Identifying Turfgrass Best Management Strategies to Improve Storm Water Reuse Irrigation Systems in Carver County, MN

Presentation by:
Cody Jennings, Thomas Donelan, Killian Harnish

Carver County Water Management Organization

Students in HORT 4061W: Turfgrass Management
Instructor: Professor Eric Watkins
Department of Horticultural Science

Prepared in Collaboration
with Tim Sundby, Water Resource Program Analyst,
Carver County Planning and Water Management

Resilient Communities Project
University of Minnesota
Building community-university partnerships for sustainability

The project on which this presentation is based was completed in collaboration with Carver County as part of the 2020–2021 Resilient Communities Project (RCP) partnership. RCP is a program at the University of Minnesota's Center for Urban and Regional Affairs (CURA) that connects University faculty and students with Minnesota communities to address strategic projects that advance local resilience and sustainability.

This publication may be available in alternate formats upon request.

Resilient Communities Project
University of Minnesota
330 HHHSPA
301—19th Avenue South
Minneapolis, Minnesota 55455
Phone: (612) 625-7501
E-mail: rcp@umn.edu
Web site: http://www.rcp.umn.edu

Resilient Communities Project
University of Minnesota
Building community-university partnerships for sustainability

Identifying Turfgrass Best Management Strategies to Improve Storm Water Reuse Irrigation Systems in Carver County, Minnesota

Presented by

Cody Jennings

Thomas Donelan

Killian Harnish

Students in HORT 4061: Turfgrass Management

Instructor: Dr. Eric Watkins

December 9, 2020

Presentation Overview

- Introduction to the project
- Literature review of turfgrass species and other vegetation
- Recommendations for suitable vegetation

INTRODUCTION

Turfgrass Species Selection

Turfgrass Management Framework:

- Functionality
- Purpose
- Aesthetics

Functionality

https://streeteasy.com/blog/nyc-neighborhoods-closest-to-central-park

Purpose

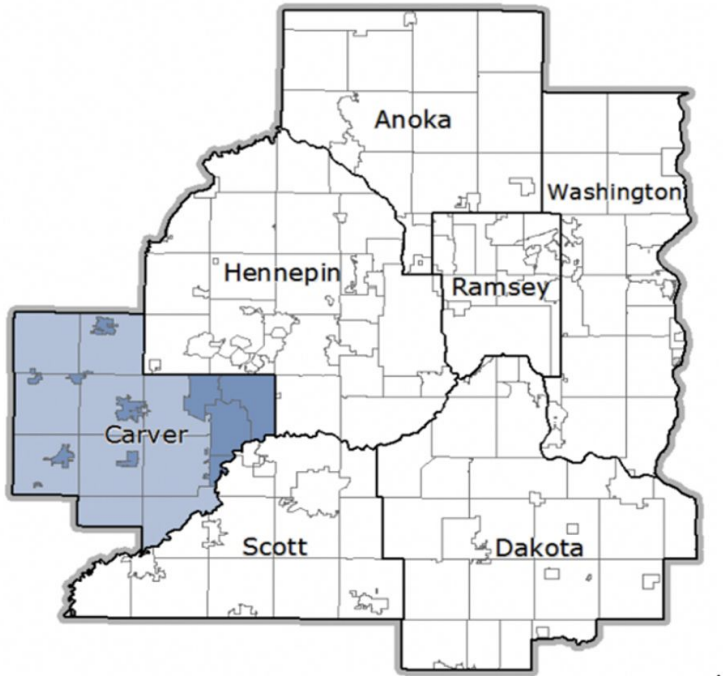
https://www.edinamn.gov/ImageRepository/Document?documentID=6751

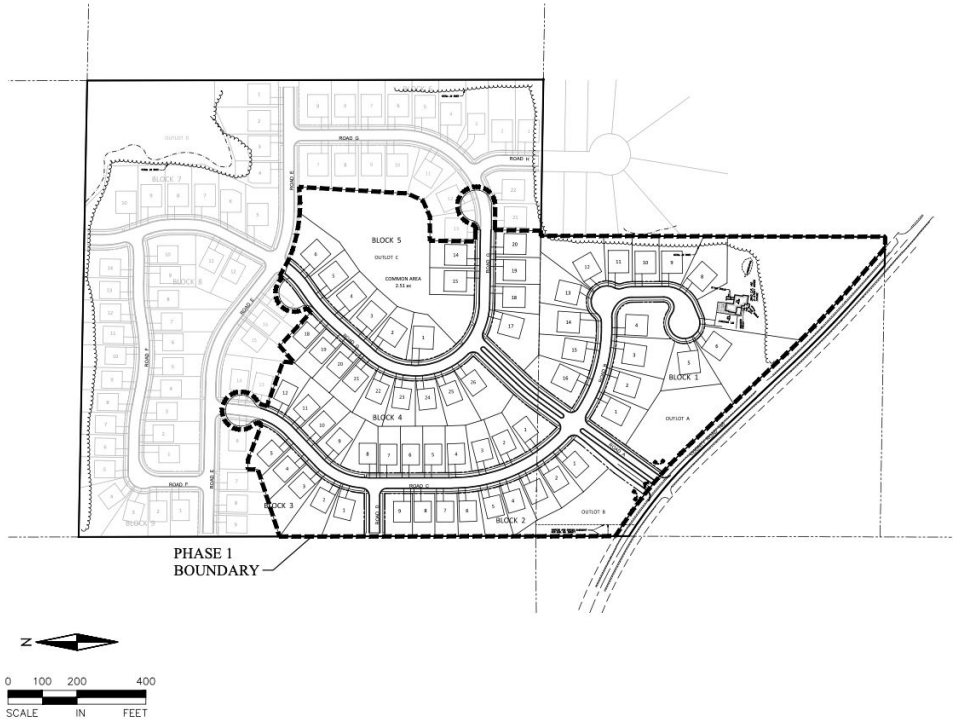
Aesthetics

https://www.pennington.com/-/media/Images/Pennington2-NA/US/blog/seed/All-You-Need-to-Know-About-Kentucky-31-Tall-Fescue/Kentucky-31-og.jpg

Study Area

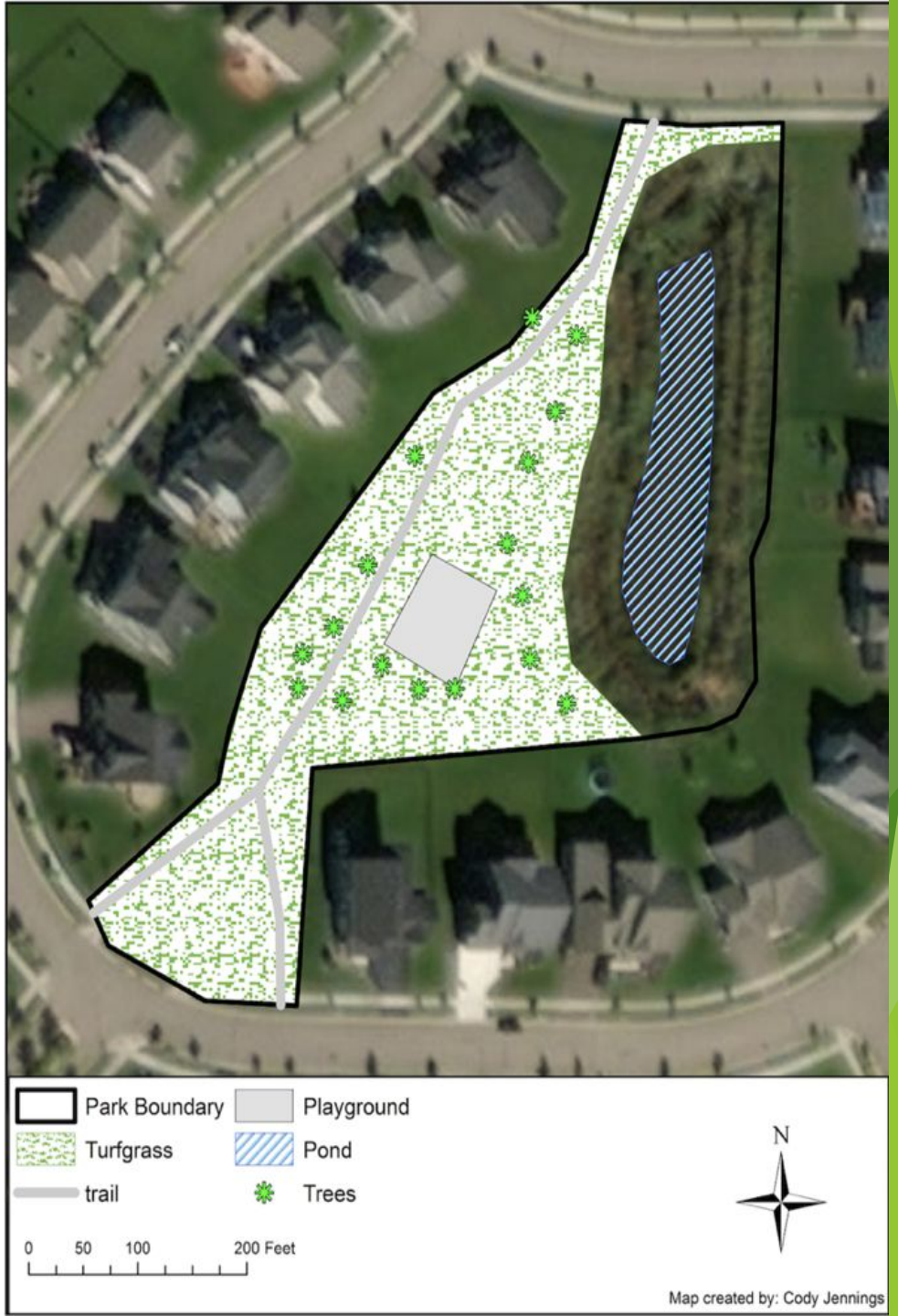
- A master planned subdivision within the City of Chaska in Carver County





Harvest Subdivision

- 2.5-acre common area (park)
  - Walking trail
  - Playground
  - Retention pond for stormwater runoff
  - Soil profile - Lester-Kilkenny complex (clay loam)
    - Compacted clay layer
- Turfgrass in park
  - Fine fescues
  - Perennial ryegrass
  - Scattered clumps of tall fescue



Turfgrass Challenges

- Saturated/waterlogged soils
- Irrigation determined by runoff events
- Compacted clay soil prevents soil-water movement

Standing water on turfgrass

Saturated soils and soggy turfgrass

Water pooling on the walking trail

Standing water near the retention pond

Residents irrigation also contributes to park runoff

Yellowing saturated turf in the park

Objectives

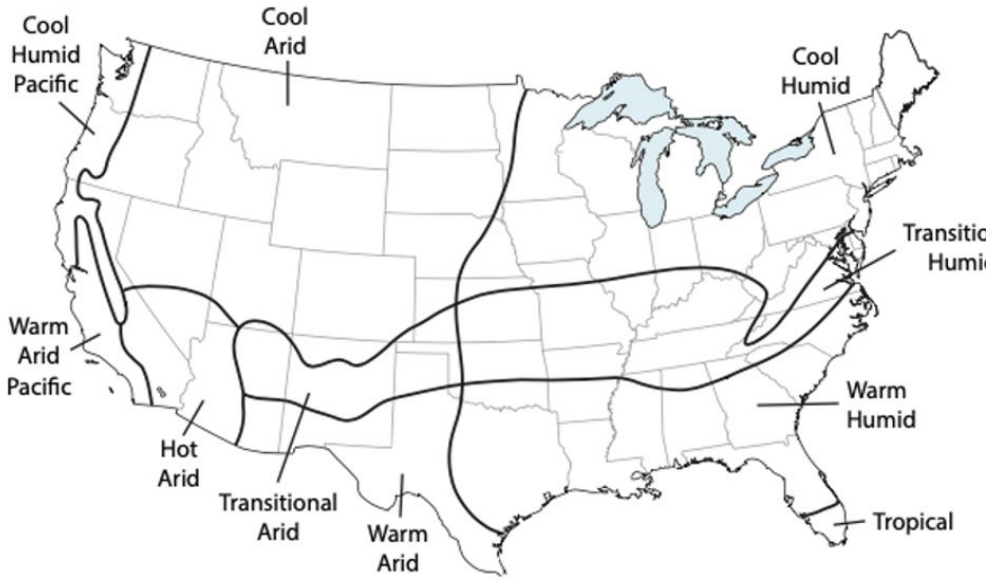
- To identify more resilient types of turfgrass and other vegetation that can tolerate both long periods of drought and excessive water

- To provide recommendations that Carver County staff can use to inform conversations with developers about types of vegetation used in developments

Vegetation Selection

Cool Season Turfgrass

- Growth most active in spring and fall months
- Temperatures between 65ºF – 75º F.
- Can be sensitive to summer heat and experience stress periods
- Minnesota is in the Cool Humid climate for turfgrass



Distribution of cool and warm season grasses in the United States

Vegetation Review

- Cool season turfgrasses reviewed for this study:
  - Fine fescue (*Festuca spp.*)
    - sheep, creeping red, chewings, and hard
  - Tall fescue (*Festuca arundinacea*)
  - Perennial ryegrass (*Lolium perenne*)
  - Kentucky bluegrass (*Poa pratensis*)

- Other suitable vegetation reviewed
  - Big bluestem (*Andropogon gerardii*)
  - Indian grass (*Sorghastrum nutans*)
  - Ironweed (*Vernonia baldwini)*

Fine Fescue (*Festuca spp.*)

- Positive characteristics:
  - Slow growth habit
  - Limited water and fertilizer needs
  - Adapted for dry and shady conditions
- Negative characteristics:
  - Shallow roots lacking adaptation to survive saturated environments
  - Low transpiration rates
  - Intolerance to heavily trafficked areas

https://www.gardeningknowhow.com/wp-content/uploads/2015/07/fine-fescue.jpg

Tall Fescue (*Festuca arundinacea*)

- Positive characteristics:
  - Produce deep roots that can absorb water at greater depths than fine fescue
  - Fast growth and high transpiration rate
  - High traffic tolerance

- Negative characteristics:
  - More mowing required
  - Can have winter stress under prolonged exposure of ice
  - Summer stress issues

https://cdn.shopify.com/s/files/1/0198/8486/products/il_570xN.1602574405_luqq_600x.jpg?v=1535402547

Perennial Ryegrass (Lolium perenne)

- Positive characteristics:
  - Fast growth rate
  - High transpiration rate
  - Great for quick germination and establishment
- Negative characteristics:
  - Not winter hardy
  - Susceptible to summer stress & diseases
  - Drought intolerance

https://silverfallsseed.com/wp-content/uploads/2016/02/IMG_8911.jpg

Kentucky Bluegrass (*Poa pratensis*)

- Positive characteristics:
  - Provides dense attractive turf
  - Can tolerate high traffic and maintain vigor
  - Can be established via sod for quick establishment
- Negative characteristics:
  - Some KBG types cannot tolerate waterlogged soils
  - Shallow root system
  - Frequent mowing

https://3qbjdyotwye2jtieg16p2v1f-wpengine.netdna-ssl.com/wp-content/uploads/2018/01/FORAGE_GRASSES__Kentucky_Bluegrass-768x690.jpg

Other Suitable Vegetation

Prairie Vegetation

- Positive characteristics:
  - High transpiration rates
  - Deep root systems can penetrate compacted soils
- Negative characteristics:
  - Would not suit park areas for recreation activities
  - Public perception of prairie vegetation in traditional park areas

Ironweed (*Vernonia fasciculata*)

Big Bluestem (*Andropogon gerardii*)

Indian Grass (*Sorghastrum nutans*)

Turfgrass Recommendations

General Preferred Mixture

- A mixture of tall fescue and Kentucky bluegrass would provide the best turfgrass stand in the park.
  - Improved tolerance of environmental stress
  - Tolerant of major disease and insect problems

https://sep.yimg.com/ay/yhst-61819287486445/conservation-grass-seed-mix-2.gif

- Tall fescues have long root system and high transpiration rates that will alleviate issues of waterlogged and saturated soils. Can also tolerate compact clay soils and high trafficked areas.
- Kentucky bluegrass will provide a dense attractive turf with enough rigor to tolerate high foot traffic
- A tall fescue and Kentucky bluegrass mixture will create a dense turfgrass that will not be susceptible to patchiness that can occur with only tall fescue stands

Recommended Turfgrass	Mixture
Tall fescue	90%
Kentucky bluegrass	10%
Not Recommended Turfgrass	**Perennial ryegrass & fine fescue**

Potential Mixes

Twin City Seed Co.Turfgrass Mix:

Turfgrass Species	Name	Mixture
Tall fescue	2nd Millennium	30%
	Raindance	30%
	Cumberland	30%
Kentucky bluegrass	Tirem	10%
		100%

https://www.twincityseed.com/

General Recommendations

Timing of Irrigation

- Adjust irrigation timing when water is applied to the turfgrass.
- Morning at sunrise irrigation would be preferable
- “waste as much water as possible”

https://www.mprnews.org/story/2014/07/10/ground-level-beneath-the-surface-lawns

https://www.themasterslawncare.com/sites/default/files/blog/irrigation-system-sprinkler.jpg

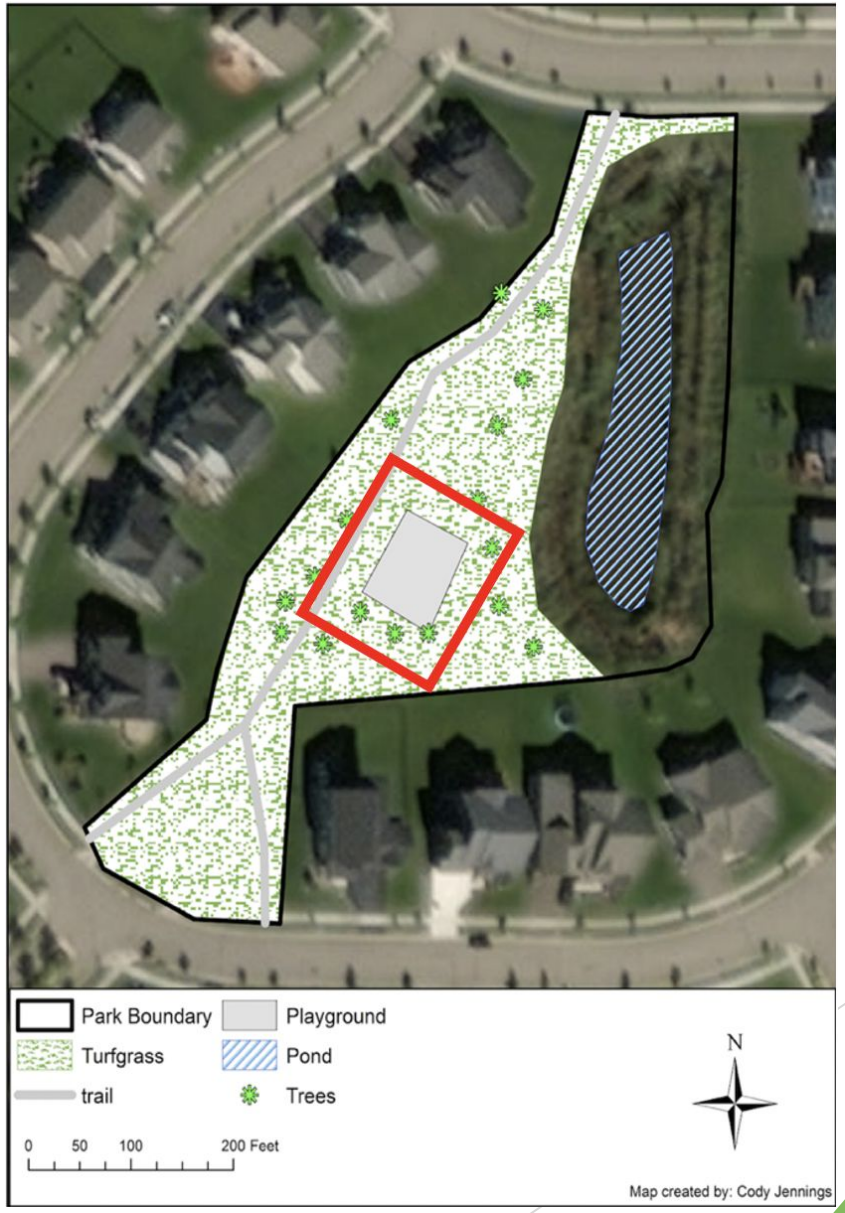
Home Lawn Suggestions

- Home lawn irrigation resources
- UMN Extension site - Irrigation Audit Program https://turf.umn.edu/lawn-info/irrigation-resources

http://www.vermillionriverwatershed.org/irrigation-audit_pilot/

Native Prairie Plants

- Can be used as borders separating different uses



Future Subdivision Development

- Future subdivision development be designed enabling retention pond water use for home lawn irrigation

https://aspenlandscaping.ca/irrigation-services/

Demonstration Plots

- Provide a visual representation of different turfgrass species and native grass options.

Questions