



GREEN BMPs: SUSTAINABLE POST-CONSTRUCTION STORMWATER MANAGEMENT AND EROSION CONTROL



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Stormwater: Nowhere to go but up



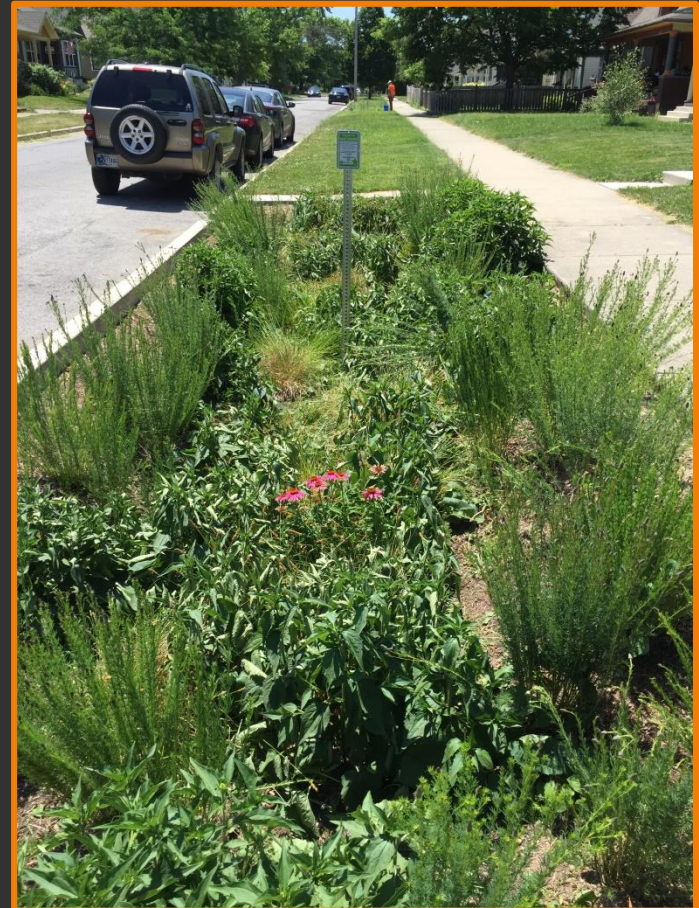
- ❑ Erosion
- ❑ Flooding
- ❑ Pollution
 - Sediments, viruses/bacteria, nutrients, oil, grease, and heavy metals

Gray vs. Green Infrastructure

Gray Funnel



Green Filter



Types of BMPs (Best Management Practices)

- Retention
- Detention
- Green Infrastructure
- Manufactured



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- ☐ Retention
- ☐ Detention
- ☐ Green Infrastructure
- ☐ Manufactured



Vegetated BMPs just do it better!

- ❑ Pollinator/ Wildlife benefits
- ❑ Rainfall interception
- ❑ Lessen erosive sheetflow
- ❑ Roots maintain infiltration capacity
- ❑ Decrease total stormwater volume through transpiration



Sure, but what plants?

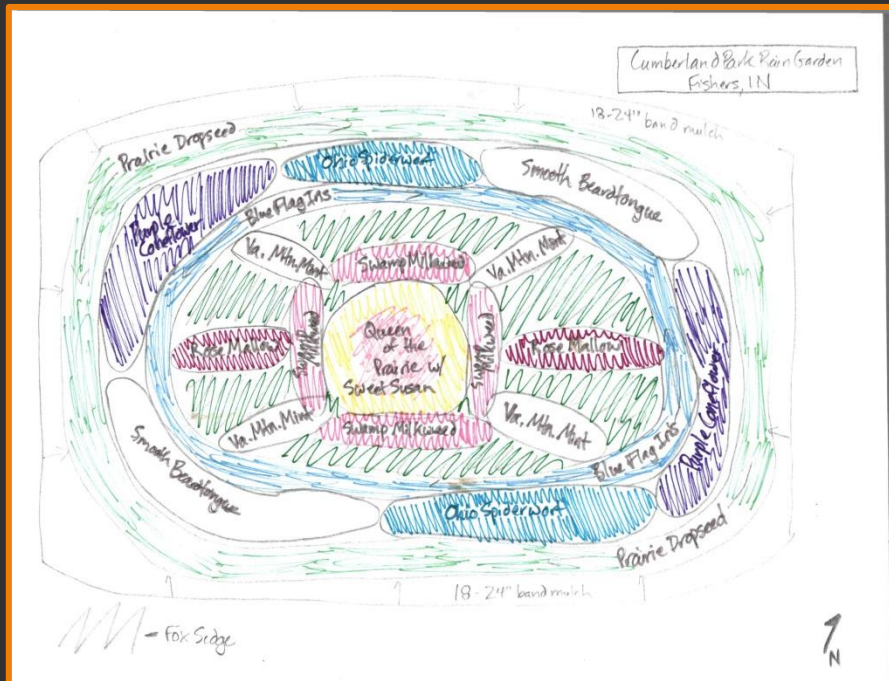
□ Things to consider

▣ Public visibility

▣ Height (line of sight issues)

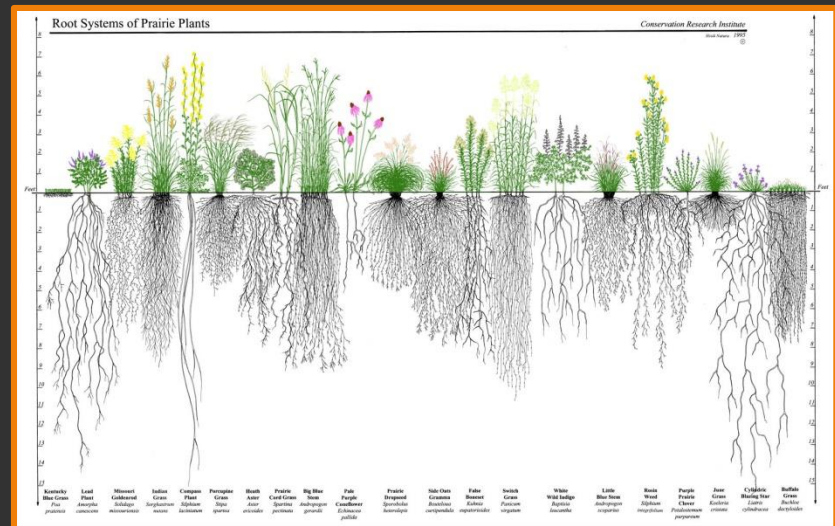
▣ Bloom time/Color

▣ Aesthetic appeal



Sure, but what plants?

- “Workhorse” plants
 - ▣ Resilient to a variety of conditions
 - Salt tolerance
 - High pH
 - ▣ Adaptable to many soil types
 - ▣ Deep perennial roots
 - ▣ Strong reproduction
 - ▣ Vigorous growth



The Workhorses



Purple Coneflower
(*Echinacea purpurea*)



Lance-leaf
coreopsis
(*Coreopsis lanceolata*)



Beardstongues
(*Penstemon* spp.)



Blue wild
Indigo
(*Baptisia australis*)

The Workhorses



Golden Alexander (*Zizia aurea*)



Orange Coneflower (*Rudbeckia fulgida*)

Water tolerant plants

- ❑ Plants with high water absorption or tolerance
- ❑ Areas that often have pooling water
- ❑ Detention area expected to permanently have water
- ❑ Lake edge plantings
 - ▣ Littoral zone
 - ▣ Decompose nutrients and pollutants



Water tolerant plants



Swamp Rose
Mallow
(*Hibiscus
moscheutos*)



Common
Arrowhead
(*Sagittaria
latifolia*)



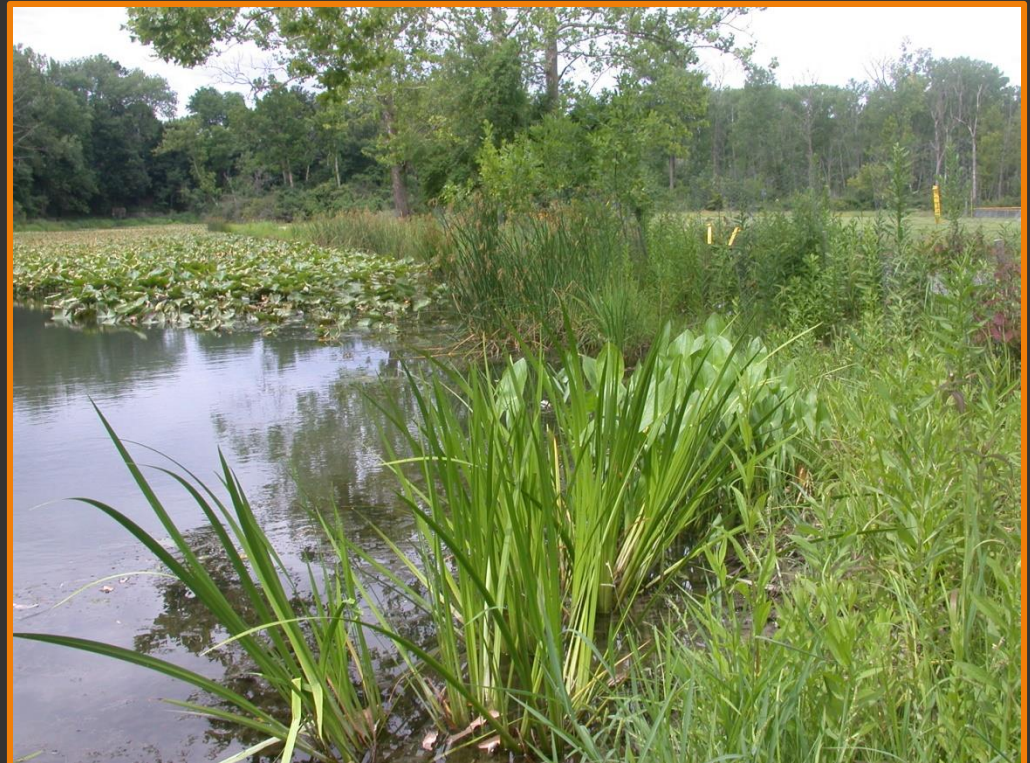
Swamp
Milkweed
(*Asclepias
incarnata*)



Softstem Bulrush
(*Schoenoplectus
tabernaemontani*)

Erosion control

- ❑ Construction areas are one of the largest sources of NPS pollution
- ❑ Vegetation is the most natural and effective method of erosion control



Common Erosion control methods

- ❑ Plastic mulches
- ❑ Riprap
- ❑ Erosion control matting
- ❑ Silt fences
- ❑ Cellular confinement systems
- ❑ Fiber rolls



Planting for erosion control

- ❑ More sustainable solution
- ❑ Plants with:
 - ▣ Large root mass
 - ▣ Resilience to sediment
 - ▣ Sediment capturing ability
 - ▣ Flood and drought resistant
- ❑ Graminoids
 - ▣ Hold system together
 - ▣ Reduce weed pressure



Plants for Erosion control: Sedges



Field Oval Sedge (*Carex molesta*)



Fox sedge (*Carex vulpinoidea*)

Plants for Erosion control: Grasses



Prairie Dropseed (*Sporobolus heterolepis*)



Little bluestem (*Schizachyrium scoparium*)

Plants for Erosion control: Forbs



Blue flag Iris (*Iris virginica* var. *shrevei*)

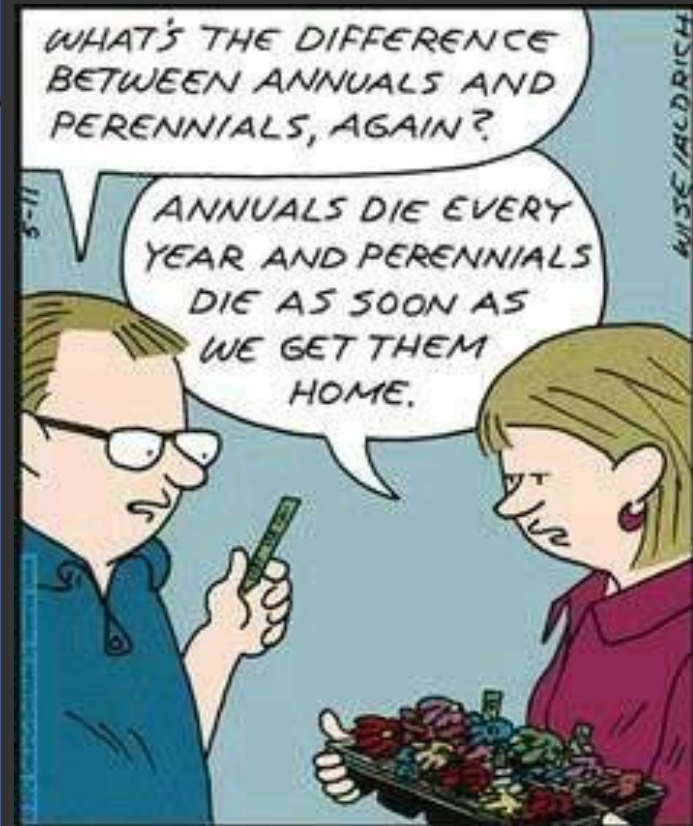


Heath Aster (*Symphiotrichum ericoides*)

Successful vegetation establishment

NOT SURE IF PLANTING A SEED

OR BURYING IT TO WATCH IT DIE



Seed mix establishment

- ❑ Seed cover crop species
 - ▣ Deters invasion/weeds
 - ▣ Allows perennial seeds and seedlings develop
- ❑ Seeding under erosion blankets



Seed mix establishment

- ❑ Establish seed to soil contact
 - ▣ Light tilling or raking in seeds if small amount
 - ▣ Truax no till drill seed for larger areas
- ❑ Seed during Fall and Winter months



Plug planting establishment

- Planting technique
 - ▣ Level with existing soil
 - ▣ Topsoil must cover potting mix
 - ▣ NO air gaps
 - Refill hole if dug too deep
 - Firm fill soil as you go
- Spacing
 - ▣ Follow spacing specs
 - ▣ Staggered pattern



Plug planting establishment

- Regular watering
 - ▣ Water immediately after planting
 - ▣ Several months after planting
 - ▣ Establish vigorous growth



Plug planting establishment

- Increased weeding with first 1-2 years of establishment
 - ▣ Wards off interspecific competition
 - ▣ Required skilled labour
- Regular maintenance



BMP Maintenance

- ❑ Low maintenance \neq No Maintenance
- ❑ Maintenance protocols depend on size and nature of BMP

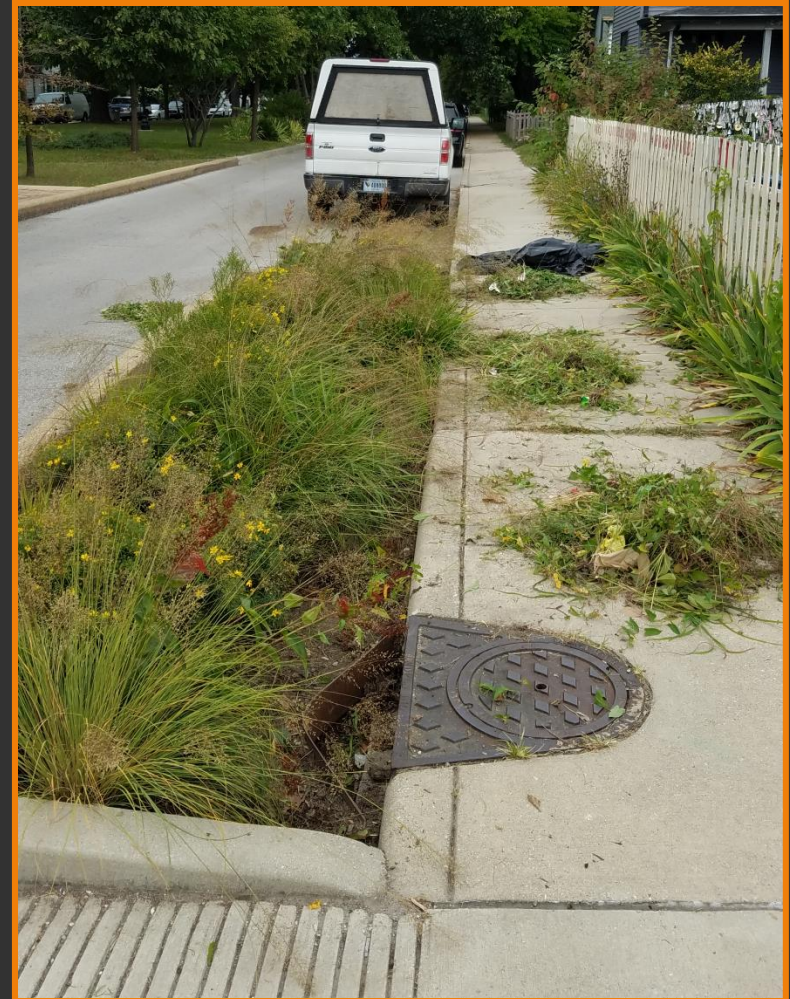


BMP Maintenance

- Maintenance Plan upon BMP construction
 - Checklist for maintenance crews
 - Regular inspections by qualified experts
 - Tailored to specific site needs
 - Picture directory of common weeds/ intended plants

BMP Maintenance

- ❑ Small Urban BMP High Visibility
- ❑ 6-12 site visits per season
- ❑ Main Activities:
 - ❑ Weed Management
 - ❑ Mulching
 - ❑ Plant replacements
 - ❑ Trash Removal
 - ❑ Maintaining Drainage



BMP Maintenance

- ❑ Large BMP Low to Medium Visibility
- ❑ 3-4 site visits per season
- ❑ Main Activities:
 - ▣ Weed Management
 - ▣ Mowing or Prescribed Burning
 - ▣ Over-seeding/Plant Replacement
 - ▣ Maintaining Drainage



BMP Maintenance

- ❑ Keys to Successful Weed Management
 - ▣ First year seedling identification
 - ▣ Early identification of noxious weed species
 - ▣ 2nd and 3rd year seedling identification of more conservative species is necessary for establishing diverse plant communities



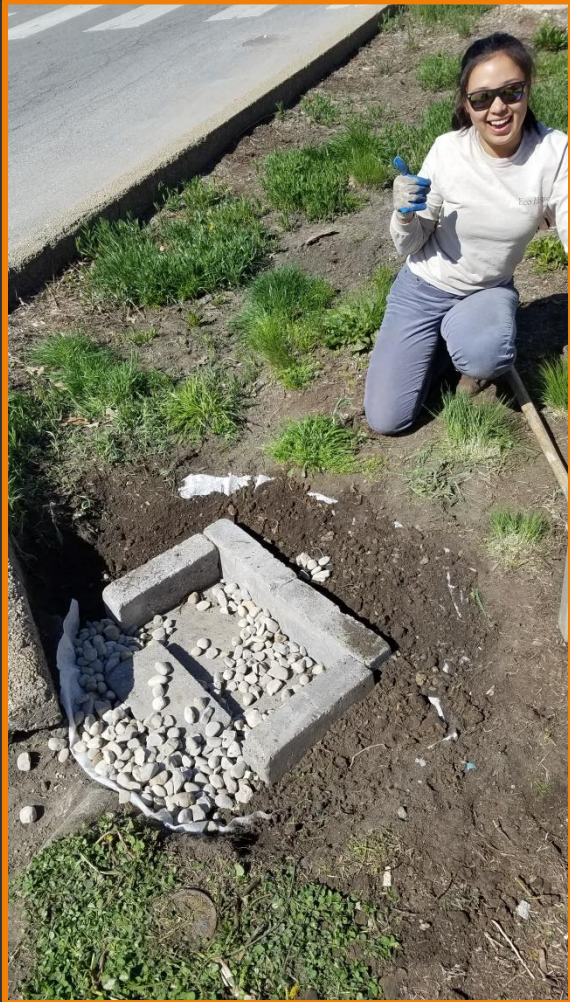
Surina Square: Riparian Corridor



Surina Square: Riparian corridor



Lincoln and Alabama: Raingarden Retrofitting



Lincoln and Alabama: Raingarden Retrofitting



Questions?

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