



Roadside Vegetation Naturalization Pilot Project in Calgary, Alberta

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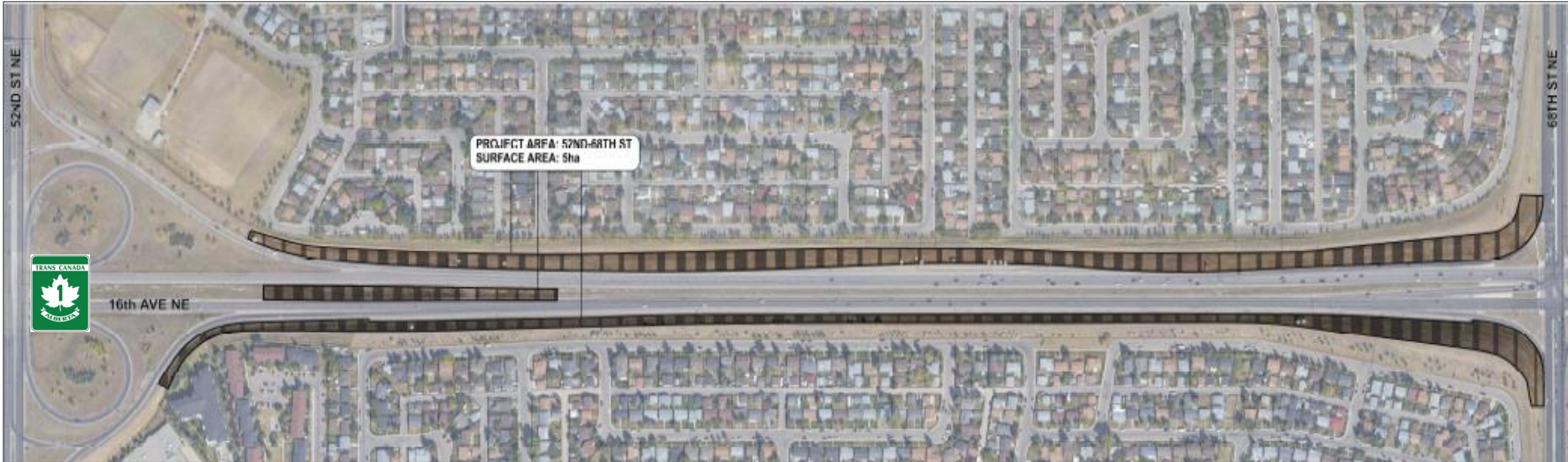
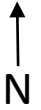
Earthmaster Environmental Strategies Inc.

A Canadian environmental technologies company:

- Founded in 1998 and based in Calgary, Alberta, Canada.
- Specializes in providing environmental services (remediation & reclamation) to the commercial/industrial and upstream oil and gas industry in Western Canada.
- In-house lab facilities for microbiological research and a growth facility for plant testing.
- Co-developed commercial phytoremediation systems (PEPSystems®) to treat contaminated soil in an eco-friendly and responsible manner.

Earthmaster uses a combination of plants and bacteria to remediate contaminants from soil in an eco-friendly way.

Site Location

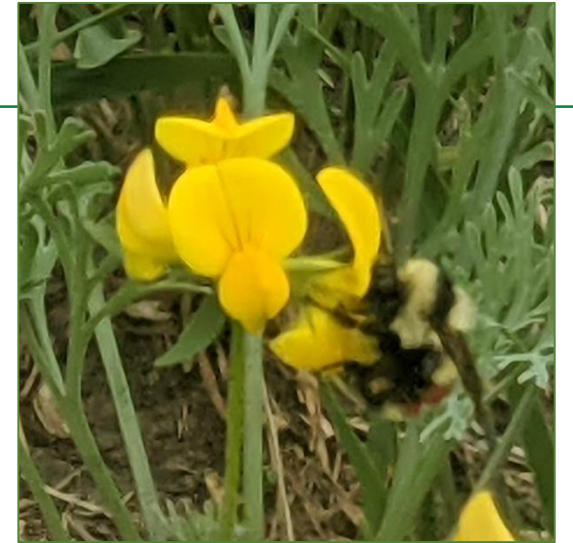


16th Ave NE in Calgary, AB (Trans Canada Highway)
Project site is 5 hectares in size

Pilot Project Goals

Change vegetation management practices to:

- Replace manicure turfgrass with:
 - Plants that are adaptable and can withstand extremes
 - Native grasses
 - Wildflowers
- Achieve environmental benefits including:
 - Increasing diversity
 - Reducing maintenance
 - Mowing
 - Weed control
 - Increasing resilience to changing climate
 - Enhancing the pollinator population



This is Year 1 and 2 of a 3 year project.

Earthmaster's Role in Pilot Project

Work with the project team to source and select seed:

- The City of Calgary
- University of Calgary
- ISL Engineering

Procure seed, make mixes, and install:

- No till seed drill

*Build and install social and solitary bee boxes:

- Register with the AB Native Bee Council

*Conduct PEPSystems trial.

*Monitor and assess vegetation throughout the growing season.

Conduct weed and litter control.



Seed Mixes

Mix A


Upper slopes

Latin Name	Common Name
GRASSES	
<i>Agrostis scabra</i>	Rough Hairgrass
<i>Deschampsia caespitosa</i>	Tufted Hairgrass
<i>Elymus glaucus</i>	Blue Wild Rye
<i>Elymus lanceolatus</i>	Northern Wheatgrass
<i>Elymus trachycaulus</i>	Slender Wheatgrass
<i>Festuca saximontana</i>	Rocky Mountain Fescue
<i>Nassella viridula</i>	Green Needlegrass
<i>Pascopyrum smithii</i>	Western Wheatgrass
<i>Poa palustris</i>	Fowl Bluegrass
<i>Puccinellia nuttalliana</i>	Nuttall's Saltgrass
PERENNIALS	
<i>Achillea millefolium</i>	Common Yarrow
<i>Gaillardia aristata</i>	Common Gaillardia
<i>Linum lewisii</i>	Blue Flax
<i>Ratibida columnifera</i>	Prairie Coneflower
ANNUALS	
<i>Clarkia elegans</i>	Elegant Clarkia
<i>Coreopsis tinctoria</i>	Plains Coreopsis
<i>Cleome serrulata</i>	Bee-plant
<i>Eschscholzia californica</i>	California Poppy
<i>Gaillardia pulchella</i>	Annual Gaillardia
<i>Helianthus annuus</i>	Annual Sunflower

Latin Name	Common Name
GRASSES	
<i>Agrostis scabra</i>	Rough Hairgrass
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<i>Poa palustris</i>	Fowl Bluegrass
<i>Puccinellia nuttalliana</i>	Nuttall's Saltgrass
PERENNIALS	
<i>Linum lewisii</i>	Blue Flax
<i>Artemisia ludoviciana</i>	Prairie Sagewort
<i>Dalea purpurea</i>	Purple Prairie Clover
<i>Lotus corniculatus</i>	Bird's-foot Trefoil
<i>Onobrychis viciifolia</i>	Sainfoin
ANNUALS	

Mix B

Adjacent to roads
On the median

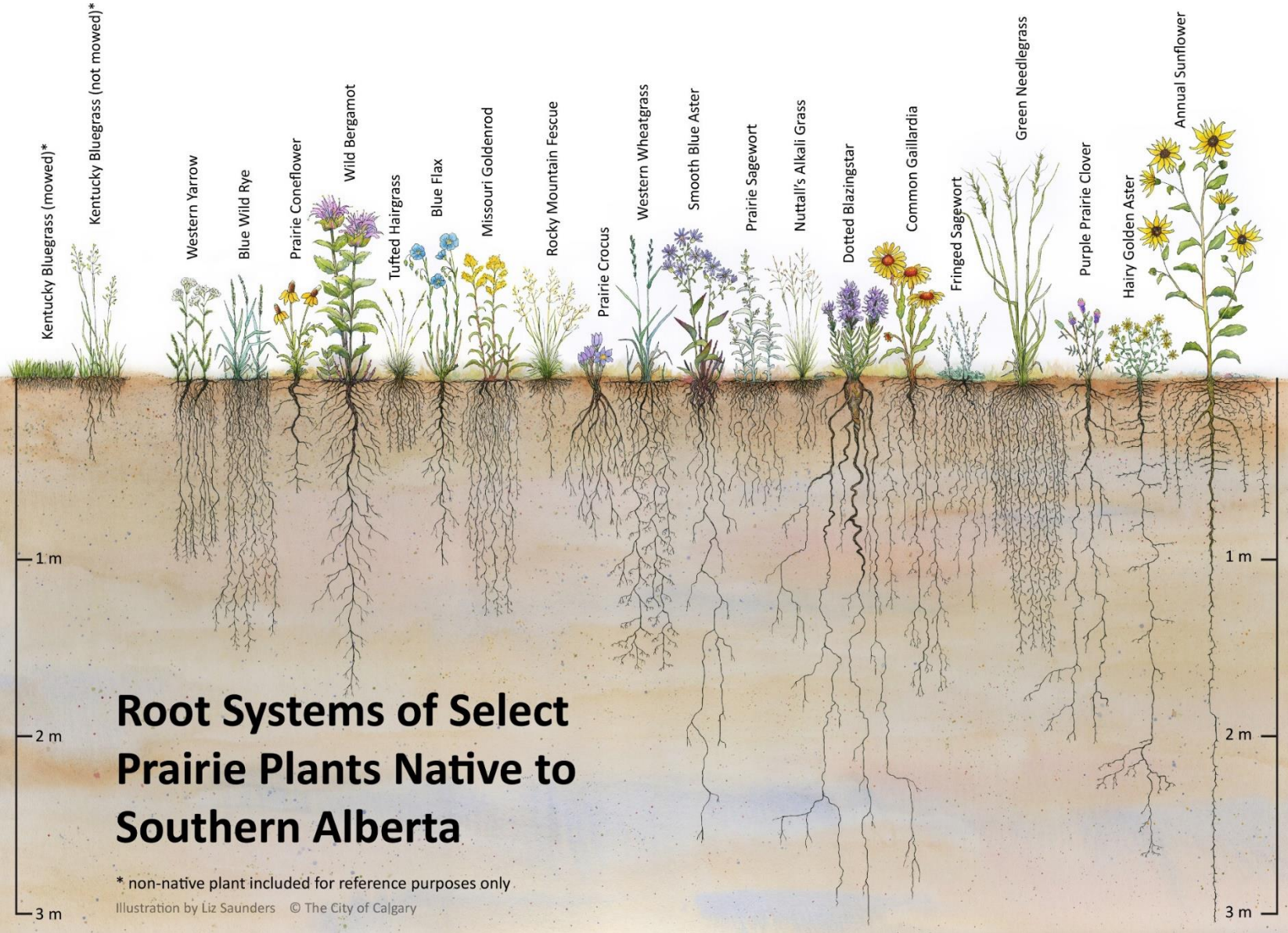


City of Calgary Seed Mixes

Recommendations and guidelines to inform revegetation work in Calgary

2018 Version 1.1

The Native Plant Advantage



Site Conditions



May 5, 2021

Site Conditions

Site was to have had:

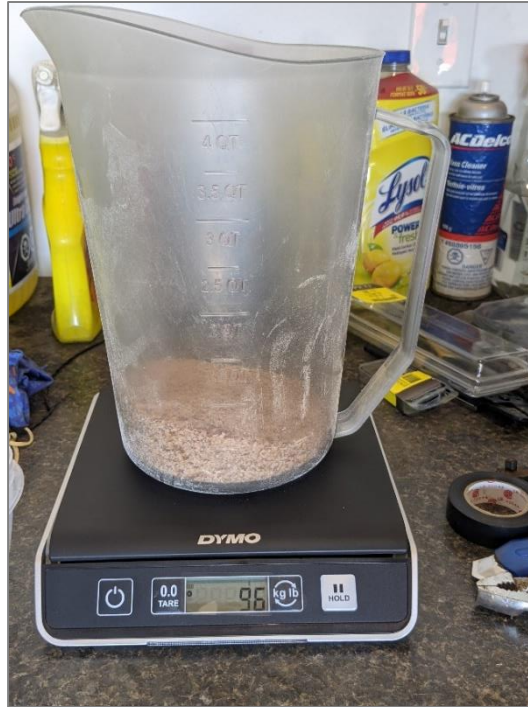
- Herbicide applied to eradicate cultivated turfgrass (fall 2020 and spring 2021)
- Mowing and dethatching to leave short stubble (challenge)
- Site required additional preparation (including herbicide) in early June 2021 – delayed seeding



Seed Mixes – Bulking Agent and Seeder Calibration

Bulking agent:

- Wheat bran
- Mixed 1:1
- Added volume
- Prevented settling of seed
- Determined during calibration
- Tune seeder specifically for project needs
- Blended with seed onsite before placing in seeder hopper



Seeder and Harrows

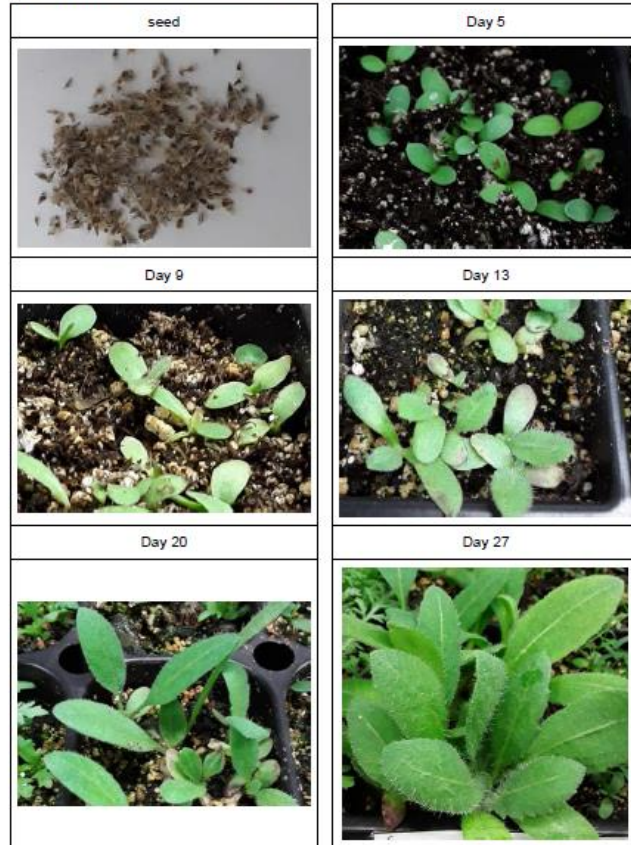
Seeder: Land Pride no till seed drill.

- Pulled by a skid steer – tractor not suitable for steep slopes
- Seeded in one direction - safety
- Followed by harrowing
- Seeding rate ~45 kg/ha



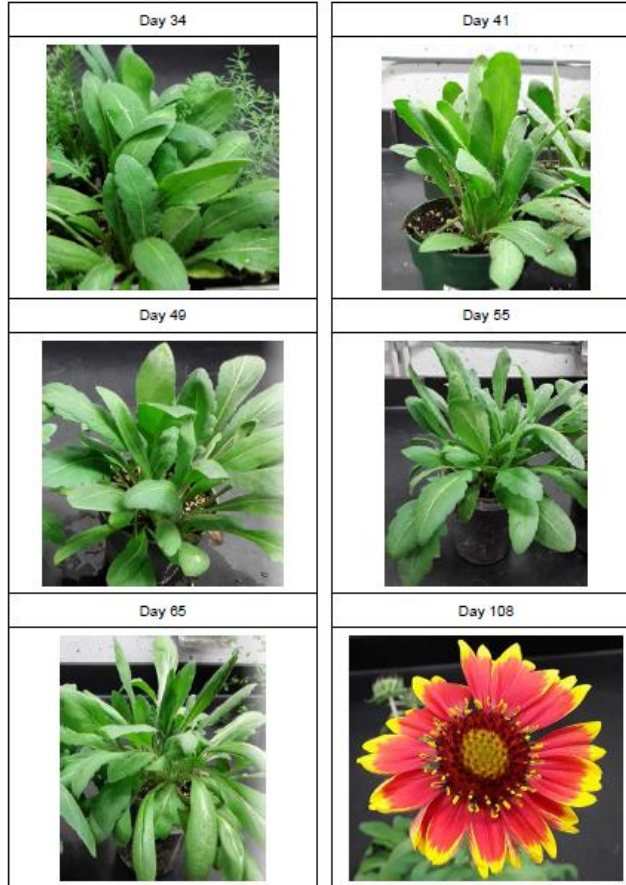
Side Project – Plant Development Guide

Common Gaillardia - *Gaillardia aristata*. Mix A. Similar to Annual Gaillardia but with more elongated leaves, no stalk. Fuzzy leaves.



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How can seedlings be identified when just a few days old?

- Develop a guide for every annual, perennial, and grass used in the project.
- Ideal growing conditions in an environmental growth chamber planted in ProMix.

Side Project – Highfield Farms

Site conditions:

- No topsoil
- Extremely compacted
- No weed control
- No fertilizer
- Some watering was done

Compost tea (LBA) trial:

- Area A – extract #1
- Area B – extract #2
- Area C - control



Results & Learnings Year 1



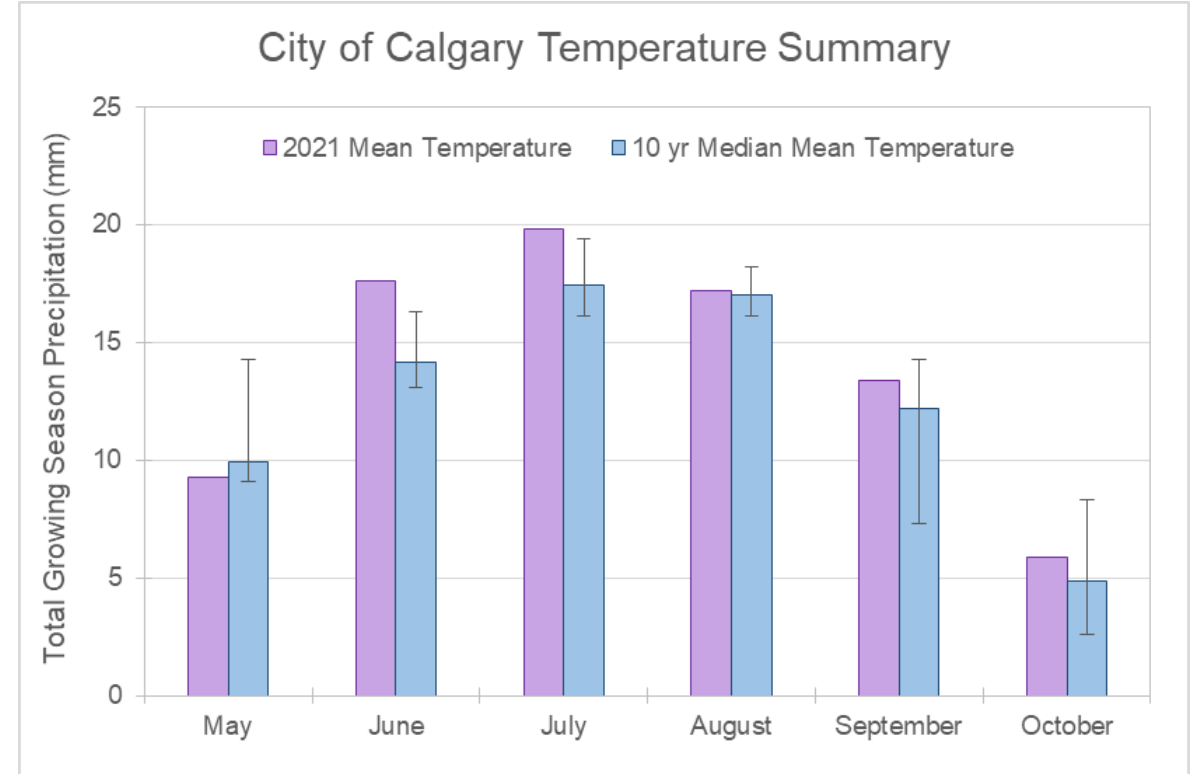
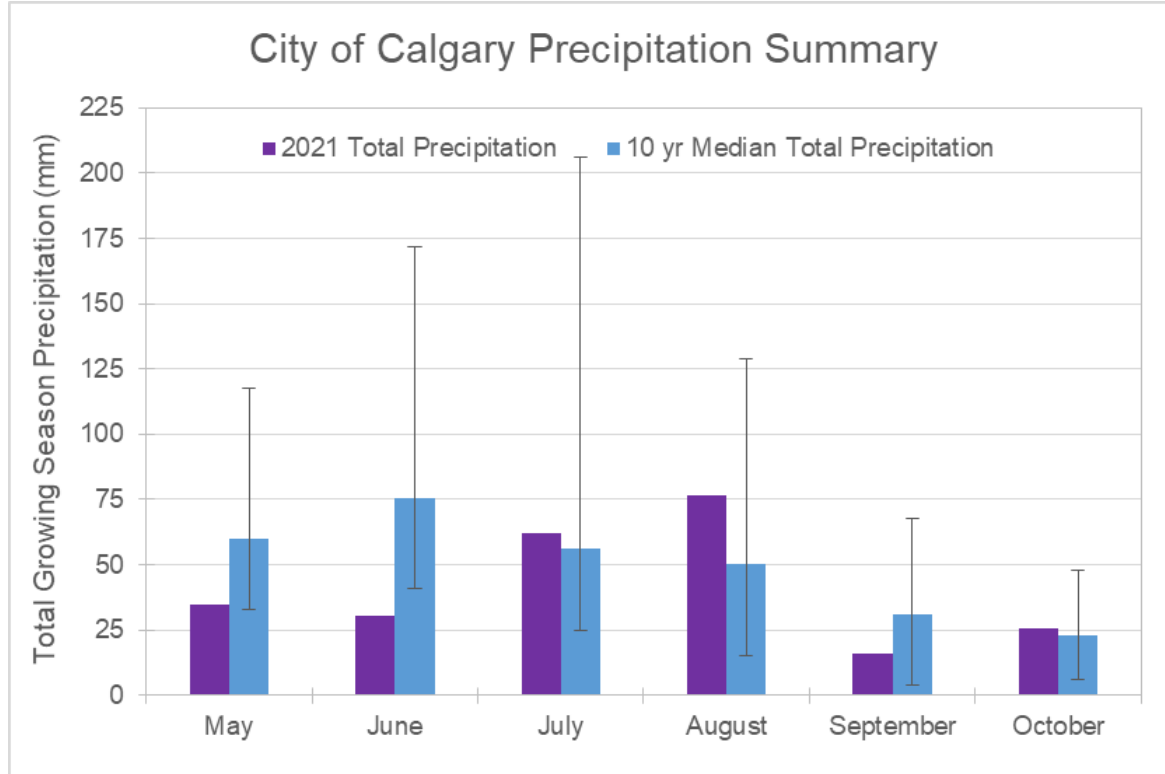
Calgary 688 *Don't mow, let us grow*
Please Bee Patient
Naturalization
pilot project under way
Calgary.ca/pollinators.



Results – Late Planting and Challenging Weather

Goal – seed the site by mid-May 2021

Reality – planting was on June 14th (hot and dry)



Results Year 1 – Flowers



Sep 16, 2021

Year 1 (2021)



Year 1 (2021)



Learnings Year 1

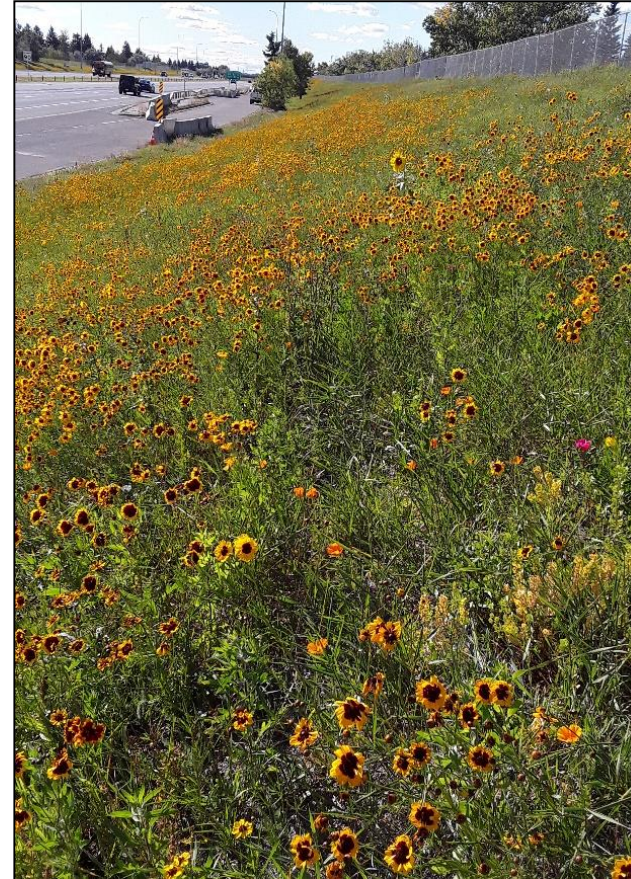
Despite the late planting, limited precipitation and exceedingly hot temperatures – things grew!

Stubble is a bonus:

- Prevents movement of seed in heavy rain
- Shelters and protects

North side and south side are not the same.

- Seed produced on north side plants
- They will not progress the same



north

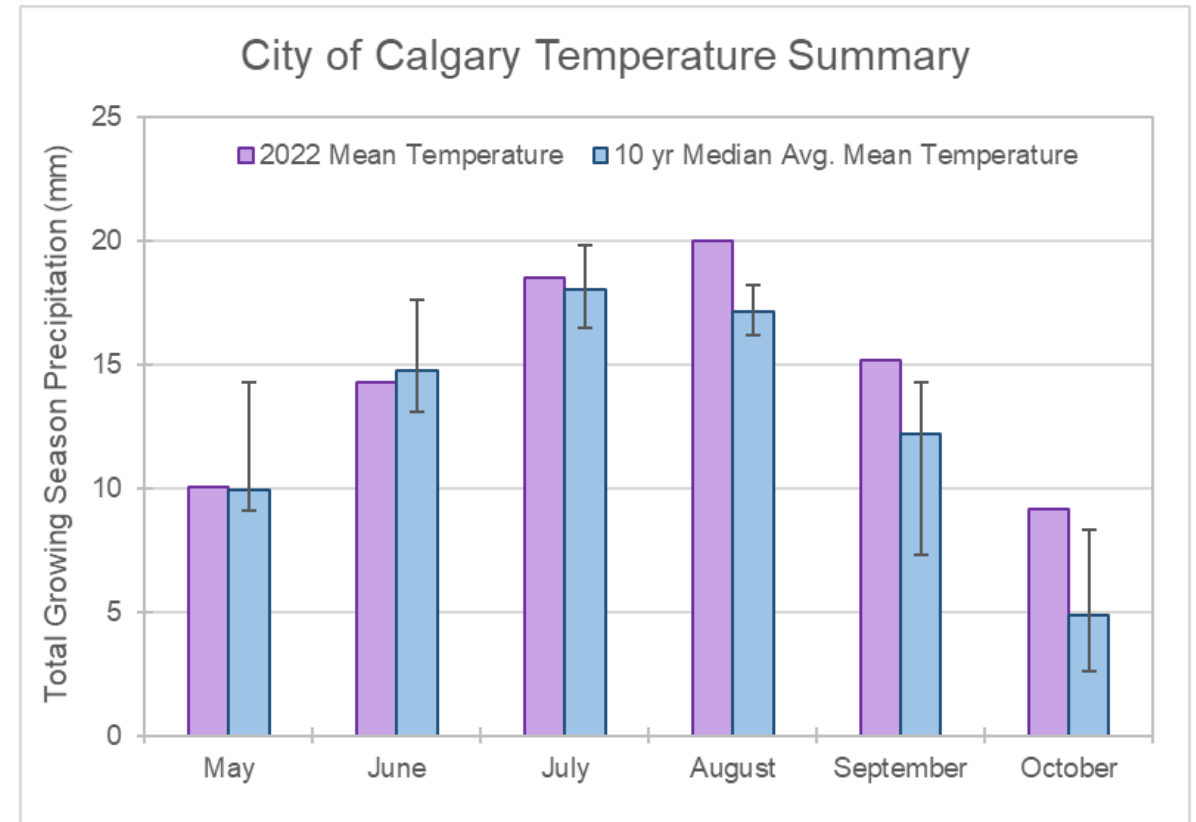
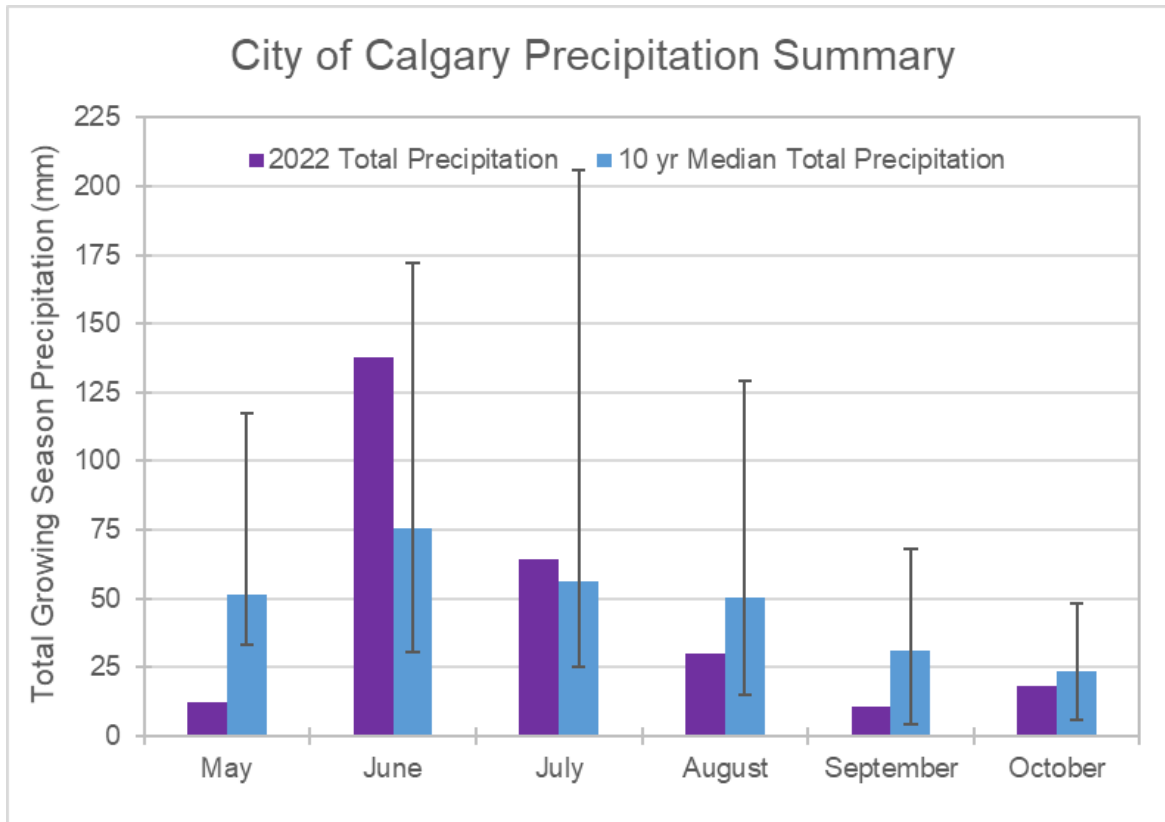


south

Weather Challenges - 2022

Moisture – May was exceptionally dry, June was wet

Temperature – August to October were exceptionally warm



Year 2 (9



Year 2 (2022)



Results – Grass

There was lots of fescue and Nuttall's alkali grass.
The tall grasses dominated the site.
There was some breakthrough Kentucky Blue Grass.



Aug 2022



Aug 2022



Sep 16, 2021



Sep 16, 2021

Results – Bee Boxes



Box occupancy following July 2021 installation:

- One of the 15 social bee boxes occupied (Sep2022)
- Some signs in 4 of 15 solitary bee boxes
 - holes plugged

Bee identification on site:

- Collected from flowers
- Signs of enhancement of pollinator diversity

Collection Date	Genus	Species	Common Name	Number of Specimens
Sep-16-21	<i>Bombus</i>	<i>ternarius</i>	Orange-belted bumblebee	1
		<i>rufocinctus</i>	Red-belted bumblebee	2
		<i>insularis</i>	Indiscriminate cuckoo bumblebee	1
		<i>huntii</i>	Hunt bumblebee	2



Results – Weeds

Canada thistle and kochia were spot sprayed Year 1 & 2

- Wild oats, Goatsbeard, and Bindweed were pulled by hand.
- Thistle was less of a problem in Year 2 (allelopathic).



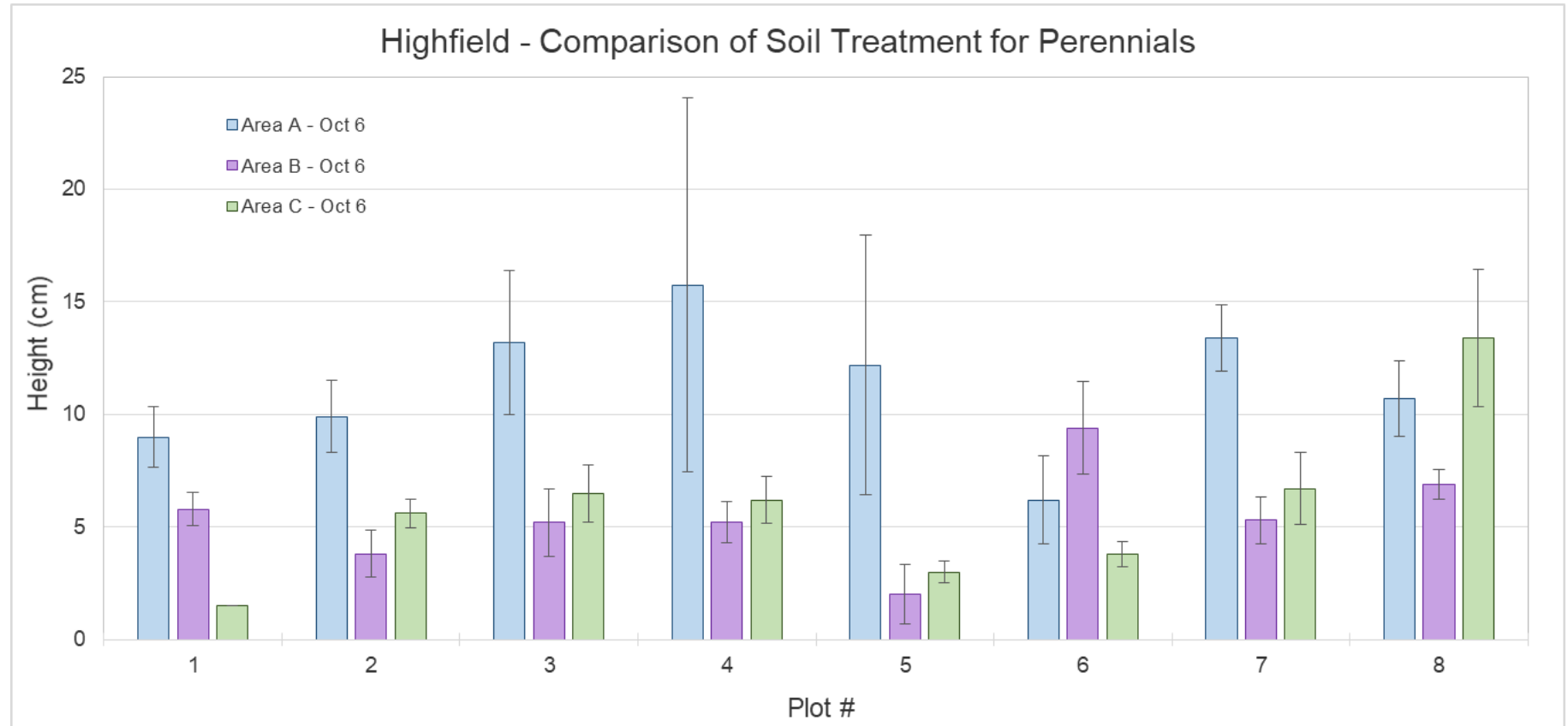
Results – LBA Study (Highfield)

Area A – LBA #1

Area B – LBA #2

Area C – control

1	Western Yarrow
2	Common Gaillardia
3	Blue Flax
4	Prairie Coneflower
5	Prairie Sagewort
6	Purple Prairie Clover
7	Bird's-foot Trefoil
8	Sainfoin



LBA #1 shows a statistically significant benefit in height of perennials. This was especially prevalent in Year 2.

There was no real benefit in height of grasses or annuals. **PEPS**systems®

Results – LBA Study (Highfield) Year 2

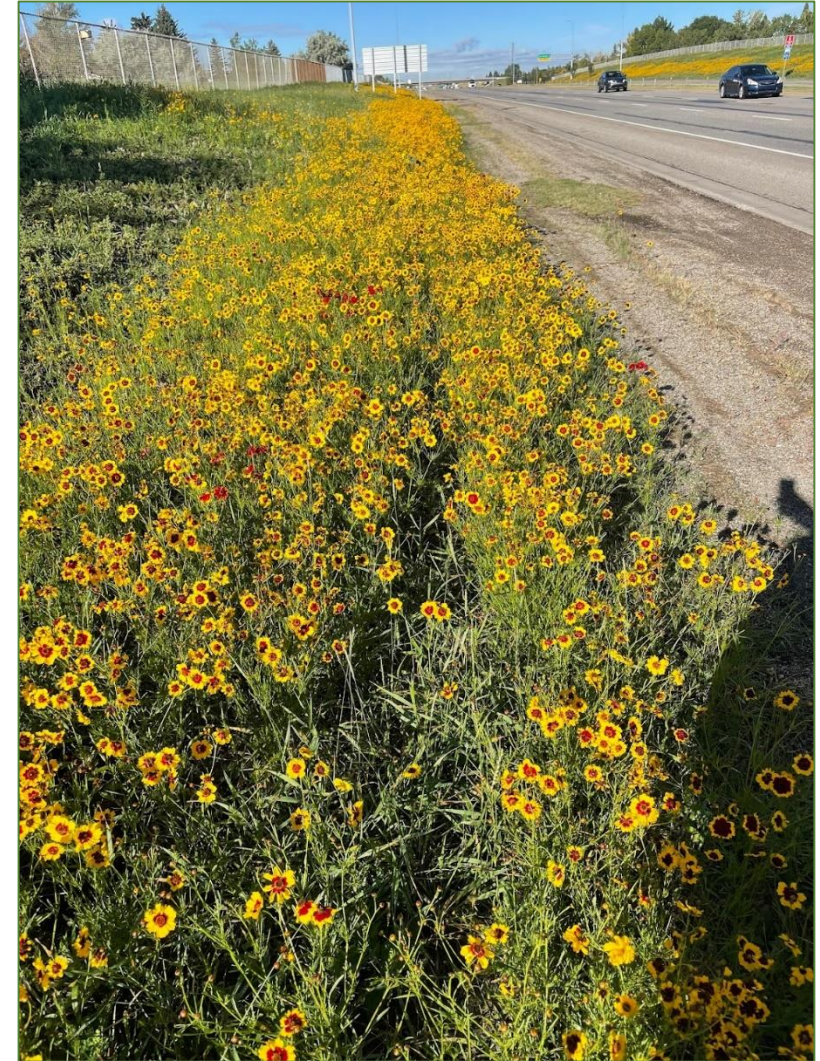


June 20, 2022

Immediate Roadside

The areas adjacent to the roadway will be difficult

- Regular vehicle traffic
- Lots of amendment accumulation
- Elevated salinity



Median



Learnings Year 2

Annuals were replaced by perennials:

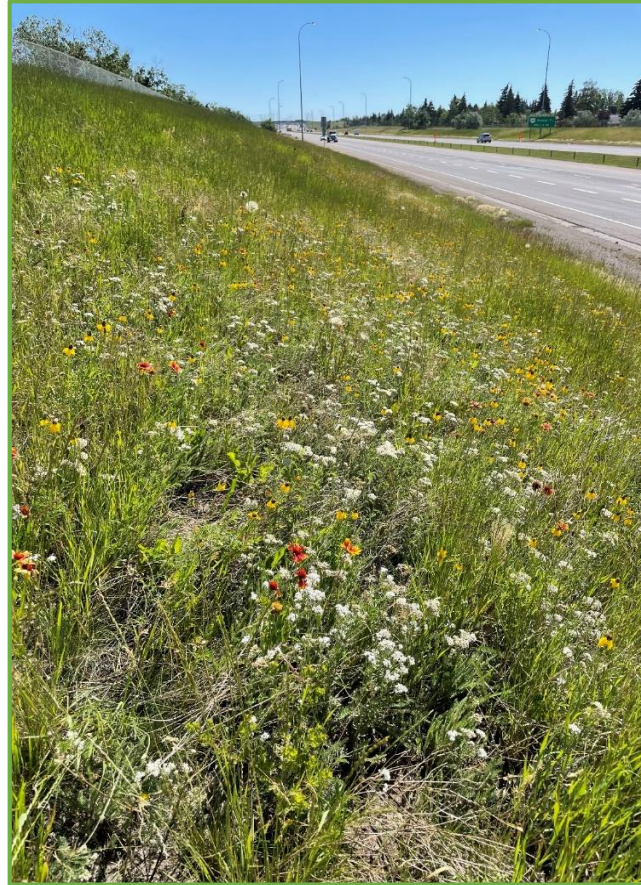
- Tall grass choked out the annuals so little self seeding was evident

Yarrow, Prairie coneflower, sage, and Gaillardia are prevalent.

The north and south side have progressed differently

- North side is about 2 weeks ahead of the south side
- South side has less flowers

Breakthrough of KBG



north



south

The Team



Ethan Askey
Jenna Cross
Peter Yee



Kent Cryer
Ben Poltorak
Mike Quesnel
Adam Dunn
Liz Murray



Mathis Natvik



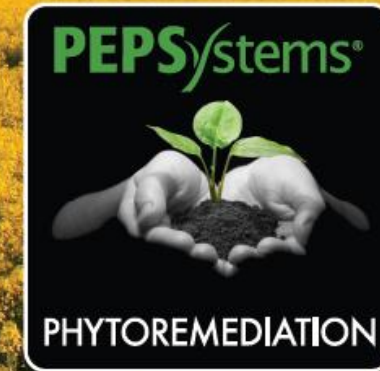
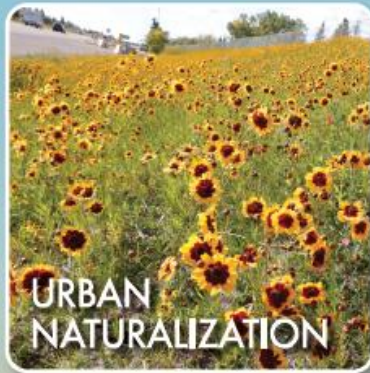
Gavin Wyman

Subcontractors:



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environmental strategies



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