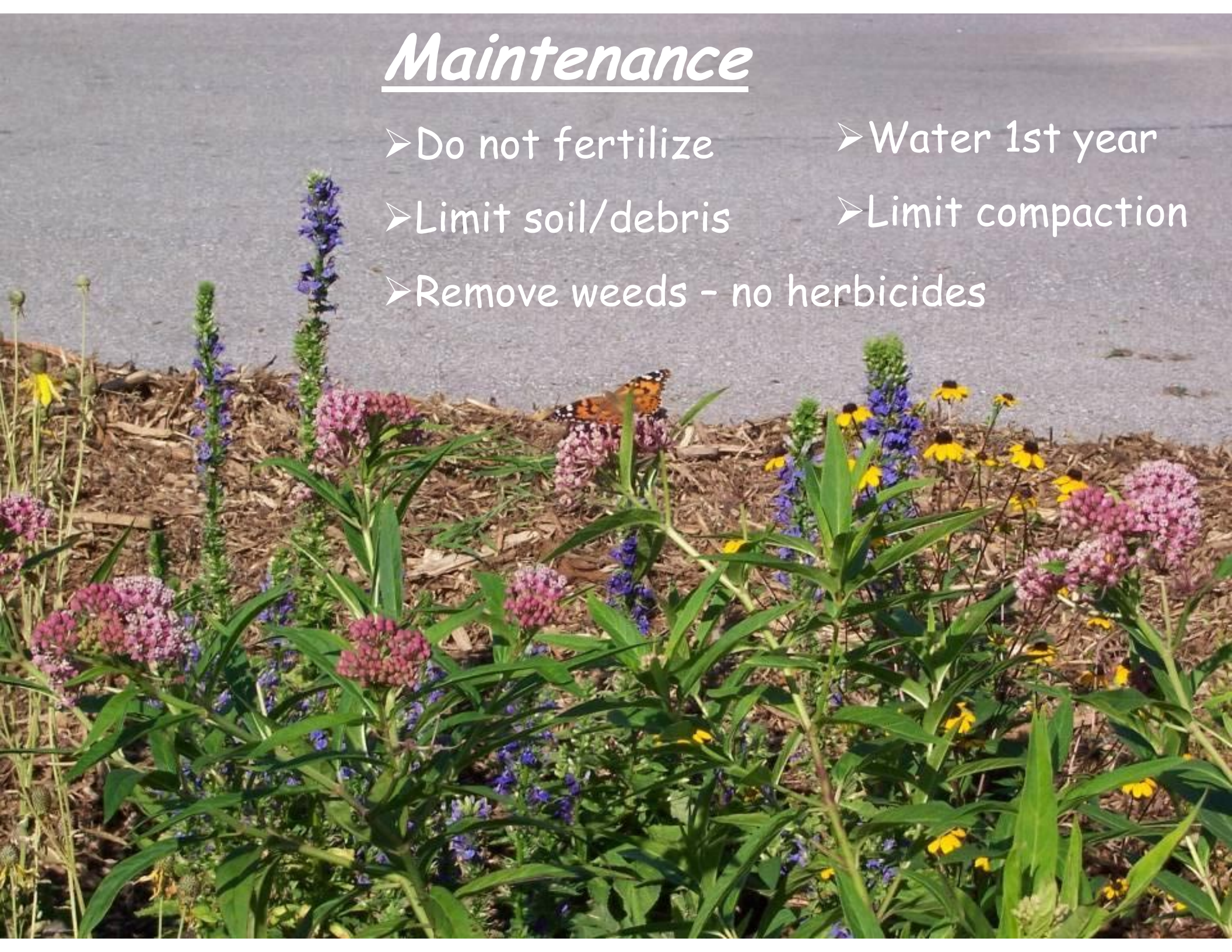
Planting

- Zones
- Plant placement - height
- Defined edge
- Mulch

Connect downspout underground or with a grass or rock lined swale.

Protect inflow from scouring and erosion.

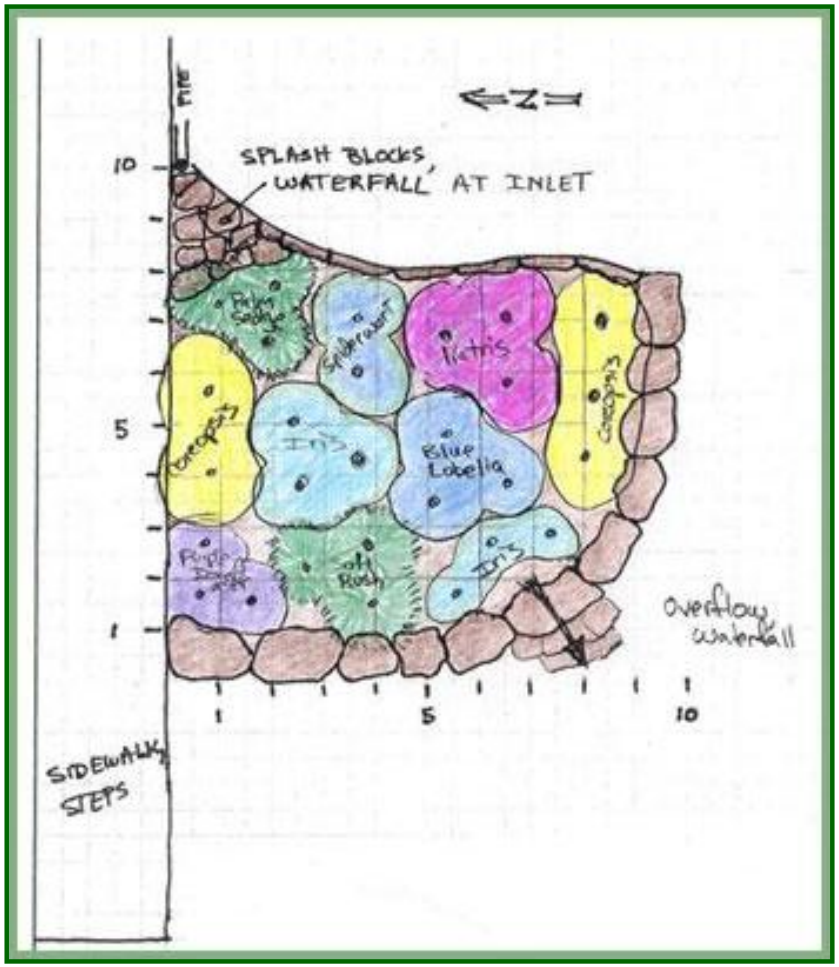
First Growing Season



Maintenance

- Do not fertilize
- Limit soil/debris
- Remove weeds – no herbicides
- Water 1st year
- Limit compaction

Downspout Rain Garden


Fire
SPLASH BLOCKS, WATERFALL AT INLET
10
5
1
Iris
Blue Lobelia
Iris
Overflow waterfall
1
5
10
SIDEWALK STEPS

Church

Kansas City

Rain Garden

BEFORE

Rain Garden

AFTER

Rain Garden

BEFORE

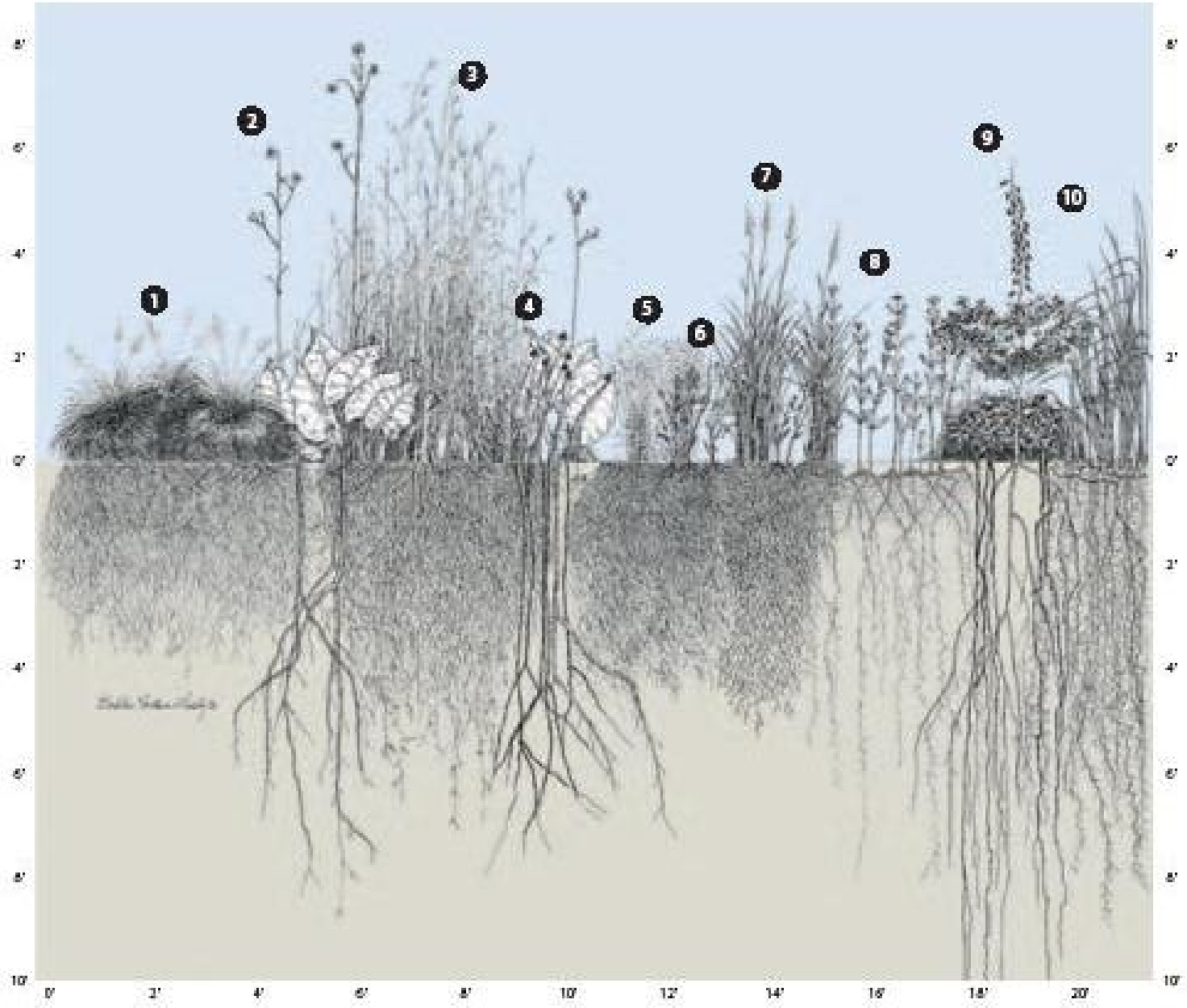
Rain Garden

AFTER

Rain Garden

AFTER

Power of the Prairie: Roots!



1. Prairie Dropseed
2. Prairie Dock
3. Big Bluestem
4. Pale Purple Coneflower
5. Little Bluestem
6. Black Eyed Susan
7. Indiangrass
8. Showy Sunflower
9. White False Indigo
10. Prairie Cordgrass


Turtlehead
Cardinal Flower
Marsh Milkweed
Butterfly Milkweed
Prairie Coreopsis
New England Aster
Sideoats Grama
Prairie Blazing Star
Blue Lobelia
Golden Alexanders
Little Bluestem
Yellow Coneflower
Bebbs Sedge
Blue Flag Iris
Culver's Root