Rainwater and Resilient Communities

CLIMATE ACTION KC

BLACK & VEATCH

Today's Agenda

- Introduction to Green Infrastructure
  - Benefits
  - Challenges
  - Relevance to Resilience
- GI & Resilience with KC Water
- Exchange
  - Vision
  - Economic Resources & Benefits
  - Implementation & Maintenance
- Closing

Acknowledgements

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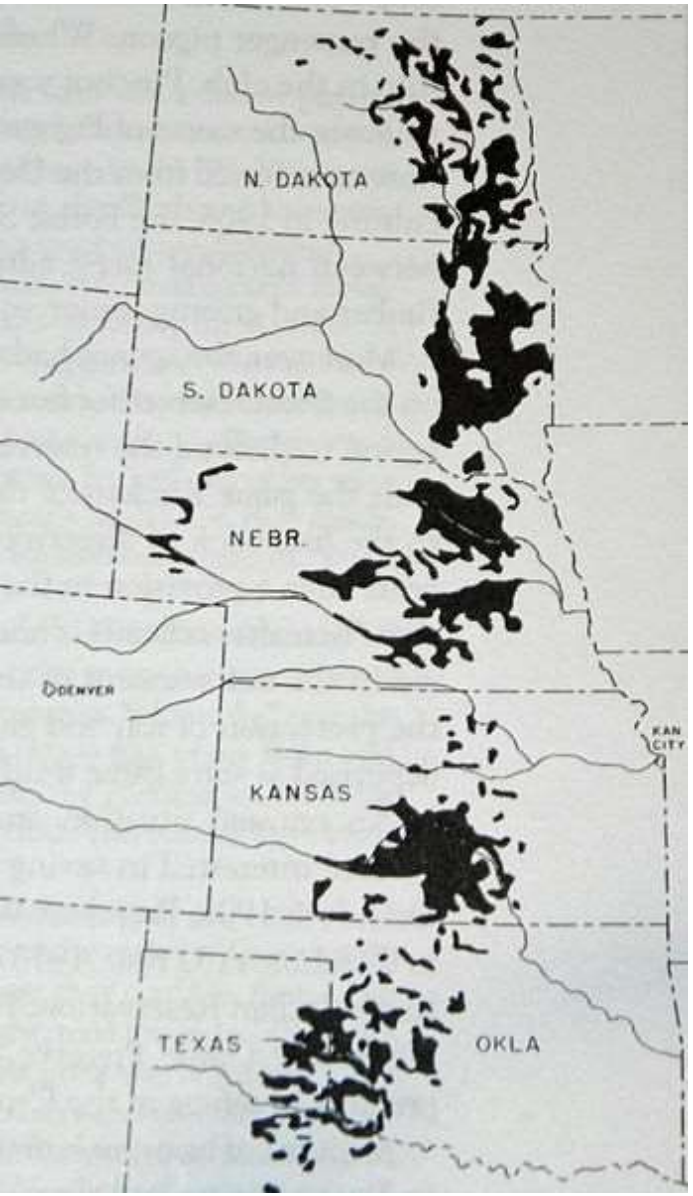
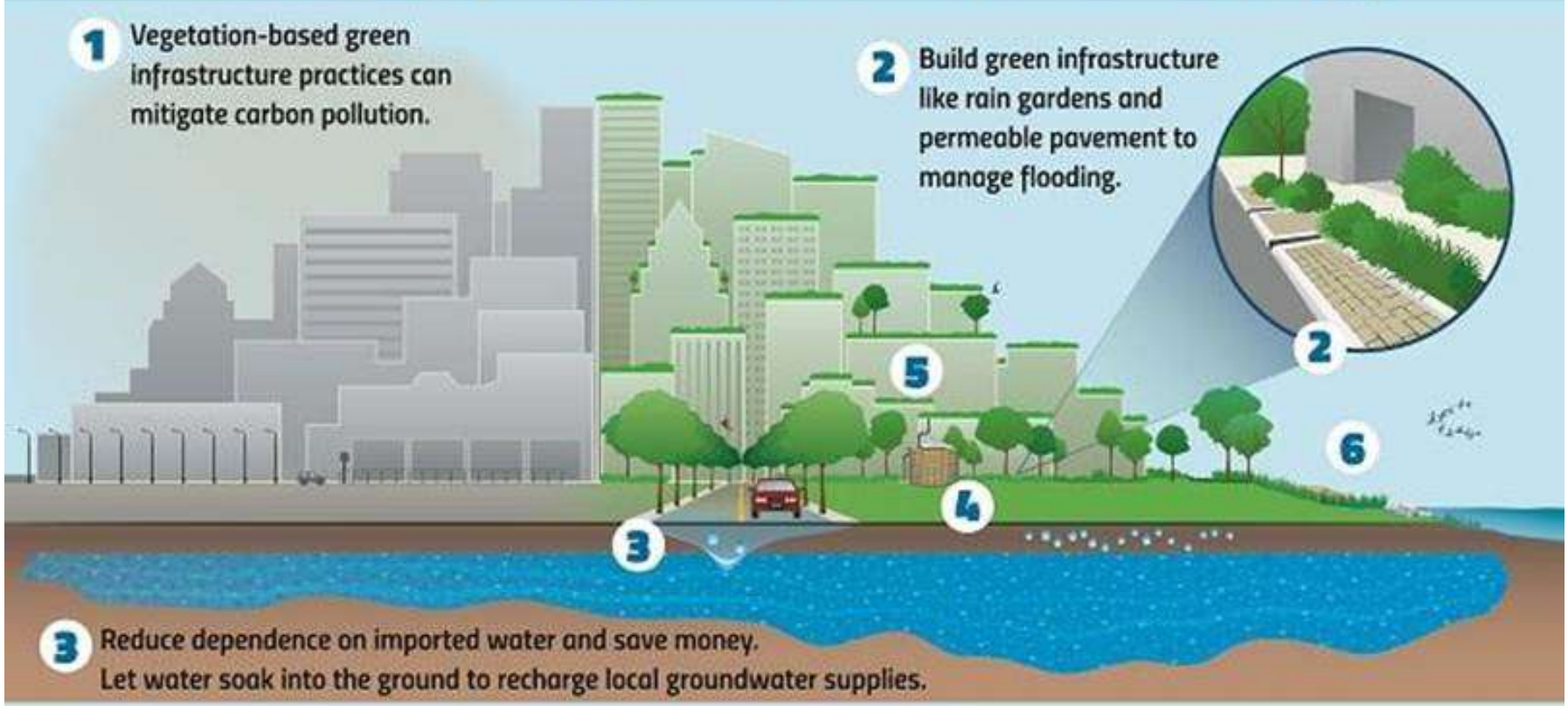


Green Infrastructure in the 1930s

- Winds moved topsoil by the ton in the Dust Bowl
- FDR mobilized the US Forest Service and Civilian Conservation Corps to plant 220 million trees.
- Vision was for a wall of trees, stretching from Canada to Texas.

Shelterbelt Project, 1933-1942
Photo Credit: US Forest Service, Wikimeda Commons

Green Infrastructure Builds Resiliency



3 Reduce dependence on imported water and save money.
Let water soak into the ground to recharge local groundwater supplies.

4 Keep water local. Capture runoff in cisterns and rain barrels to reduce municipal water use.

5 Plant trees and green roofs to mitigate the urban heat island effect.

6 Use living shorelines, buffers, dunes and marsh restoration to reduce the impact of storm surges.

What is Green Infrastructure?

- Planned and Managed Natural/Semi-Natural Systems
  - Regional Landscape Management
  - Urban and Suburban Structural Practices

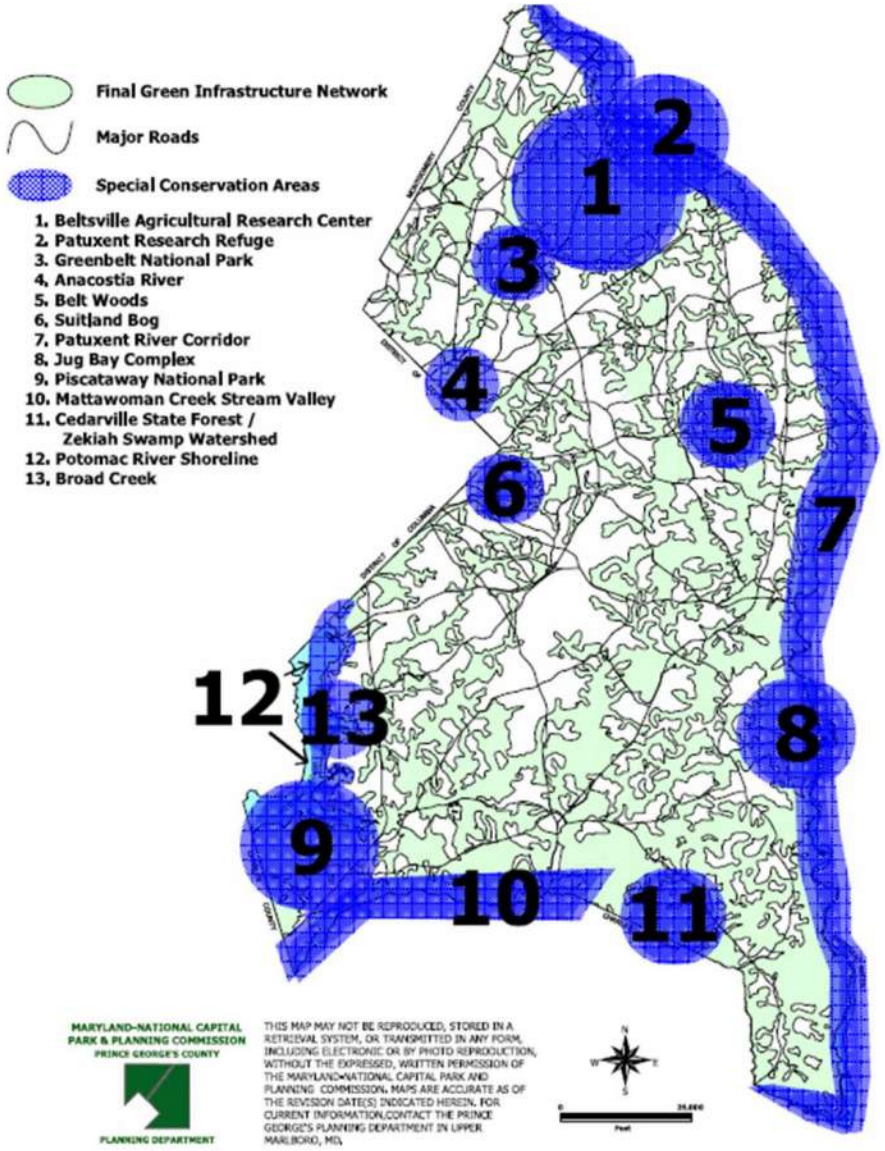
- Non-Structural Practices often used in Coordination
  - Strategic Planning for Institutional Controls
  - Pollution Prevention Procedures
  - Education Programs

Commonly known as GSI, GI, or Stormwater BMPs

Regional Scale supports *Mitigation*

- Prince George's County created 1st county-wide green infrastructure plan.
  - Identified a network of green space that covered 54% of the county.
  - Strategies for preservation, protection, restoration.
- Milwaukee Greenseams is managing 3,700 acres of land to help infiltrate water, protect downstream communities during floods.

- **Right here, in the Blue River Watershed…**



Urban and Suburban Practices support Climate *Adaptation*

Green Infrastructure Basics: Mimicking Nature

Infiltration

- *Slow water down*
- Water Soaks into the Ground
- *Remove pollutants*

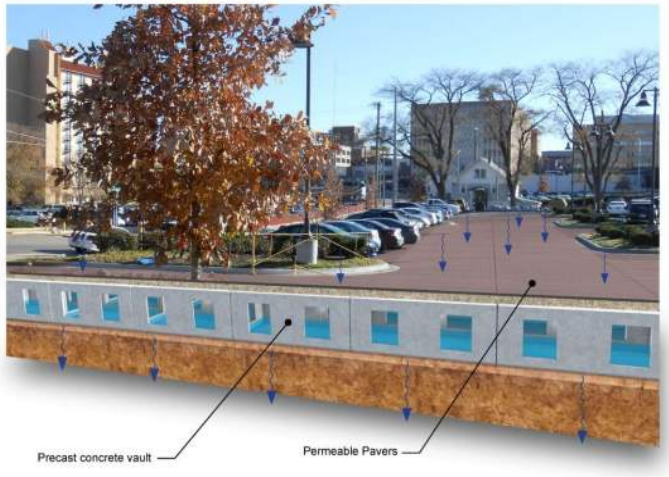
Retention

- *Slow water down*
- Water is temporarily Stored
- *Remove pollutants*

How is GI integrated with Grey Infrastructure?

Traditional Infrastructure provides capacity for large storm events.

Green Infrastructure supports improved water quality and reduces frequent flooding.

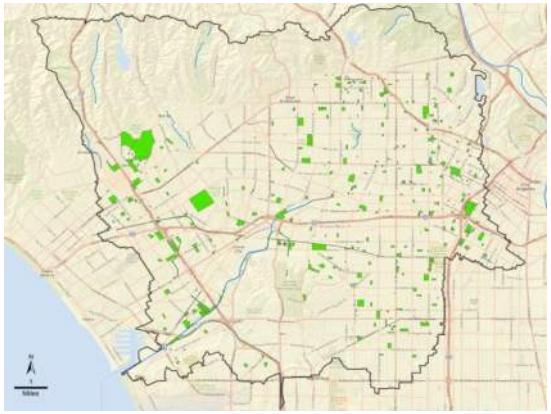


Key Challenges for Municipal and Utility Leaders

Green Infrastructure is Known for Diverse Co-Benefits

Barriers to Green Infrastructure Implementation

Infrastructure is Decentralized



Competing Priorities

Staff Availability for Inspection

Workforce Capacity

Maintenance Commitment

Development Opportunity Cost

Milwaukee, Wisconsin

FRESH COAST GUARDIANS

- **Strong Leadership & Vision**
  - Integrated Watershed Management Goals
  - Climate Change Mitigation and Adaptation
- **Utility Supports Innovation**
  - Developed Partnership for Alternate Delivery
  - BaseTern: abandoned buildings become storage
  - Milorganite: waste as a revenue
- **Team Celebrates Green Luminaries**

740 Million Gallons by 2035
Green Infrastructure

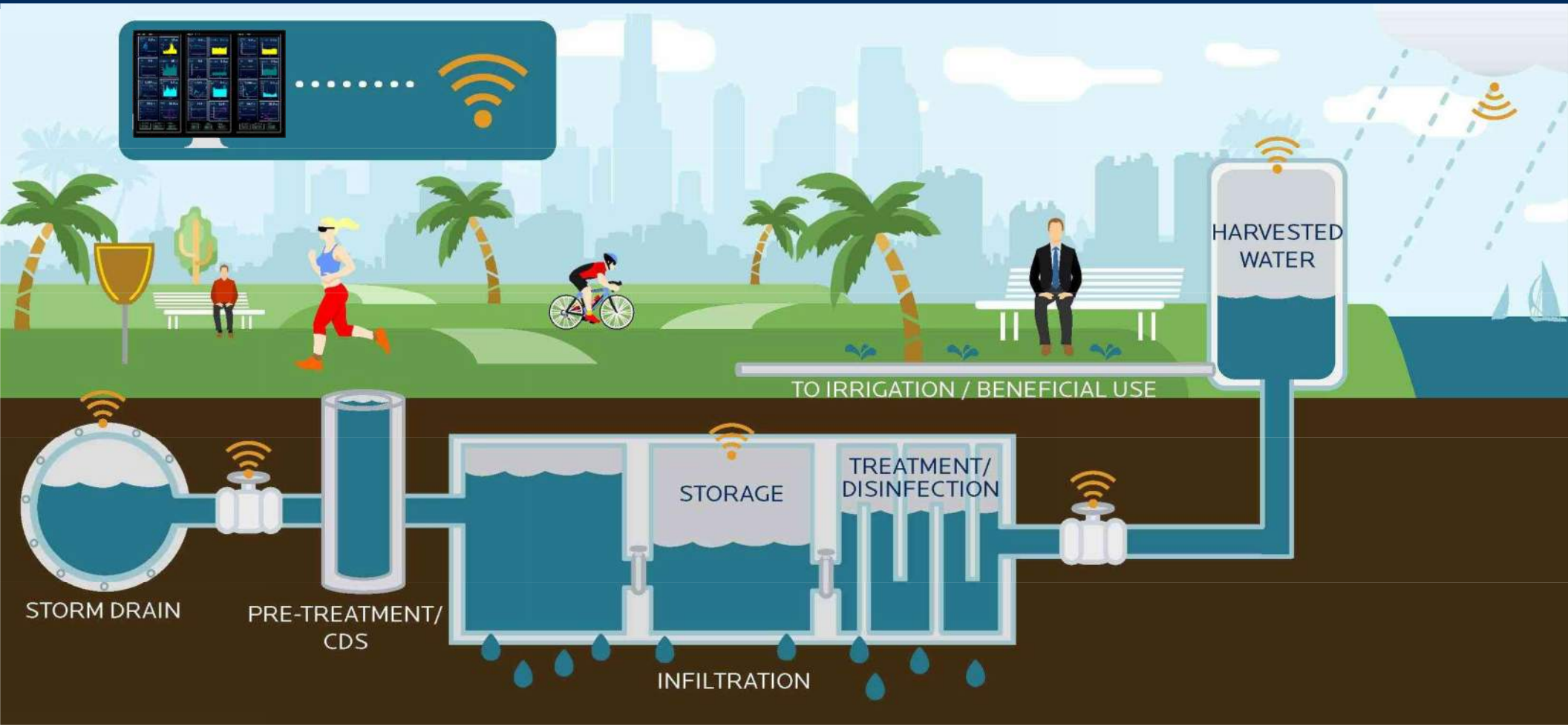
- **Alternate Delivery for MSD…what other strategies?**

Grand Rapids, MI

CSO Program Management Optimizing & Integrating Grey and Green Infrastructure

Los Angeles, CA

Rainwater Harvesting & Smart Controls



Kansas City Region

Regional Planning Informed by Natural Resources

Data Analysis and Stakeholder Engagement Organizing info that is responsive to stakeholders

Framework for prioritization and implementation

Atlas & Playbook
Identification of priority areas
Integrated System Opportunities

Partnerships
Defining a path for implementation

- **In the Shawnee Mission School District…**

PURPOSEFUL COMMUNITY GREEN INFRASTRUCTURE

RAINWATER AND RESILIENT COMMUNITIES WORKSHOP

FEBRUARY 20, 2020

Presentation Outline

- Quick overview of our green infrastructure portfolio
- Green infrastructure project goals
- Examples of green infrastructure strategies that build resilience

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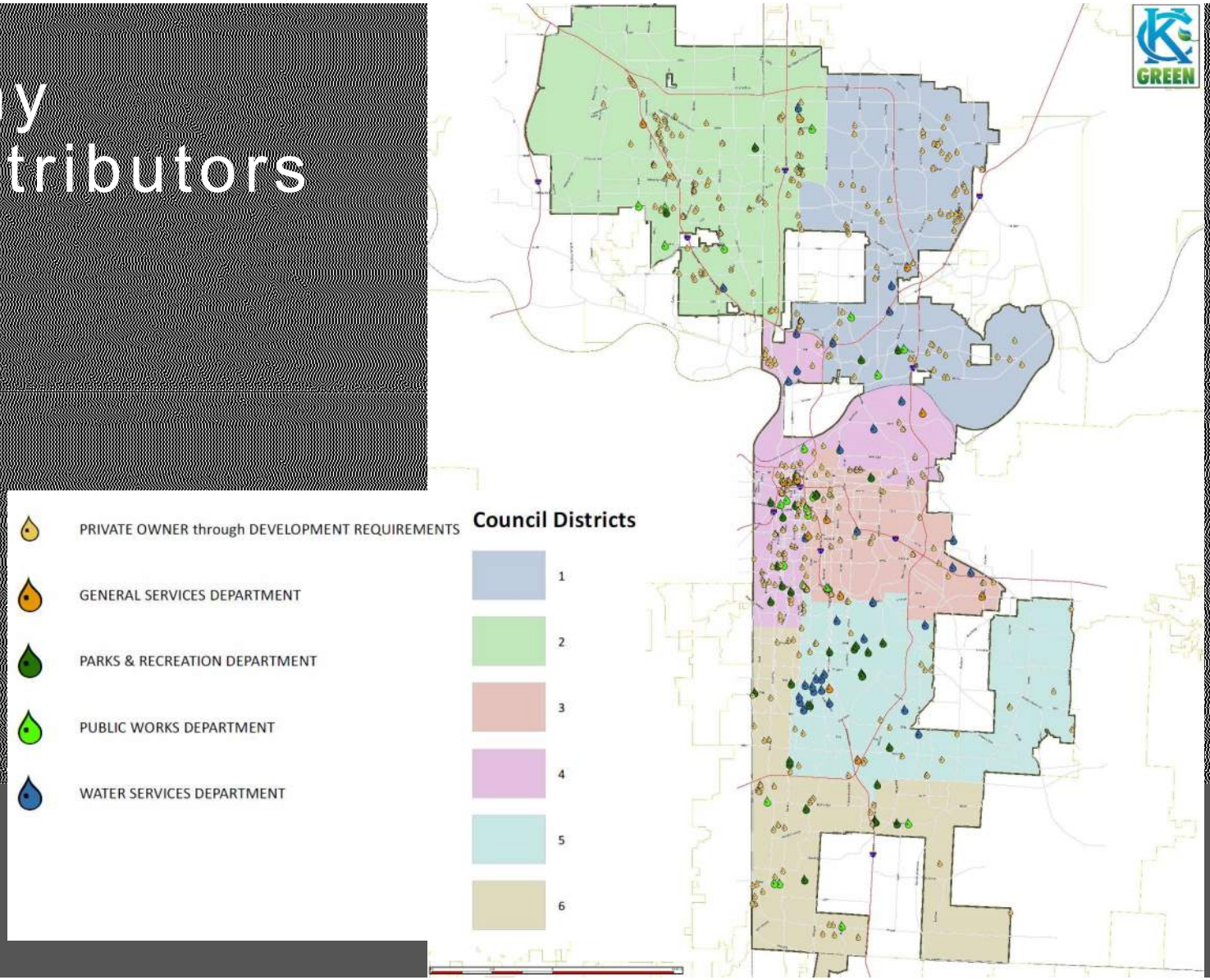
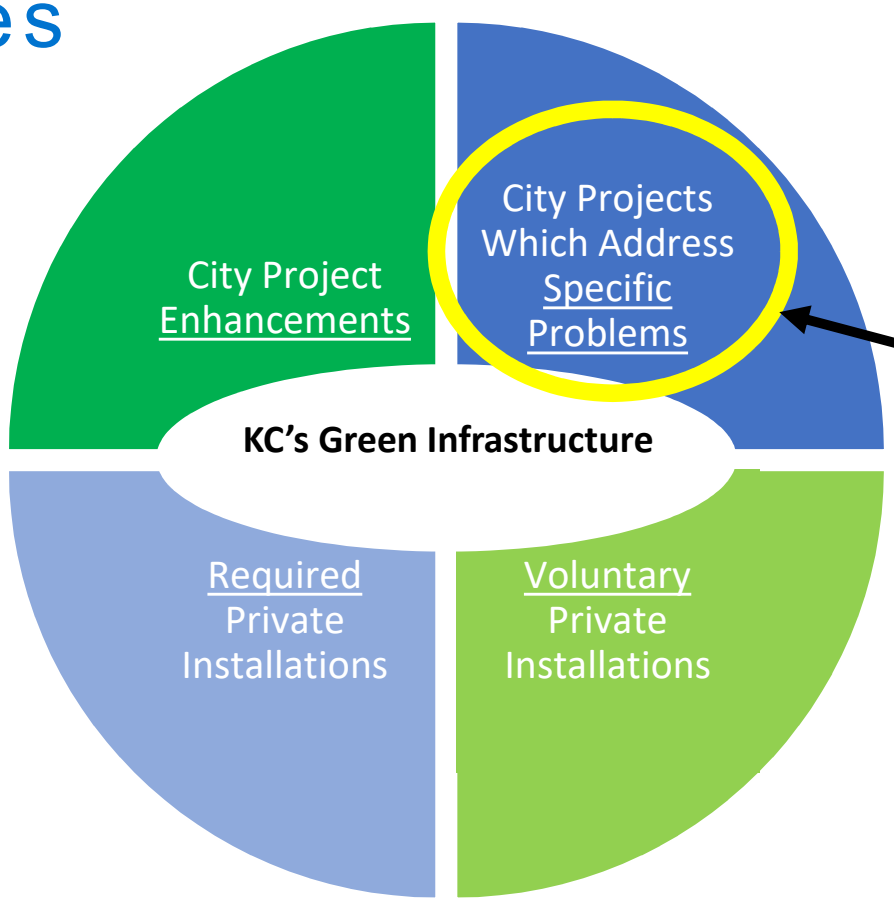
Project Portfolio Overview

Many Contributors



Categories



Presentation Focus Area

Growing Portfolio


Swope Campus


Target Green West

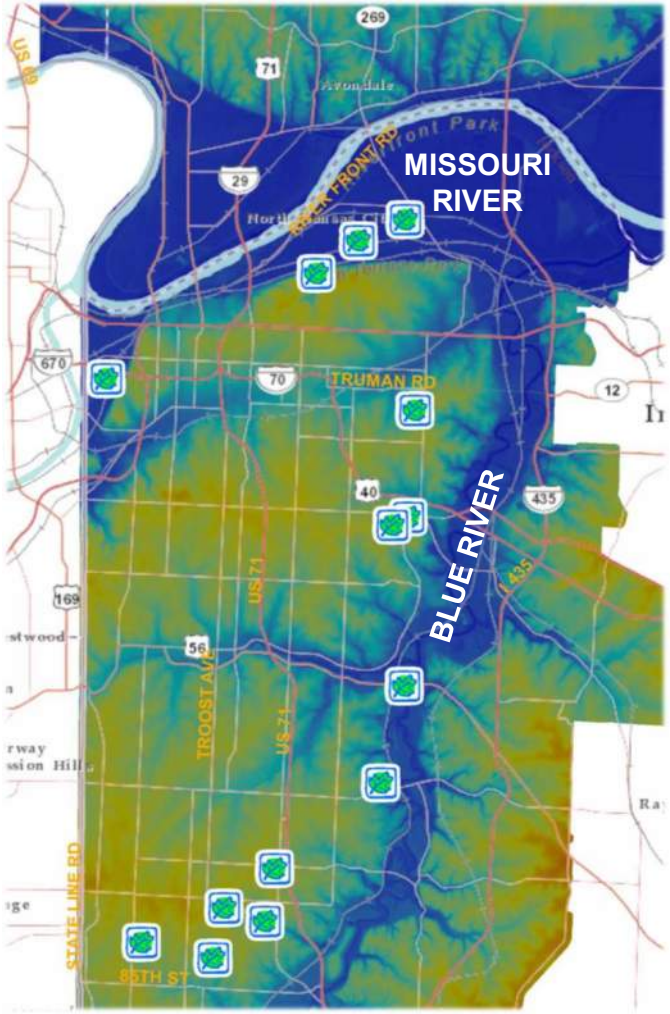

Target Green East


Pilot


East High School


Blue River Trailhead

Growing Portfolio



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Green Infrastructure Goals

Green Infrastructure Goals

Protect water resources through cost-effective stormwater management using green infrastructure

Maximize community benefits

Co-Benefits for Climate Resilience

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Climate Resiliency Co-Benefits

Climate Resiliency Co-Benefits

Image source: US EPA

Climate Resiliency Co-Benefits

1. Take in CO_2 with plants and reduce fossil-fueled maintenance

Image source: US EPA

Plants

Maintaining this grass with fossil-fueled mowers, trimmers, and blowers has a high carbon footprint

Gasoline Powered Mower (1 hour of mowing)	Electric Mower (1 hour of mowing)
8.8 lbs carbon	1.4 lbs carbon

https://sciencing.com/calculate-carbon-footprint-lawn-mower-24046.html

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Plants

Maintenance activities for planting beds involve less fossil fuels than lawn areas

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Climate Resiliency Co-Benefits

2. Reduce nuisance flooding

Image source: US EPA

Nuisance Flooding

Before project, small depressions on pavement that do not entirely drain, leading to dissatisfaction

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Nuisance Flooding

Water can be routed to a nature-based green infrastructure feature lessen nuisance flooding in small rains

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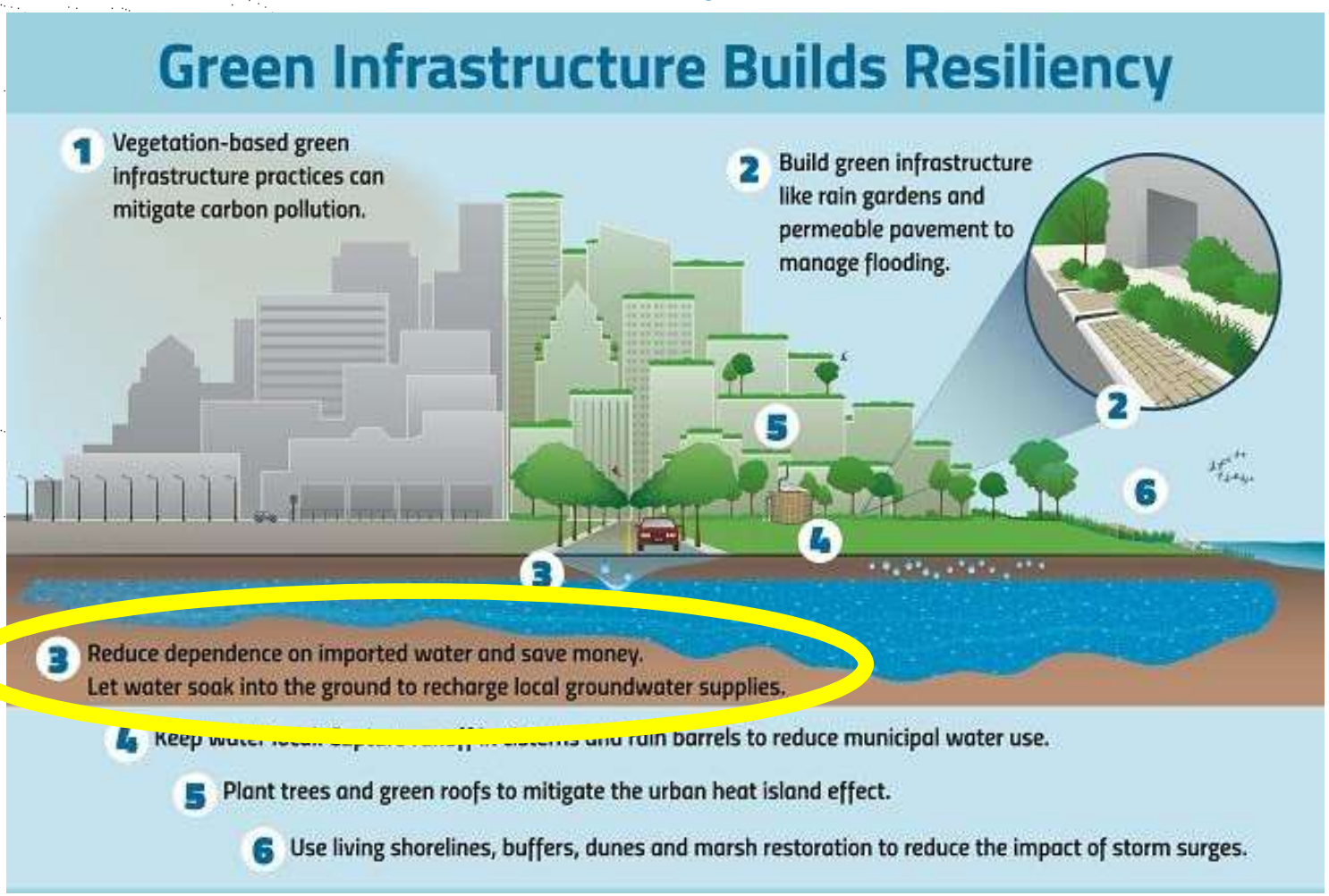
Climate Resiliency Co-Benefits



3. Recharge groundwater

Image source: US EPA

Why Care About Groundwater?

- Groundwater is rain water that has soaked into the ground into layers of soil and rock
- Wells tap into groundwater
- Streams, creeks, and rivers are fed partly by groundwater
- Absence of groundwater is a problem, even in communities that pull drinking water from rivers (like KC region)

Image source: USGS

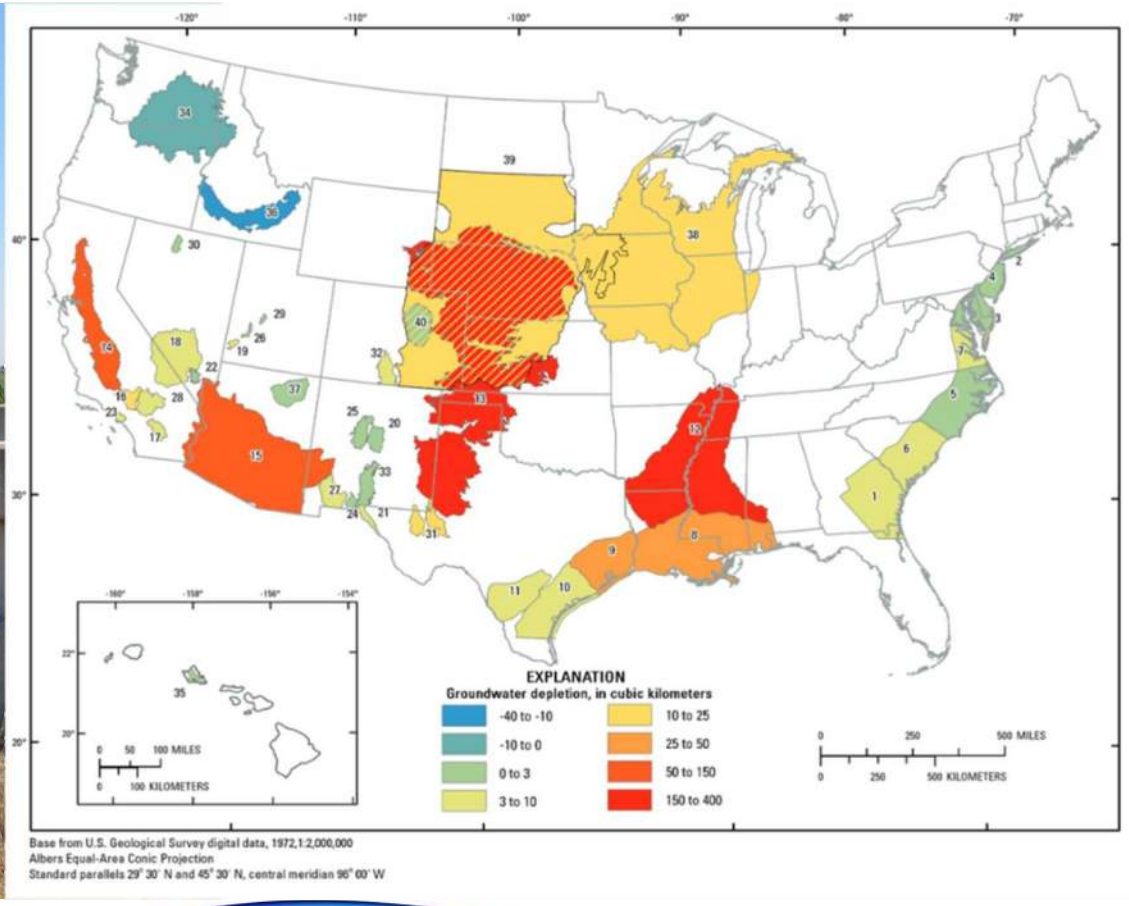
Why Care About Groundwater?

- Excessive pumping can lower the groundwater table to the point that wells can no longer reach groundwater
- As the water table lowers, the water must be pumped farther to reach the surface, using more energy and increasing costs
- When groundwater is overused the lakes, streams, and rivers connected to groundwater can also have their supply diminished
- The overuse of groundwater can bring about loss of support below ground that causes the soil to collapse, compact, and drop; referred to as **land subsidence**

Source: MDNR

Why Care About Groundwater?

Image source: USGS



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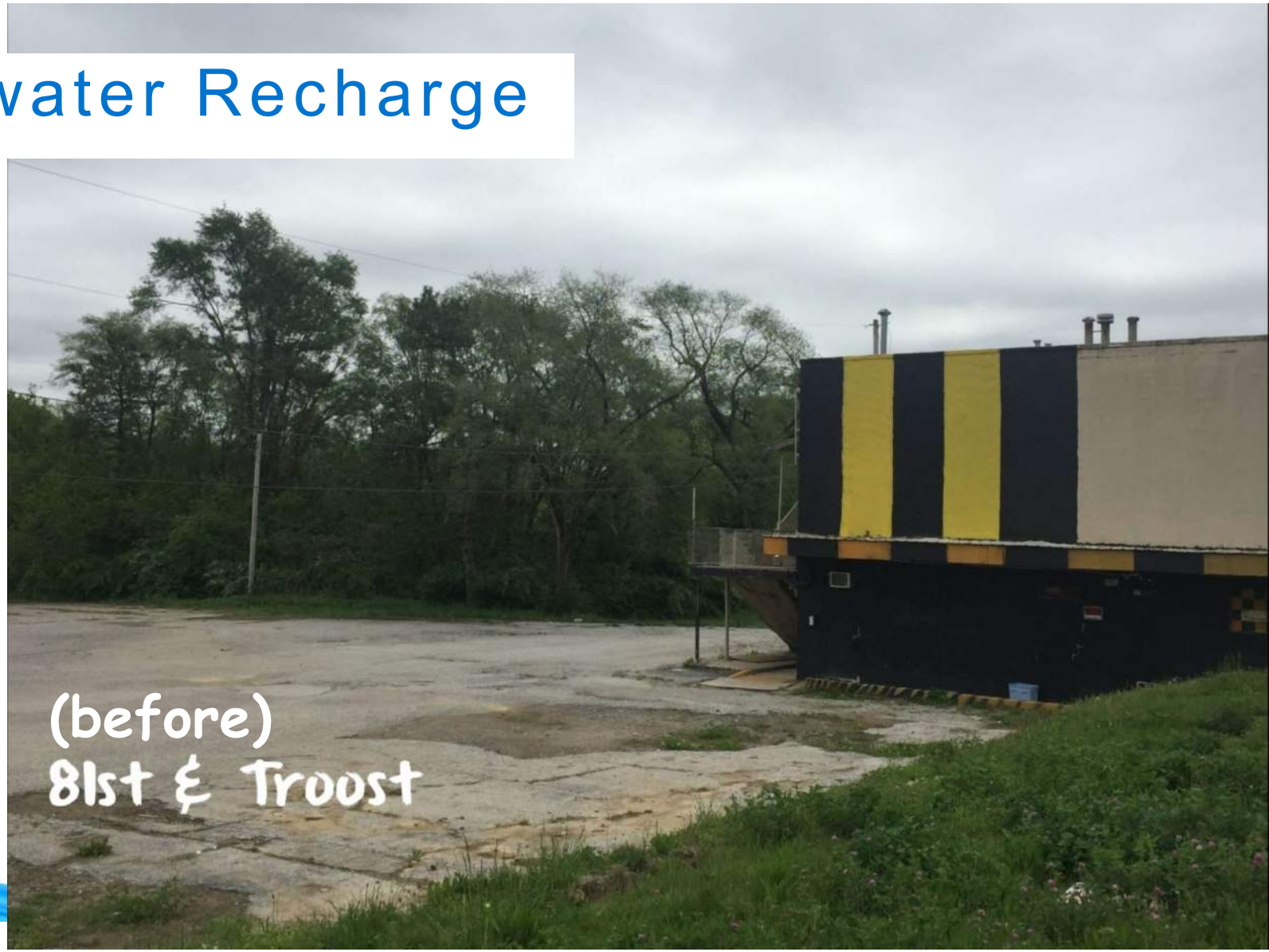
Groundwater Recharge

Before project, water quickly drains off pavement and roofs to the sewer system

Little chance for it to soak into the ground and recharge groundwater



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Groundwater Recharge

Large amount of rain water from uphill neighborhood flows to this site

Some water soaks in and recharges groundwater

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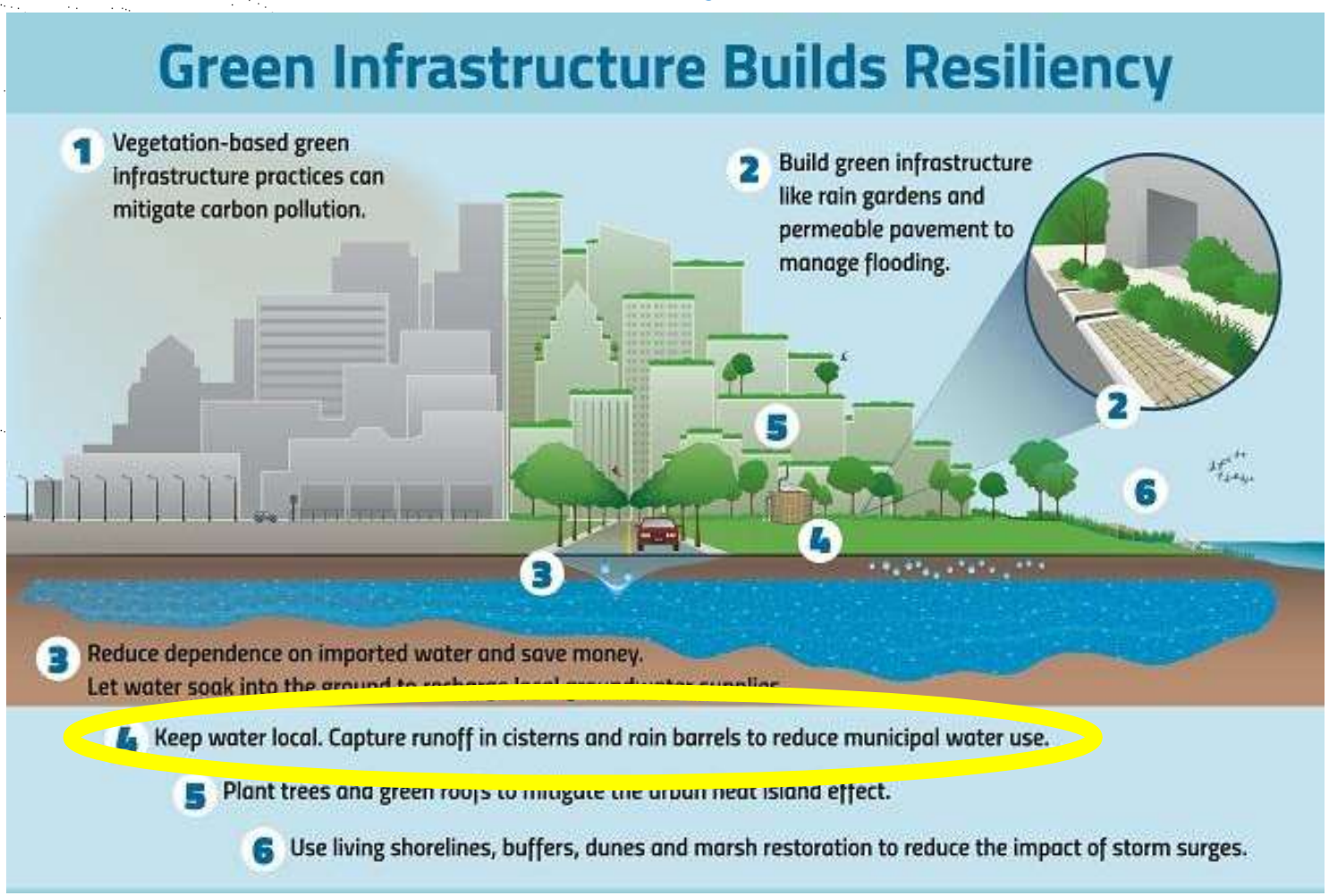
Climate Resiliency Co-Benefits

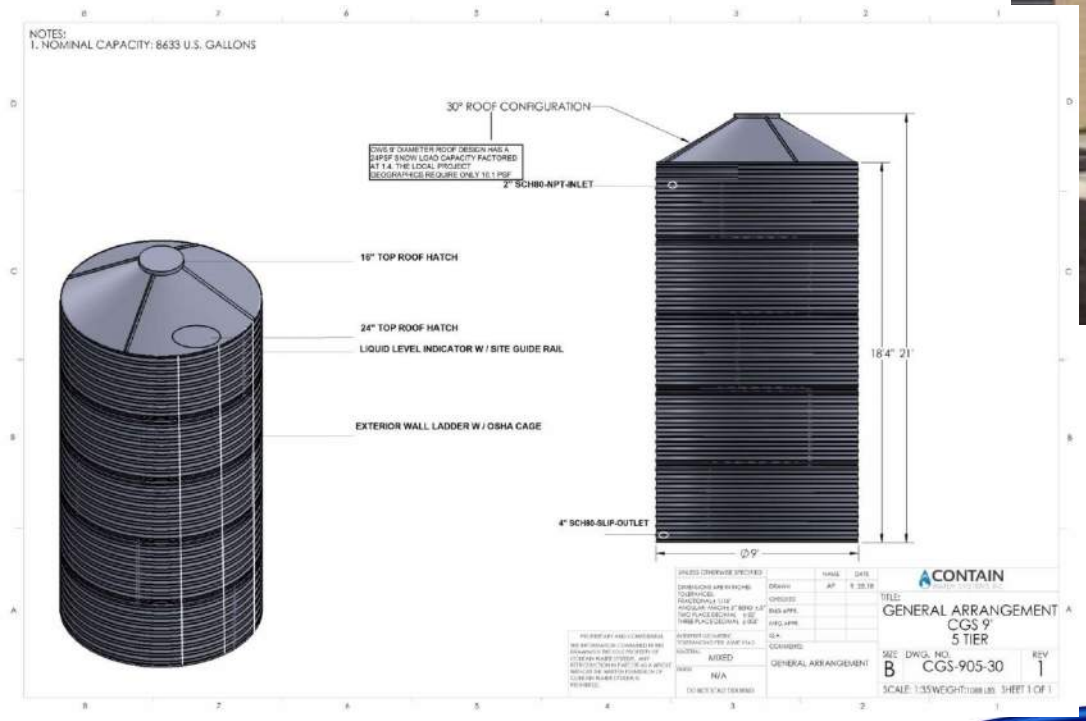


4. Capture rainwater for reuse

Image source: US EPA

Rainwater Capture

2 cisterns in West Bottoms this spring



Planned locations (below viaduct):

I-70 and Mulberry

I-70 and Wyoming

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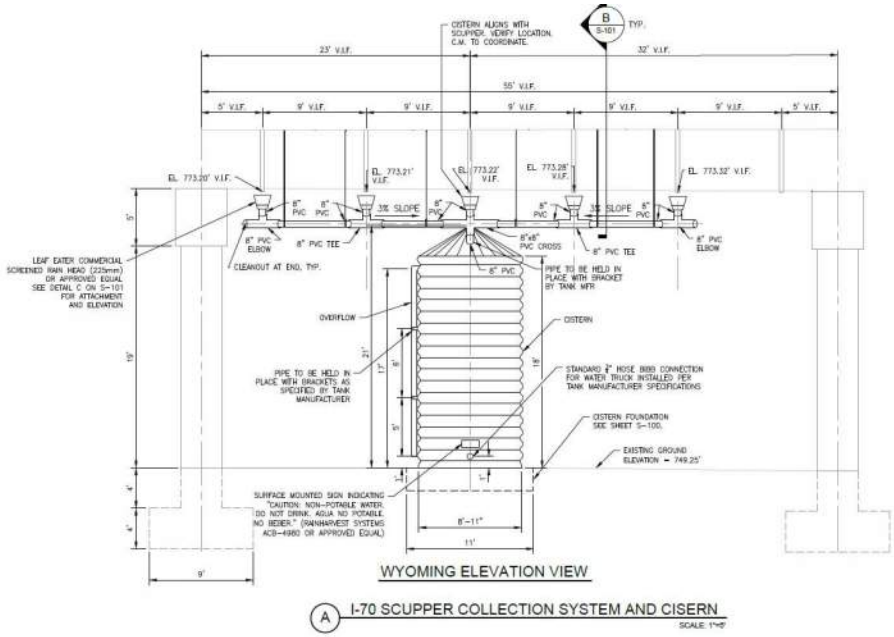
Rainwater Capture

Captured rain water will be used to water nearby 14th and Liberty green infrastructure site and offered to City departments for future use



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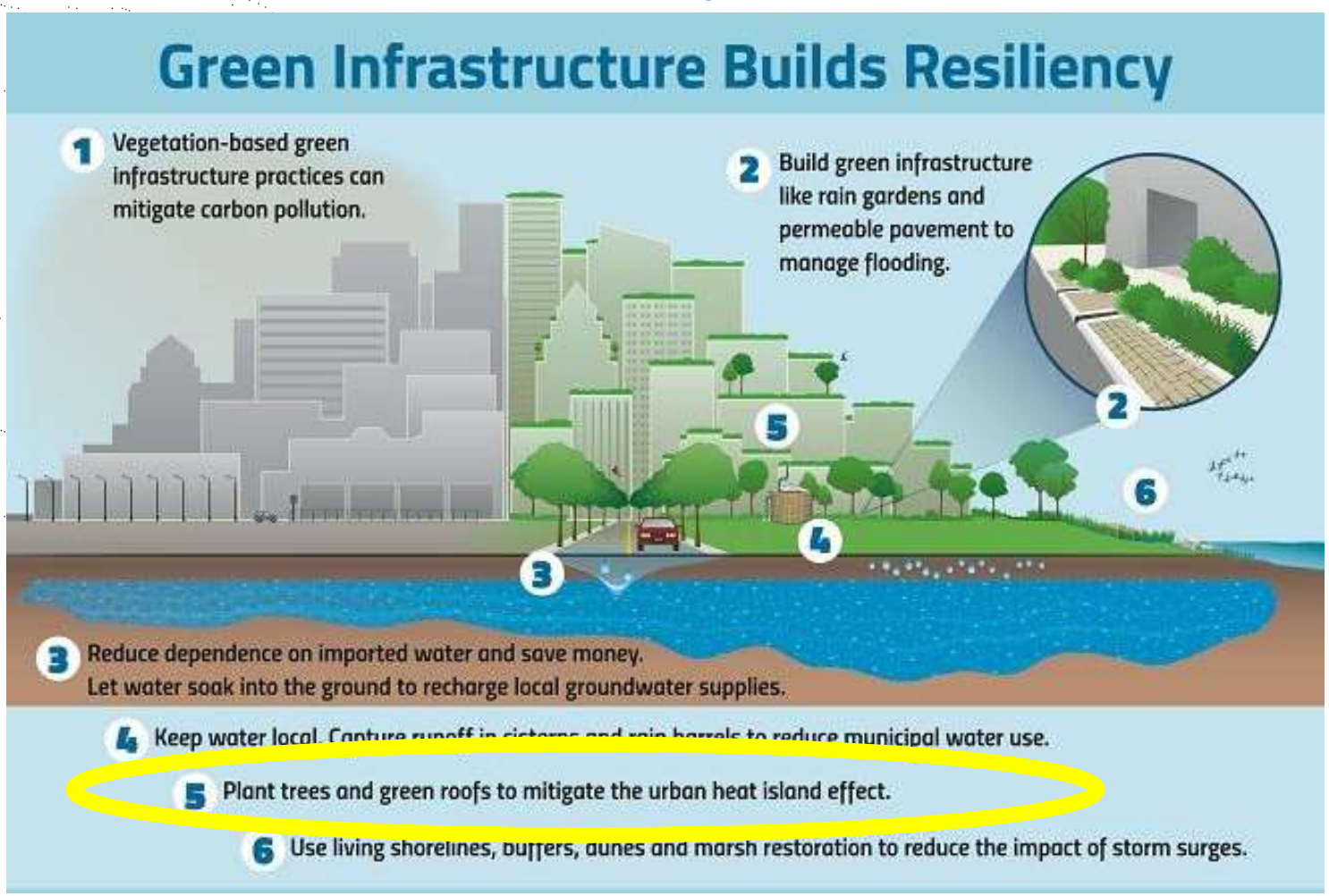
Climate Resiliency Co-Benefits



5. Reduce heat islands

Image source: US EPA

Heat Island Reduction

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Heat Island Reduction

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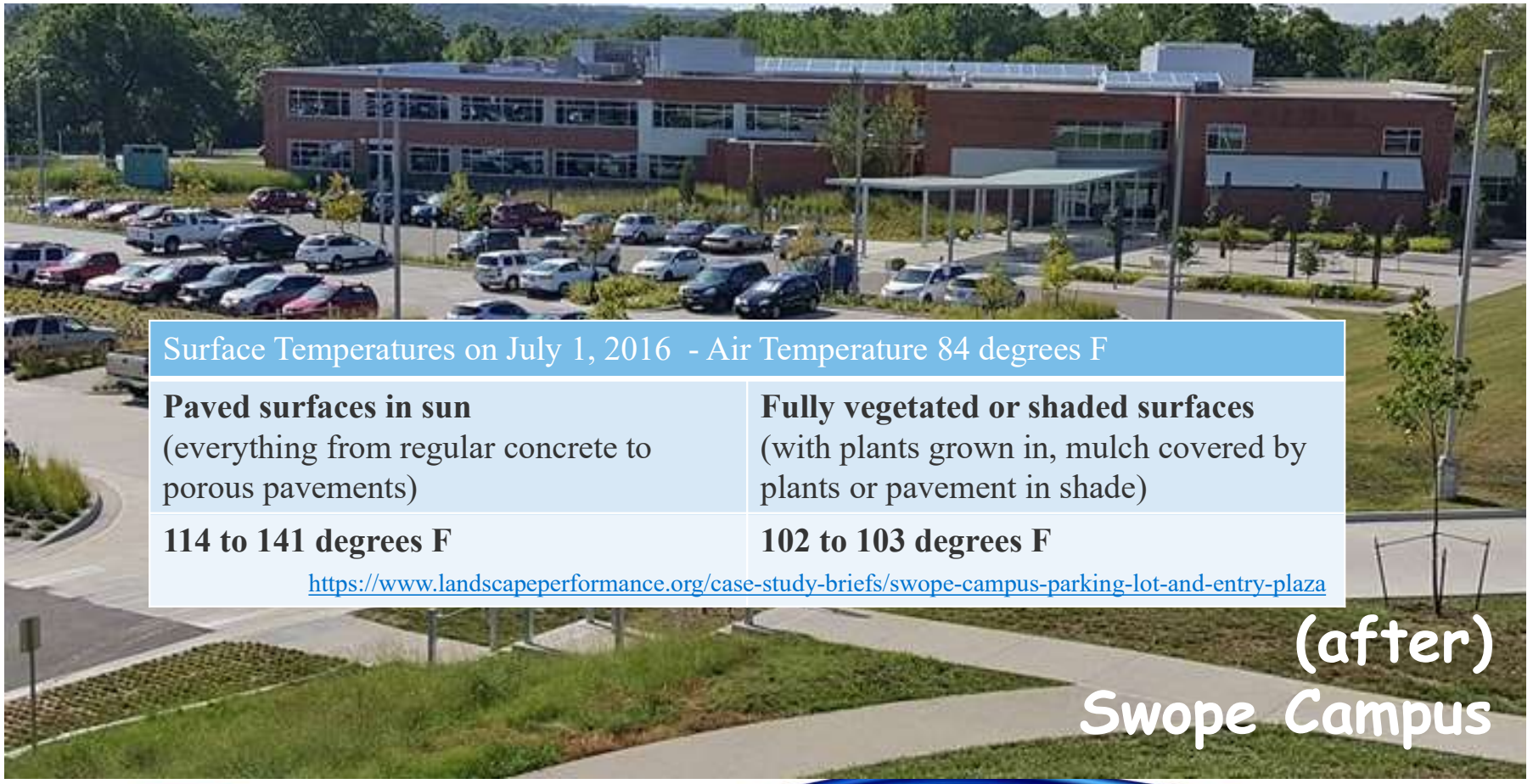
Heat Island Reduction



Surface Temperatures on July 1, 2016 - Air Temperature 84 degrees F	
Paved surfaces in sun (everything from regular concrete to porous pavements)	**Fully vegetated or shaded surfaces** (with plants grown in, mulch covered by plants or pavement in shade)
114 to 141 degrees F	**102 to 103 degrees F**

https://www.landscapeperformance.org/case-study-briefs/swope-campus-parking-lot-and-entry-plaza

(after)
Swope Campus

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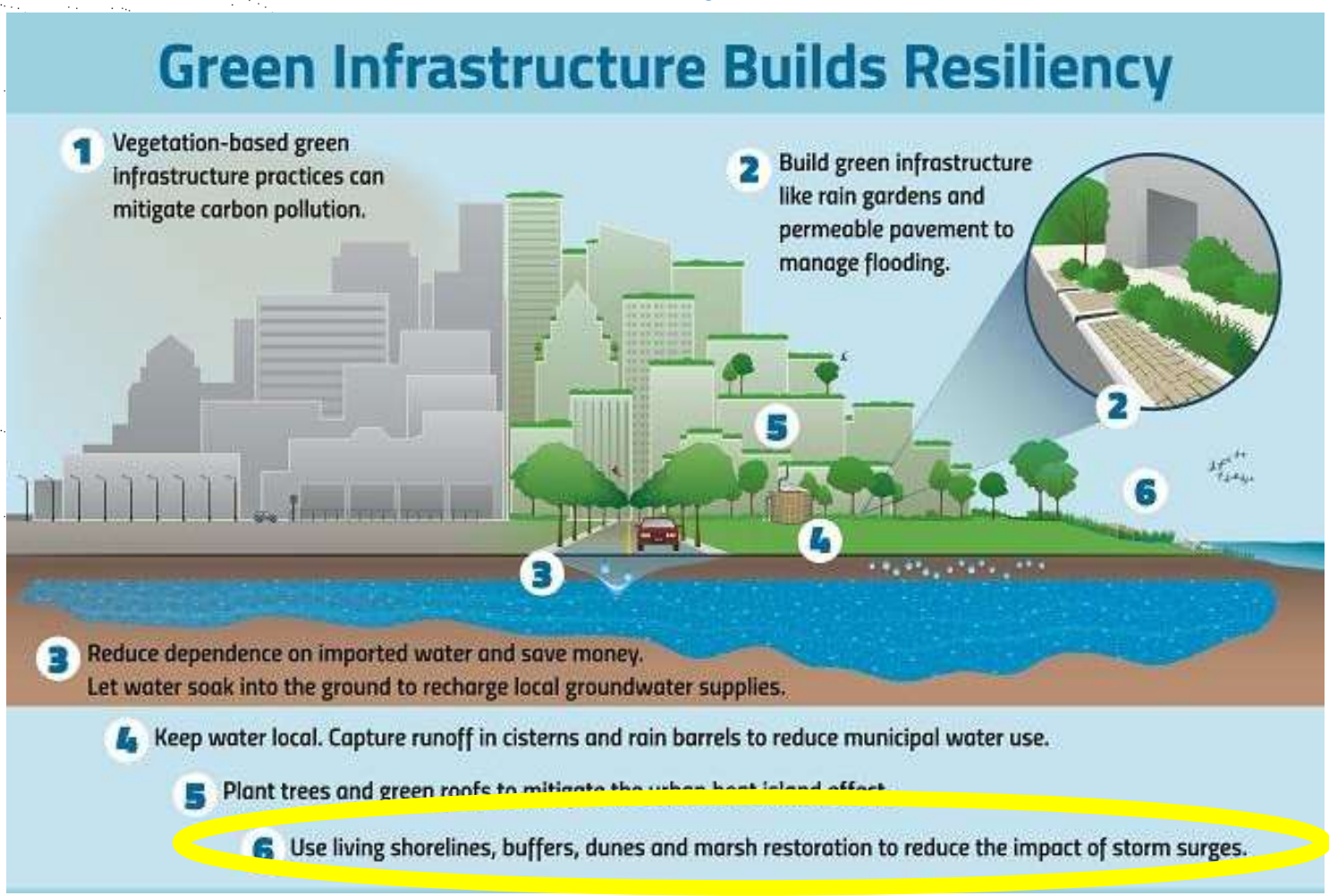
Climate Resiliency Co-Benefits



6. Make space for water

Image source: US EPA

Making Space for Water

Flash flooding

Westport

2013

Image source: WDAF-TV FOX4

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Making Space for Water

Flash flooding

Indian Creek

2017

Image source: KMBC 9

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Making Space

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Making Space

Some small water flow across the surface

Natural valley was disconnected from water flow

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Making Space

Water flows from the uphill neighborhood and resides in 5 bioretention basins for up to 24 hours

Adds capacity to sewer and drainage system by keeping water out of them

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Key Take-Away: Green Infrastructure Can Help Meet Climate Goals by…

1. Taking in CO_2 with plants; reducing fossil-fueled maintenance equipment
2. Reducing nuisance flooding
3. Recharging groundwater
4. Capturing rainwater for reuse
5. Reducing heat islands
6. Making space for water

KCWATER

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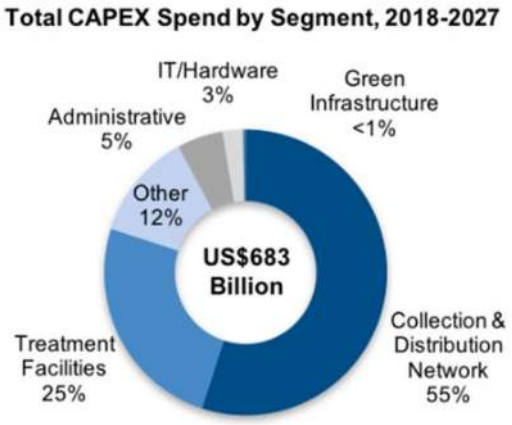
Why is GI important Now?

- **Planned Infrastructure Investments should Optimize Benefits, Catalyst for Revitalization**
- **Innovations in Delivery & Tools**
- **Knowledge & Workforce Capacity**



Bluefield Research, 2018

Moody's Update:
Climate Resilience Planning Impacts your Community's Bond Rating

Exchange

- What is your community's vision?
- What challenges do we have in common?
- How are communities integrating green?
- What other funding sources are available?
- What solutions have you tried or seen?

Next Step: Green Infrastructure as Resilience Strategy

Transportation

Materials

Food

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CLIMATE ACTION PLAYBOOK DECEMBER 2019

Electricity Generation

Buildings

Land Use