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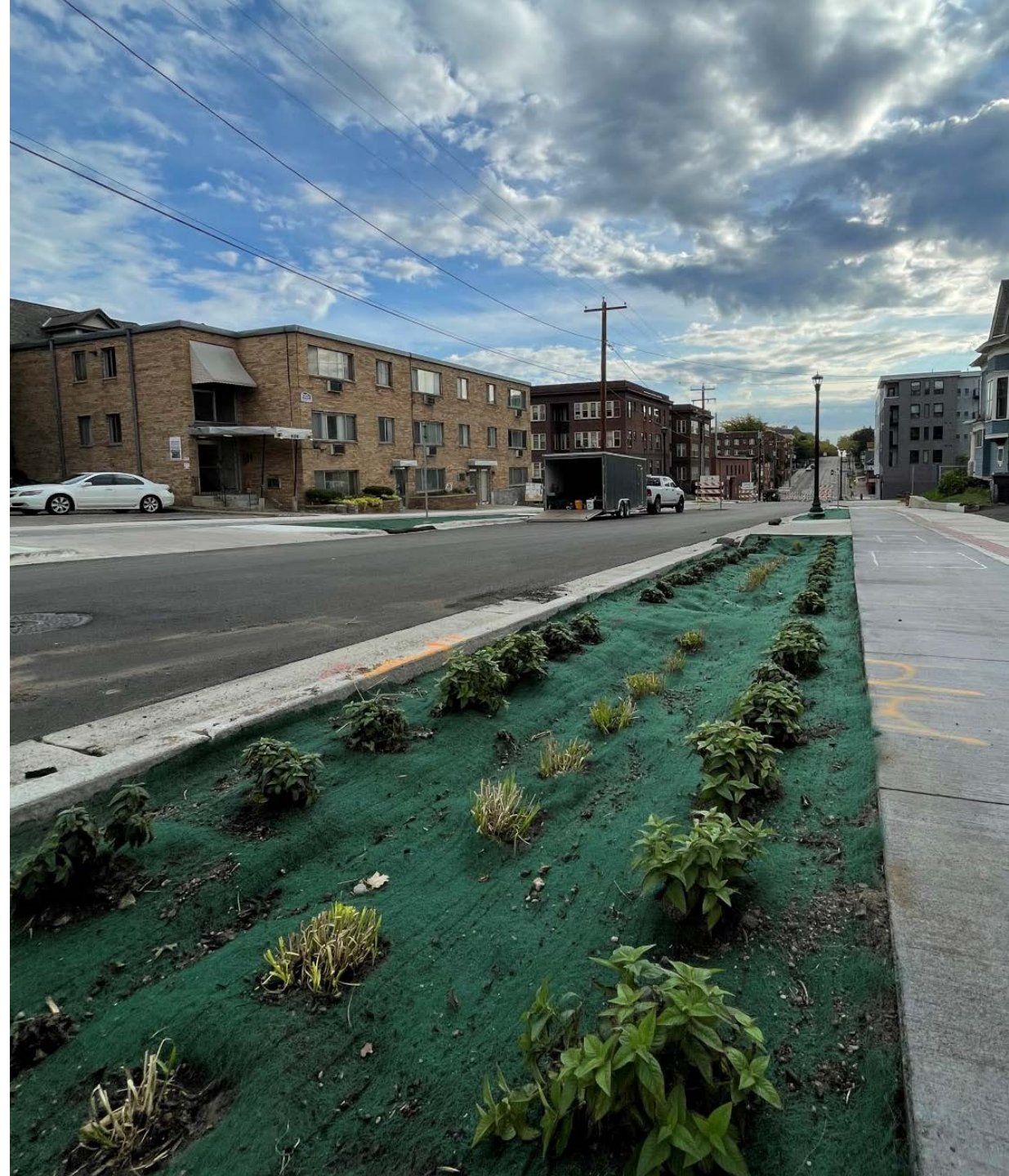
Establishing Permanent Vegetation in Urban Green Infrastructure



Agenda



- Background
- Vegetation Challenges
- Solution
- Work in Progress



Background

- New Stormwater Ordinance
- Went into effect January 1, 2022
- New Requirements



(3) *Volume control.* Volume control shall be addressed as follows:

- a. New development, redevelopment, and nonlinear projects on sites without restrictions shall capture and retain on-site one and one-tenth (1.1) inches of runoff from the new and fully reconstructed impervious surfaces within the disturbed area.
- b. Linear projects on sites without restrictions shall capture and retain the larger of the following:
 1. Fifty-five hundredth (0.55) inch of runoff from the new and fully reconstructed impervious surfaces within the disturbed land area.
 2. One and one-tenth (1.1) inches of runoff from the net increase in impervious area.



1.1" = 28mm

.55" = 14mm

Background

- Previously linear projects were exempt from stormwater management requirements
- Now public works would have to manage runoff on all new and reconstructed roadway projects



Green Infrastructure (GI)

Sustainable Landscaping (SL)



Green Stormwater Infrastructure (GSI)



**Stormwater
BMPS
With
Vegetation**



Tree Trenches



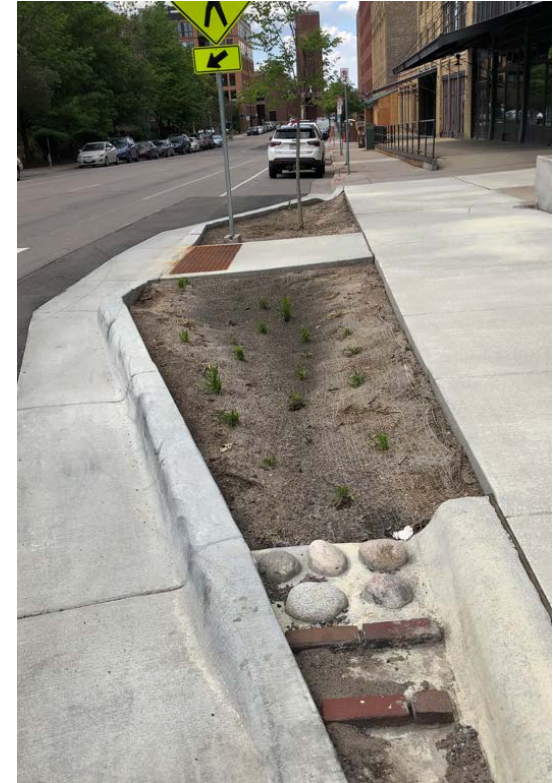
**Sustainable
Landscaping**



Bioretention

Visibility

- Poor appearance
- Weedy
- Sparse or overgrown
- Vegetation not thriving
- Making GSI “look bad”



Challenges

- GI is new
- Harsh Conditions
- Winter Maintenance
- Fully-developed city
- Expectations
- Climate Change
- Poor vegetation establishment
- Resources and skills limitations



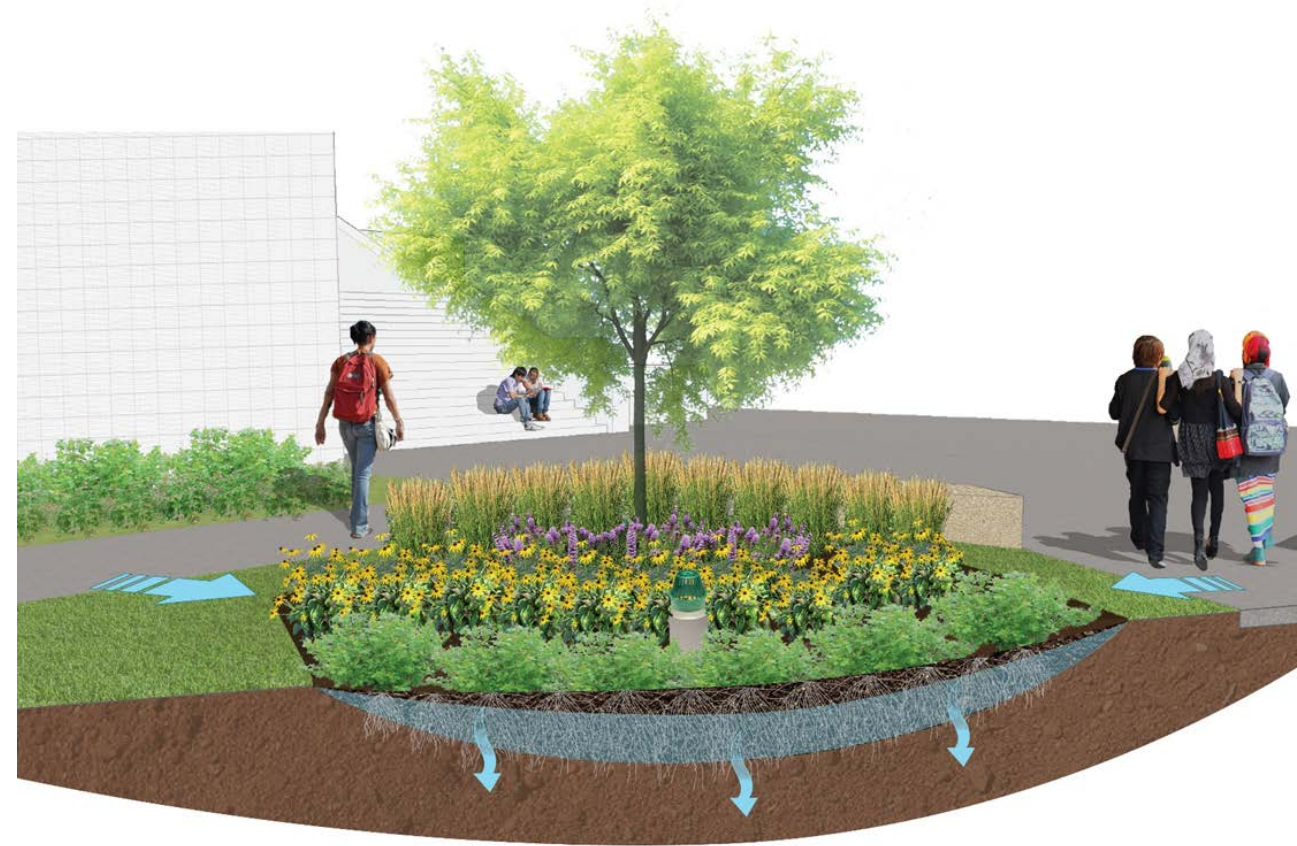
LA Contract Solution

- Contracts easier than hires
- Immediate relief
- Dedicated Landscape Architect
- Long-term program support



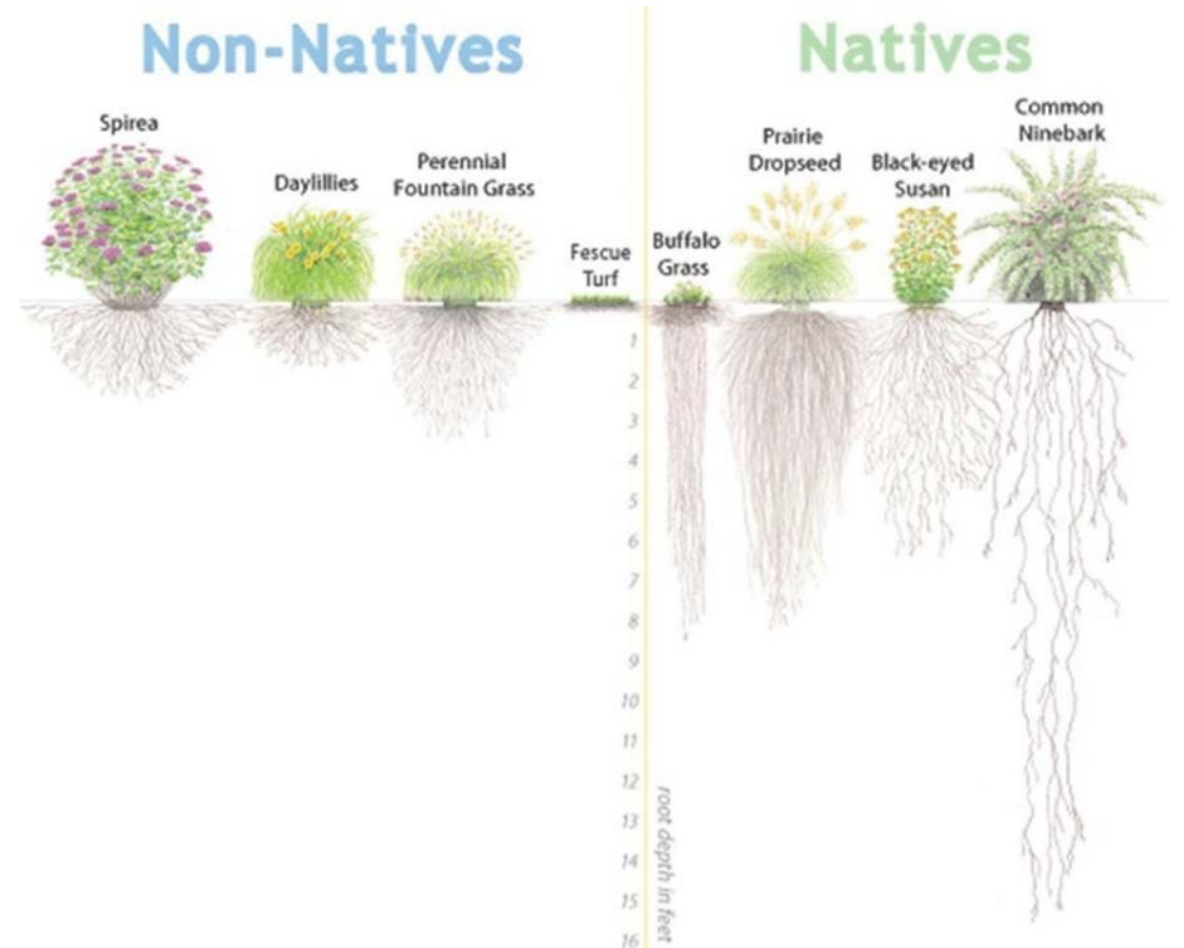
Success Is Not Optional

Healthy plants are integral to the function of green stormwater infrastructure



Plants...

- Improve BMP Performance
- Conserve Soil
- Provide Pollinator Habitat



Plants...

- **Contribute to Neighborhood Beautification**
- **Are a Conduit for Education**



Welcome to the **RAINGARDEN** a landscape at work!

NATIVE PLANTS IN THIS GARDEN:

- Butterfly Weed
- Blue Flag Iris
- Fox Sedge
- Lanceleaf Tickseed
- Bee Balm
- Culver's Root

HOW DOES A RAINGARDEN WORK?

- 1 RAINWATER FALLS:** Rainwater falls and runs over roofs, roads, and parking lots, collecting harmful pollutants and chemicals along the way.
- 2 GARDEN COLLECTS RAINWATER:** A rain garden is a bowl-shaped depression in the ground that collects this runoff water before it enters our lakes and rivers.
- 3 RUNOFF WATER IS FILTERED:** The rain garden is made of special soils and native, deep-rooted plants that filter pollutants and chemicals out of the collected water.
- 4 CLEAN WATERWAYS:** Once filtered, the purified water slowly seeps into the soil below the rain garden and joins our lakes and rivers as clean water.

FUN RAINGARDEN FACTS!

- Raingardens can absorb up to 90% of nutrients & chemicals
- Raingardens provide habitat & refuge for birds and beneficial insects
- Raingardens help make lakes & rivers safe for fish, wildlife, & people

AN URBAN WATERSHED
The highlighted area represents the local watershed. Stormwater runoff in this area drains directly into the Mississippi River.

Logos: Big Brothers Big Sisters, MWMA (Mississippi Watershed Management Organization), EOR (Ecology & Community)

Plants also...

- **Have Multiple Climate Adaptation Benefits**
 - Cooling impervious surfaces / reducing U.H.I.E.
 - Slowing and reducing runoff
 - *Interception and Evapotranspiration*
 - Improve soil health and permeability
- **And "Make or Break" Public Perception of GI**



Getting to Work

- Plan Reviews
- Installation oversight
- Establishment recommendations



memo		EOR water ecology community	
Project Name	GI Urban Landscape Support (EOR Project No. 114-0015)	Date	6/7/22
To / Contact info	Allison Bell		
Cc / Contact info	Katie Kowalczyk		
From / Contact info	Britta Hansen; Chris Long		
Regarding	Plant Inspection #3		

Inspection Date: 6-2-2022

Approximate time: 1:00PM

Weather conditions: 70° and sunny

Johnson St NE

Observations

- Variable (10-90%) coverage of cover crop
- Would not expect to see signs of native plant germination yet, but the fact that the cover crop is not apparent in some locations is concerning
- Several lost trees

Recommendations

- 2 years of monitoring and hand weeding by LandBridge
- Require contractor to replace lost trees, and potentially some lost plugs
- Outreach to homeowners about native plant establishment expectations



Photograph 1. Johnson St NE, variable cover crop establishment



Photograph 2. Johnson St NE, lost tree

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Planting Options

- Identify All Options
 - Native Seeding
 - Native Seeding with Plugs
 - Container Material Planting
 - Native Sod
- Cost / Benefit Analysis
- Understand the short- and long-term needs of each approach



Standard Plant List and Seed Mixes

Last Updated: 4/6/2022

Minneapolis Green Stormwater Infrastructure Master Plant List								
Aquatic Plants, <12" water								
Latin Name	Common Name	Mature Height	GSI	SL	Median	Shade Tolerant	Bloom Time	Soil Moisture
<i>Acorus calamus</i>	Sweet Flag	36-48	✓				May-July	s, w
<i>Carex comosa</i>	Bottlebrush Sedge	24-42"	✓				May-June	s, w, um
<i>Carex bebbii</i>	Bebb's Sedge	24"-36"	✓				May-June	w, um
<i>Carex crinita</i>	Fringed Sedge	12-36"	✓			✓		
<i>Carex lacustris</i>	Lake Sedge	24-36"	✓			✓		
<i>Carex scoparia</i>	Pointed Broom Sedge	6-30"	✓					
<i>Carex sprengei</i>	Sprengel's Sedge	12-24"	✓			✓		
<i>Carex stricta</i>	Tussock Sedge	12-36"	✓			✓		
<i>Carex vulpinoidea</i>	Fox Sedge	12-36"	✓					
<i>Eleocharis palustris</i>	Spike Rush	6-24"	✓			✓		
<i>Iris versicolor</i>	Blue Flag Iris	24-36"	✓					
<i>Juncus effusus</i>	Soft Rush	24-48"	✓					
<i>Juncus tenuis</i>	Path Rush	6-12"	✓			✓		
<i>Scirpus acutus</i>	Hardstem Bulrush	36-108"	✓					
<i>Scirpus atrovirens</i>	Dark-Green Bulrush	36-60"	✓					
<i>Scirpus cyperinus</i>	Wool Grass	36-48"	✓					
<i>Scirpus validus</i>	Softstem Bulrush	36-96"	✓					

Graminoids								
Latin Name	Common Name	Mature Height	GSI	SL	Median	Shade Tolerant	Bloom Time	Soil Moisture
<i>Andropogon gerardii</i>	Big Bluestem	36-72"	✓	✓				
<i>Bouteloua curtipendula</i>	Side Oats Grama	12-24"		✓	✓			
<i>Bouteloua gracilis</i>	Blue Grama	6-18"		✓	✓			
<i>Bromus kalmii</i>	Kalm's Brome	24-36"	✓	✓		✓		

Green Stormwater Infrastructure Seed Mix							
Type	Scientific Name	Common Name	Seeds / sq ft	Rate (lb/ac)	% Mix (by sqft)	Total PLS lbs	
Grasses	<i>Bouteloua curtipendula</i>	Side-oats Grama	8.64	2.36	19.70	2.36	
	<i>Bromus ciliatus</i>	Fringed Brome	2.91	0.72	6.00	0.72	
	<i>Bromus kalmii</i>	Prairie Brome	1.41	0.48	4.00	0.48	
	<i>Elymus villosus</i>	Silky Wild Rye	1.70	0.84	7.00	0.84	
	<i>Elymus virginicus</i>	Virginia Wild Rye	1.48	0.96	8.00	0.96	
	<i>Glyceria striata</i>	Fowl Manna Grass	2.38	0.07	0.60	0.07	
	<i>Leersia oryzoides</i>	Rice Cutgrass	1.20	0.10	0.80	0.10	
	<i>Schizachyrium scoparium</i>	Little Bluestem	10.58	1.92	16.00	1.92	
	<i>Sporobolus heterolepis</i>	Prairie Dropseed	2.29	0.39	3.25	0.39	
	Total Guild:			32.59	7.84	65.35%	7.84%
	Sedges	<i>Carex molesta</i>	Troublesome Sedge	1.21	0.13	1.10	0.13
<i>Carex scoparia</i>		Pointed Broom Sedge	1.30	0.04	0.35	0.04	
<i>Carex vulpinoidea</i>		Fox Sedge	4.28	0.14	1.20	0.14	
<i>Carex stipata</i>		Awl-fruited Sedge	1.50	0.12	1.00	0.12	
Total Guild:			8.29	0.43	3.65%	0.43%	
Forbs	<i>Agastache foeniculum</i>	Fragrant Giant Hyssop	2.38	0.07	0.60	0.07	
	<i>Anemone canadensis</i>	Canada Anemone	0.42	0.14	1.20	0.14	
	<i>Asclepias incarnata</i>	Swamp Milkweed	0.63	0.36	3.00	0.36	
	<i>Desmodium canadense</i>	Showy Tick-trefoil	0.48	0.24	2.00	0.24	
	<i>Dalea candida</i>	White Prairie Clover	4.19	0.60	5.00	0.60	
	<i>Dalea purpurea</i>	Purple Prairie Clover	4.23	0.77	6.40	0.77	
	<i>Eryngium yuccifolium</i>	Rattlesnake Master	0.66	0.24	2.00	0.24	
	<i>Liatris ligulistylis</i>	Meadow Blazing Star	0.31	0.08	0.70	0.08	
	<i>Liatris pycnostachya</i>	Prairie Blazing Star	0.48	0.12	1.00	0.12	
	<i>Lobelia siphilitica</i>	Great Blue Lobelia	4.41	0.02	0.20	0.02	
	<i>Helopsis helianthoides</i>	Common Ox-eye	0.44	0.19	1.60	0.19	
	<i>Monarda fistulosa</i>	Wild Bergamot	1.23	0.05	0.40	0.05	
	<i>Ratibida pinnata</i>	Yellow Coneflower	0.79	0.07	0.60	0.07	
	<i>Rudbeckia hirta</i>	Black-eyed Susan	4.46	0.12	1.10	0.12	
	<i>Solidago rigida</i>	Stiff Goldenrod	1.81	0.12	1.00	0.12	
	<i>Symphotrichum novae-angliae</i>	New England Aster	1.45	0.06	0.50	0.06	
	<i>Symphotrichum oolentangiense</i>	Sky-blue Aster	2.12	0.07	0.60	0.07	
	<i>Tradescantia ahensis</i>	Ohio Spiderwort	0.35	0.12	1.00	0.12	
	<i>Verbena hastata</i>	Blue Vervain	0.82	0.02	0.20	0.02	
	<i>Verbena stricta</i>	Hoary vervain	1.11	0.11	0.90	0.11	
<i>Zizia aurea</i>	Golden Alexanders	0.48	0.12	1.00	0.12		
Total Guild:			33.25	3.69	31.00%	3.70%	
TOTAL SEED MIX			74.13	12.0			

*include cover crop of oats or winter wheat



Immediate Challenges

- Native Seeding
- Homeowner/Public Perception
- What is a Cover Crop?



Native Seeding

- Looks a little different than the turf boulevard they are used to
- Moving away from cover crop
 - Public Perception
 - May inhibit growth of some native species
 - Development of “urban turf” mix



Mulch Problems

- The best-looking project had been installed with container stock plants and mulch
- Mulch clogging storm drains
- Determined not to use mulch

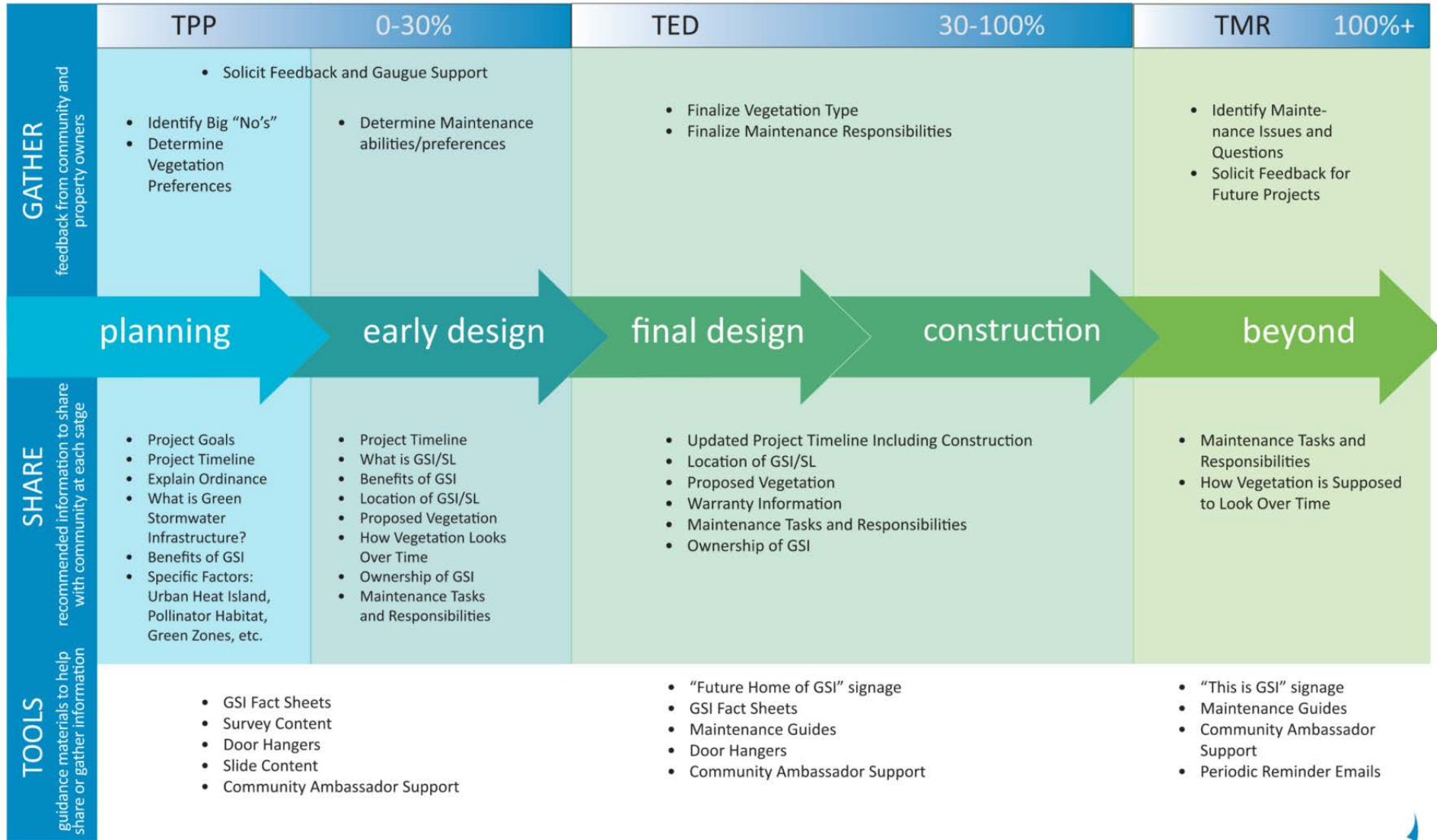


Urban Turf Mix

- Fast establishing
- Temporary and Permanent Vegetation
- Salt Tolerant
- Native, low-growing grasses
- Forbs are added as plugs

Salt Tolerant Urban Turf Mix				
Type	Scientific Name	Common Name	Rate (lb/ac)	% Mix (by sqft)
Grasses	<i>Bouteloua curtipendula</i>	Side-oats Grama	3.00	5.00
	<i>Bouteloua gracilis</i>	Blue Grama	4.00	6.75
	<i>Dalea purpureum</i>	Purple Prairie Clover	1.20	2.00
	<i>Buchloe dactyloides</i>	Buffalograss	1.18	1.90
	<i>Elymus canadensis</i>	Canada Wildrye	2.40	4.00
	<i>Elymus trachycaulus</i>	Slender Wheatgrass	3.80	6.35
	<i>Lolium taticum</i>	Annual Rye Grass	4.80	8.00
	<i>Poa compressa</i>	Canada bluegrass	7.20	12.00
	<i>Puccinella distans</i>	Alkali Grass	9.60	16.00
	<i>Talium aestivum</i>	Winter Wheat	15.60	26.00
	<i>Schizachyrium scoparium</i>	Little Bluestem	6.00	10.00
	<i>Sporobolus cryptandrus</i>	Sand Dropseed	1.20	2.00
TOTAL SEED MIX			60.0	

Outreach



Sustainable Landscape Seeding & Plugs

What to Expect



What is Sustainable Landscaping?

Sustainable Landscaping is a set of Green Infrastructure practices that work with the natural environment to sustain local habitat, conserve energy and water, alleviate the urban heat island effect, and improve air and water quality. Examples include trees, grasses, impervious conversions, and native plantings.

Native Seeding

As part of a recent roadway and stormwater improvement project the City of Minneapolis has installed Sustainable Landscaping, through seeding and plugs, in front of your property.

It takes 3+ years to fully establish healthy, native vegetation from seed.

The project contractor is responsible for providing 2 years of seed maintenance and establishment (from the date of first seeding). During this time you do not have to do anything to maintain the seeding area in front of your property.

After 2 years, city staff will distribute more information on simple tasks that you may do to take care of the native plants in front of your home for the long term. Once they are fully mature these plants will be very resilient and require less maintenance (and water) than a typical turf lawn.

When to Contact the City

Call 311 if you see any of these conditions in the native seeding area:

- areas of bare soil (greater than 2 square feet in size)
- vandalism or other physical damage to planting area
- patches of noxious weeds (per Minnesota Department of Agriculture) <https://www.mda.state.mn.us/plants-insects/minnesota-noxious-weed-list>

What to Expect During Seed Establishment

1-3 weeks after seeding the cover crop emerges



The cover crop consists of an annual crop plant such as oats or annual rye that will germinate quickly and keep the soil in place while the native seeds prepare to germinate and develop their root systems.

1 year after seeding the first natives bloom



The earliest blooming native flowers are usually Black-Eyed Susan and Yarrow (among a few others). Many annual weeds will still be evident within the planting area at this time as well. This is normal. The other native plants are still working on establishing healthy root systems.

3 years after seeding the native plants mature



The presence of weeds will be minimal and the native plants will be fully mature, with a variety of flowers and grasses blooming throughout the season.

Native Plants in the Johnson St NE Seed Mix

What to Expect



The seed mix used on the project contained over 25 species of native grasses and forbs. Two to three years after native seeding look out for some of these flowers and grasses along Johnson St NE.



Achillea millefolium
Yarrow



Aquilegia canadensis
Columbine



Asclepias syriaca
Common Milkweed



Aster laevis
Smooth Aster



Bouteloua curtipendula
Side Oats Grama



Dalea purpurea
Purple Prairie Clover



Danthonia spicata
Poverty Oat Grass



Desmodium canadense
Showy Tick Trefoil



Helianthus annuus
Smooth Oxeye



Monarda fistulosa
Wild Bergamot



Penstemon spectabilis
Showy Penstemon



Rosa arkansana
Prairie Rose



Rudbeckia hirta
Black-Eyed Susan



Schizachyrium scoparium
Little Bluestem



Verbena stricta
Hoary Vervain



Zizia aurea
Golden Alexander

Tree Trench Plant Care

The warranty for all plants in the Hoyer Heights tree trenches has now expired. The City of Minneapolis will provide inspections and maintenance, including cleaning out inlets and replacing dead plants.

Follow the tips in the table below if you want to do any of your own tree trench upkeep and care. To learn more, watch the linked videos from Mississippi Watershed Management Organization.

If you would like to add or replace plants please see the species list on the back side of this sheet.

A Tree Trench In Action



Water from the street flows in to the tree trench through curb openings like this one.

Water should soak into the soil within 2 days after a rain event.

Keeping this curb in clean will help keep tree trench healthy functioning properly.

What You Can Do

GENERAL ACTIVITIES

- Remove trash and debris from tree trench
- Clean out dirt, leaves, and debris from curb openings
Watch: Tree Trench Spring Maintenance <https://youtu.be/AICYwxn2YqY>
- Harvest seeds to plant in your yard or share with friends
- Promote the benefits of your tree trench garden to friends and neighbors



SPRING (April - May)

Cut plants down to a height of 4" above the ground



SUMMER (June - September)

- Pull weeds (refer to plant list for native plants to keep)
Reference: https://www.mwmo.org/wp-content/uploads/2020/08/20220525_Hoyer-Heights-Weeds.pdf
- Do not use herbicides or fertilizers in tree trenches
Watch: Summer Maintenance for Tree Trenches https://youtu.be/6Z_lKqKAsME
- Cut back plants that obstruct the sidewalk
- Water only in times of severe drought (more than 10 days without rain)



WINTER

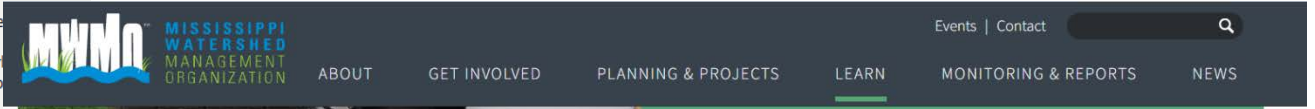
- Do not pile snow in the tree trench
- Do not use de-icing salt near tree trenches

When to Contact the City

Call 311 if you see any of these conditions in the Tree Trenches:

- Standing water more than 48 hours after a rainfall
- Areas of bare soil (greater than 2 square feet in size)
- Vandalism or physical damage to the planting area
- Noxious weed patches (per MN Department of Agriculture)
- For sick or damaged trees call 612-313-7710 or email forestry@minneapolis.org.

For more information please visit: <https://www.mwmo.org/projects/hoyer-heights-tree-trenches/>



RAINGARDENS

Raingardens are bowl-shaped (depressed) gardens with sandy soils and deep-rooted native plants. They act like filters on the landscape, capturing stormwater runoff and letting it soak into the ground, where the soils naturally filter out harmful pollutants.

[LEARN MORE](#)



TREES

Trees help protect water quality by capturing, storing and using rainfall. This reduces the amount of runoff that carries pollution off of the landscape and into nearby rivers and lakes. A healthy and robust tree canopy is especially important in an urban environment.

[LEARN MORE](#)

Signage

- In Development
- Sets Expectations
- Gives Important Info
- Connects to Other Resources



Native Plant Establishment

- Not for the faint of heart!
- It may look bad for some time
- Before it looks amazing
- Proper maintenance is key
- And setting correct expectations



Working on it

- Weed Management
 - No herbicide allowed
 - Mow or hand pull
 - Need trained maintenance staff
- Watering
- Plant Density
- Plug Theft



Working on it

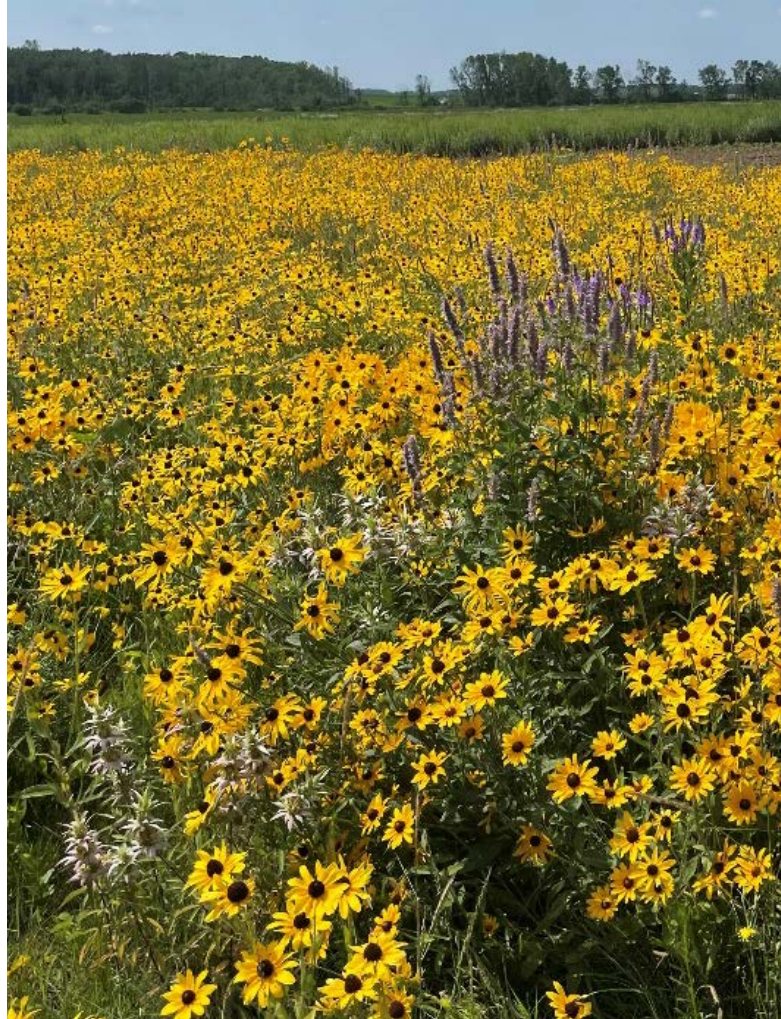
- Erosion Control Options
 - Mulch challenges
 - Different types of EC Blanket
 - Native Sod



Native Sod



Rolled prairie sod ready for install.



Native Sod Installation – October 2022



Questions?

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