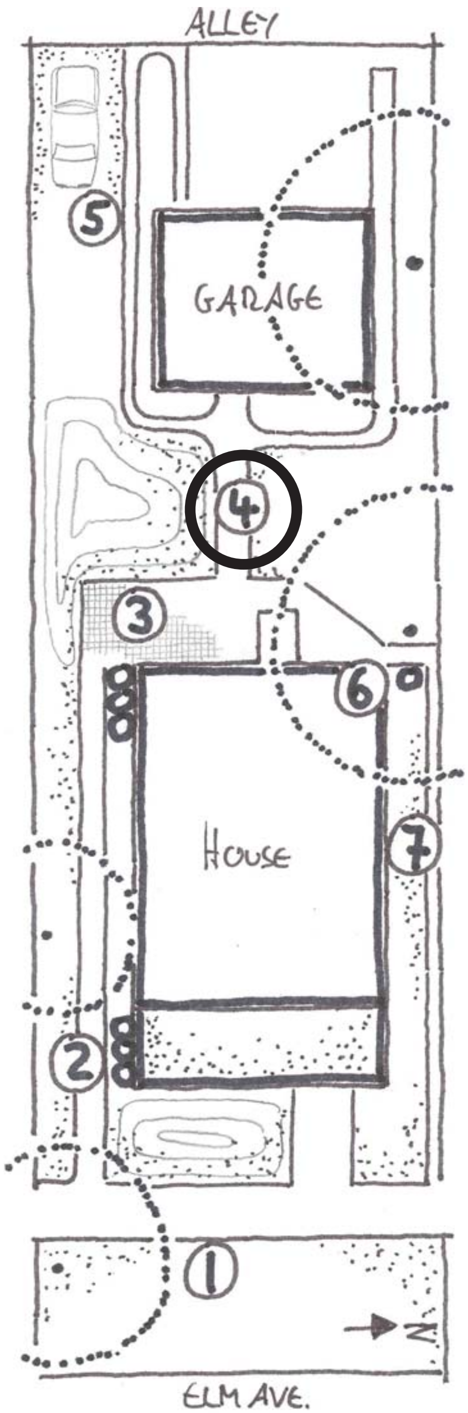


Station 4 - Rain garden

The emergence of rain gardens

"Bioretention" systems, which include rain gardens, were developed in the early 1990s by Prince George's County officials in Maryland. The objective was to find an effective, low-cost resolution to the problems of runoff quantity and quality.

Rain garden principles

A rain garden is based on the principles of our pre-settlement ecology and hydrology: Our native prairie landscapes were able to soak up almost all the precipitation that fell onto them. Water that was not used by the plants was slowly released into the lower soils, where it moved towards lowland areas. This process is also known as "base flow", which constantly and consistently fed into our wetlands, lakes, and streams.

Rain gardens 101

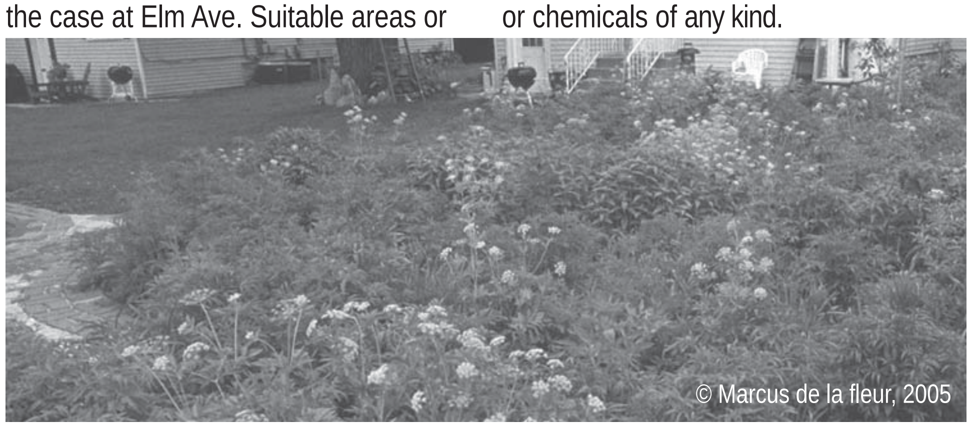
Rain gardens are shallow, excavated garden areas, vegetated with native prairie and savanna species. They are designed to receive and retain stormwater runoff from individual lots and their impervious areas. Rain gardens are sized to drain (fully infiltrate the received runoff) within 12-24 hours. They can be integrated into new developments and can be retrofitted into an existing development, as was the case at Elm Ave. Suitable areas or development types in which rain gardens can be incorporated are:

- Residential gardens/yards
- Commercial development
- Parking lot landscape islands
- Parkways
- Median strips
- Other streetscapes

By minimizing the amount of untreated stormwater that drains to the local storm sewer drainage system, rain gardens protect from localized flooding and improve runoff quality.

Rain garden vegetation

An important component of rain garden design is the planting of native grasses, sedges, and perennials with strong fibrous root systems (unlike lawn or turf grasses - see also diagram overleaf). These root systems fully rejuvenate every three years and contribute to the buildup of soil organic carbon (organic matter). The buildup of soil organic carbon ensures the longevity of the rain garden's filtration and infiltration capacity. It works like a sponge that soaks up the rainfall and allows it to infiltrate into the lower soils, providing an effective runoff filtering mechanism through the microorganisms in the root zone. Even in dry spells, these are still some of the greenest plants and are blooming beautifully - without the typical irrigation or chemicals of any kind.



Station 1 - Green roof
Station 2 - Rain barrels
Station 3 - Porous pavement
Station 4 - Rain garden
Station 5 - Gravel grass
Station 6 - Cistern
Station 7 - Bioswale

In order to maximize the production of soil organic carbon, the grasses and sedges need to be fueled by sufficient sunlight. It is preferable to place the rain garden in full sun or partial sun conditions.

The Elm Ave. rain gardens

The rain gardens at Elm Ave. are about 12 to 18 inches deep and located over soils that can infiltrate one to two inches of runoff per hour. The vegetation was initially seeded into the rain garden in November of 2003, with the exception of some sedges, which were salvaged from a construction site and transplanted in the summer of 2004. Since then some additional species were seeded directly into the rain garden, while other species were first pre-grown in plugs and later transplanted (a process known as augmentation planting).

Rain gardens are a cost-effective stormwater management application if strategically placed near impervious surfaces. At Elm Ave. the south facing roof area of the house drains into the rain gardens. The runoff from the roof area discharges through the downspouts, rain barrels, and small channels. The rain garden could also receive runoff from pavement, or other areas that generate runoff, such as lawn areas.

Rain garden benefits:

1) Reduces runoff volumes and rates from roofs, pavements, and lawns
2) Recharges groundwater and sustains base flow to natural water bodies
3) Reduces sediment, nutrient runoff, and other pollutants
4) Reduces maintenance requirements compared to conventional lawn
5) Effective land use through stormwater management and garden planting
6) Aesthetic value
7) Diversifies site habitat
8) Can reduce the need for costly stormwater infrastructure

Plants in the Elm Ave. rain garden:

Grasses and Sedges:

Side-Oats Grama
(*Bouteloua curtipendula*)
Copper-Shouldered Oval sedge
(*Carex becknellii*)
Straight-Styled Wood Sedge
(*Carex radiata*)
Bottelbrush Grass
(*Hystrix patula*)
Switch Grass
(*Panicum virgatum*)
Little Bluestem Grass
(*Schizachyrium scoparium*)
Indian Grass
(*Sorghastrum nutans*)
Spike Grass
(*Uniola latifolia*)

Forbs:

Sky-Blue Aster
(*Aster azureus*)
Smooth Blue Aster
(*Aster laevis*)
New England Aster
(*Aster novae-angliae*)
Sand Coreopsis
(*Coreopsis lanceolata*)
Tall Coreopsis
(*Coreopsis tripteris*)
Pale Purple Coneflower
(*Echinacea pallida*)
Purple Coneflower
(*Echinacea purpurea*)
Wild Geranium
(*Geranium maculatum*)
Round-Headed Bush Clover
(Lespedeza capitata)
Rough Blazing Star
(*Liatris aspera*)
Prairie Blazing Star
(*Liatris pycnostachya*)
Wild Bergamot
(*Monarda Fistulosa*)
Wild Quinine
(*Parthenium integrifolium*)
Foxglove Beard Tongue
(*Penstemon digitalis*)
Purple Prairie Clover
(*Petalostemum purpureum*)
Obedient Plant
(*Physostegia virginiana*)
Gray-Headed Coneflower
(*Ratibida pinnata*)
Black-Eyed Susan
(*Rudbeckia hirta*)
Compass Plant
(*Silphium lacinicatum*)
Showy Goldenrod
(*Solidago speciosa*)
Golden Alexanders
(*Zizia aurea*)

Kentucky Blue Grass
(turf grass)

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