
GSI to Mitigate Stormwater and Heat Island Effects:

Project Update

February 2024



Project Purpose

“ Identify, design, and **construct GSI opportunities** that **enhance community resiliency** by using **natural features and processes** to **mitigate the impacts of climate change** and the urban heat island effect. ”



What is GSI?

Green Stormwater Infrastructure (GSI) preserves nature, soil, and waterways, and/or mimics nature by managing, treating, and reducing stormwater runoff from impervious surfaces, like roads, sidewalks, roofs, and driveways.



Tree Well



Curb Bump-Out
Bioretention



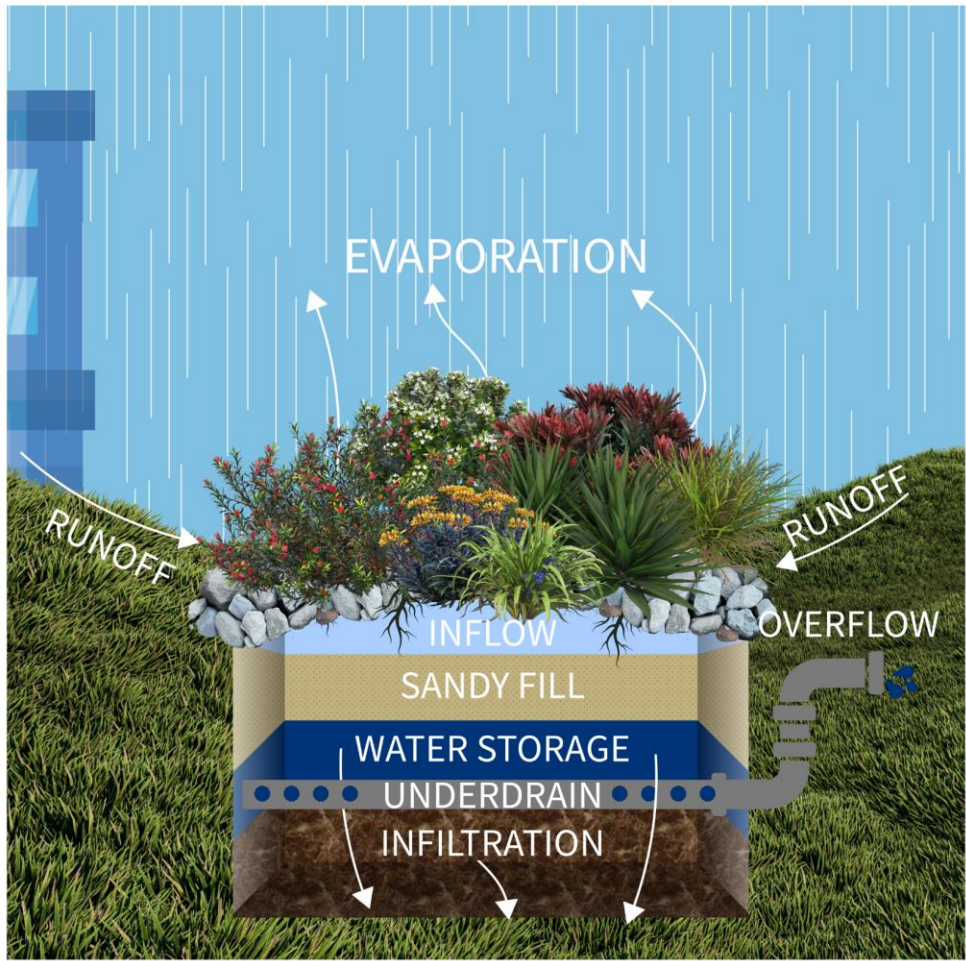
Suspended
Pavement



Bioretention



Benefits of GSI



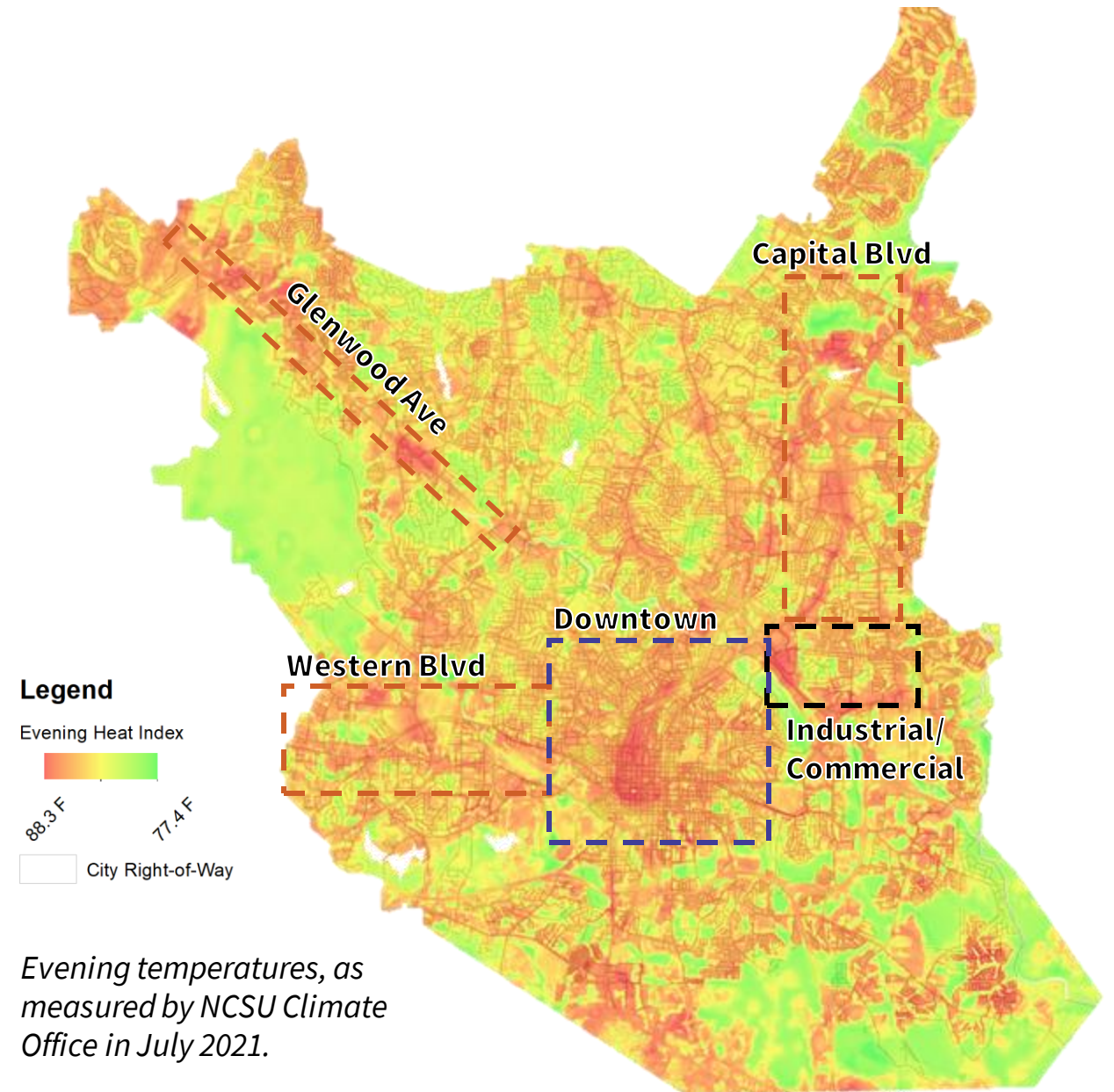
- Cooling of surrounding air
- Filtering of air pollution
- Providing wildlife/pollinator habitat
- Beautification
- Absorption of stormwater runoff
- Filtering of stormwater pollution
- Mimics natural hydrologic processes



Raleigh's Urban Heat

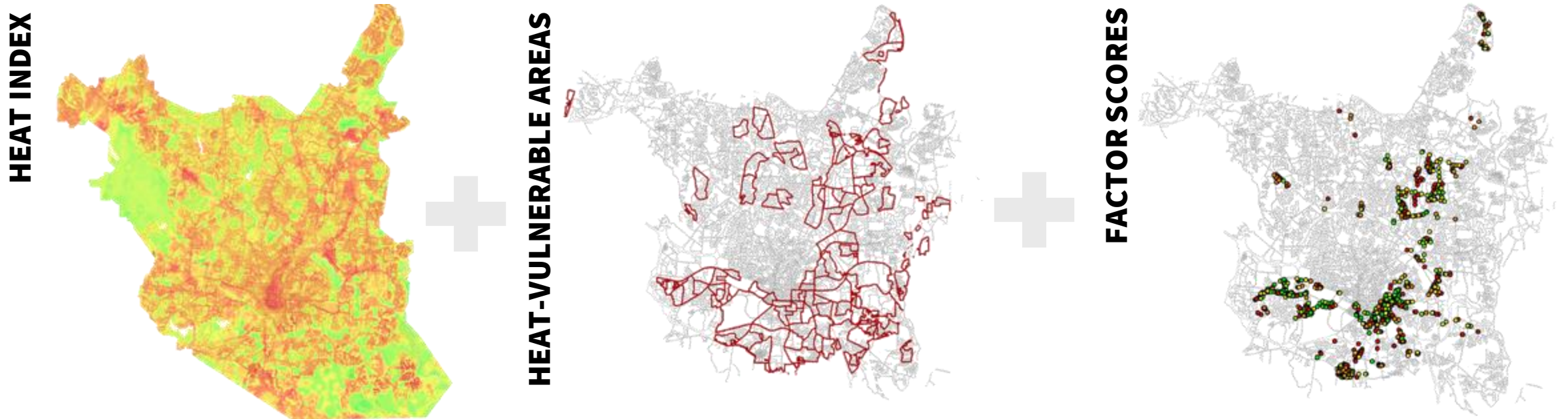
High heat areas:

- Downtown and adjacent neighborhoods
- Roadway and transportation corridors
(e.g., Capital Blvd, Western Blvd, Glenwood Ave)
- Industrial areas



Site Selection

“Potential project sites” considered were segments of City-owned rights-of-way and City-owned parcels. Sites were ranked based on the following:

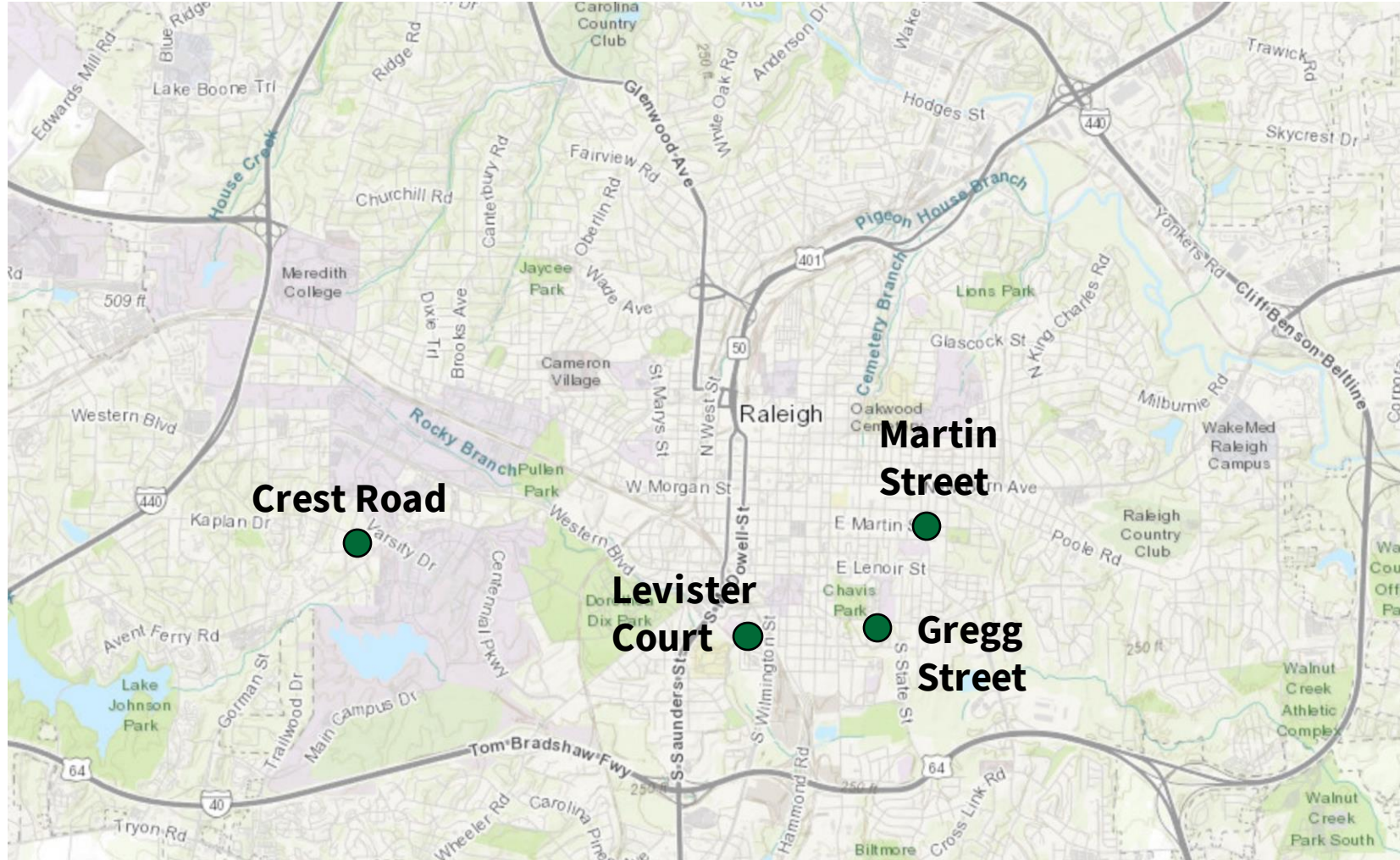


Site Prioritization Factors

High Priority	Medium Priority	Low Priority
Evening Heat Index (↑ temperature, ↑ score)	Available Space (↑ space available, ↑ score)	Presence of Other GSI (↑ distance, ↑ score)
Future Land Use (↑ density and/or residential)	Proximity to Bus Stop (↓ distance)	Soil Infiltration/Type (↑ infiltration rate)
Proximity to Stormwater Pipe (↓ distance)	Proximity to Greenway or Bike Lane (↓ distance)	Proximity to other City Stormwater Projects (↑ distance)
Tree Canopy Percentage (↓ coverage)		Proximity to City Tree Planting Projects (↑ distance)
		Proximity to City Traffic Calming Project (↓ distance)
		Proximity to Schools or Parks (↓ distance)
		Proximity to High-Risk Flood Zones (↓ distance)



Selected Project Locations

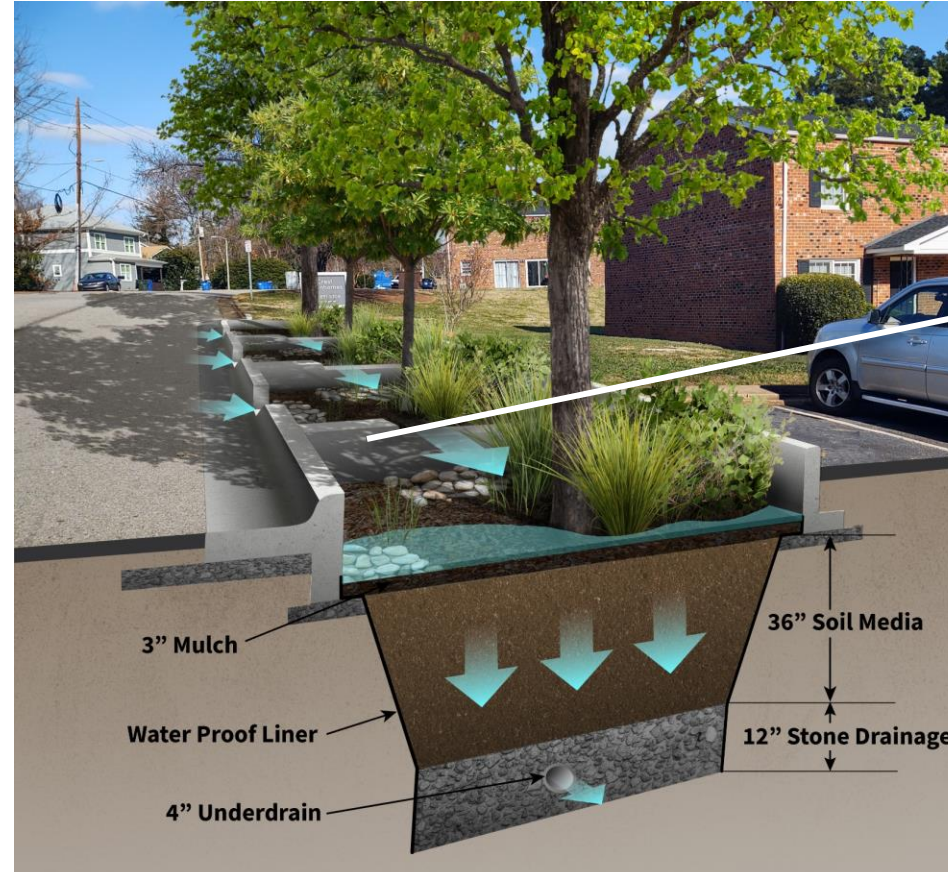


Crest Road

Attribute	Description
Nearest Address	1713 Crest Road
Proposed Green Infrastructure Type	Bioretention System
July Evening Heat Index	85 °F



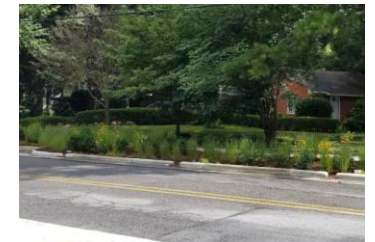
Existing Conditions



Proposed Conditions



Check Dam Example



Curb Bump Out Bioretention Example

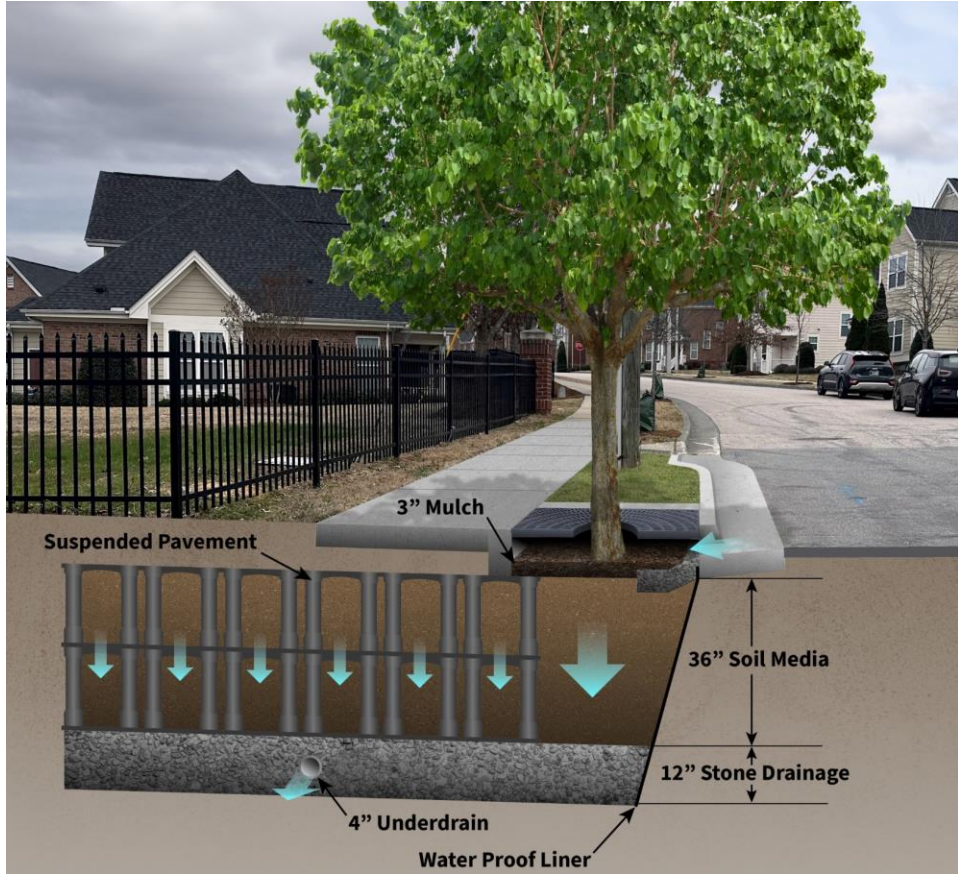


Levister Court

Attribute	Description
Nearest Address	98 Levister Court
Proposed Green Infrastructure Type	Tree Well with Suspended Pavement System
July Evening Heat Index	84 °F



Existing Conditions



Proposed Conditions



Underground View of Suspended Pavement



Example of a Tree Well

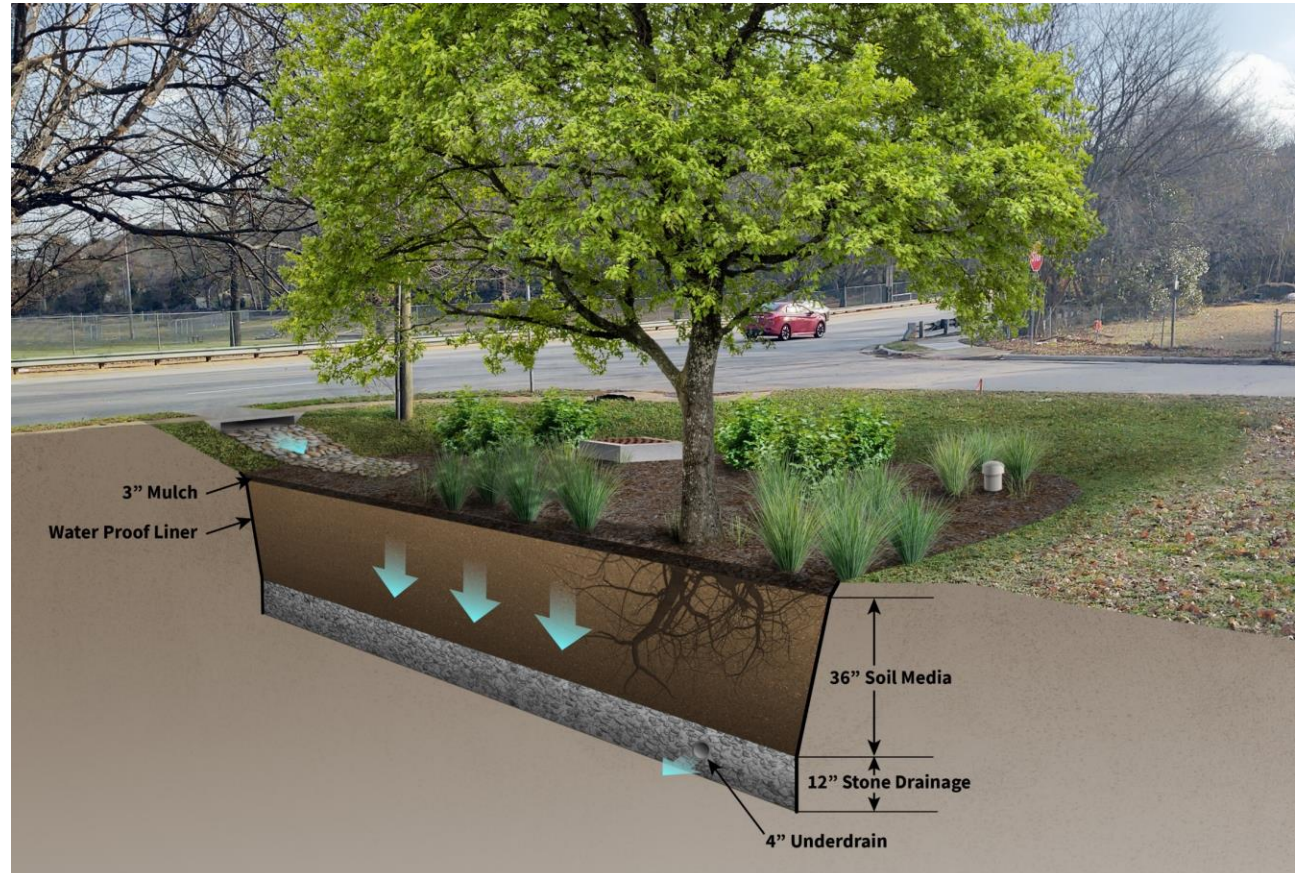


Gregg Street

Attribute	Description
Nearest Address	1000 Gregg Street
Proposed Green Infrastructure Type	Bioretention System
July Evening Heat Index	86 °F



Existing Conditions



Proposed Conditions

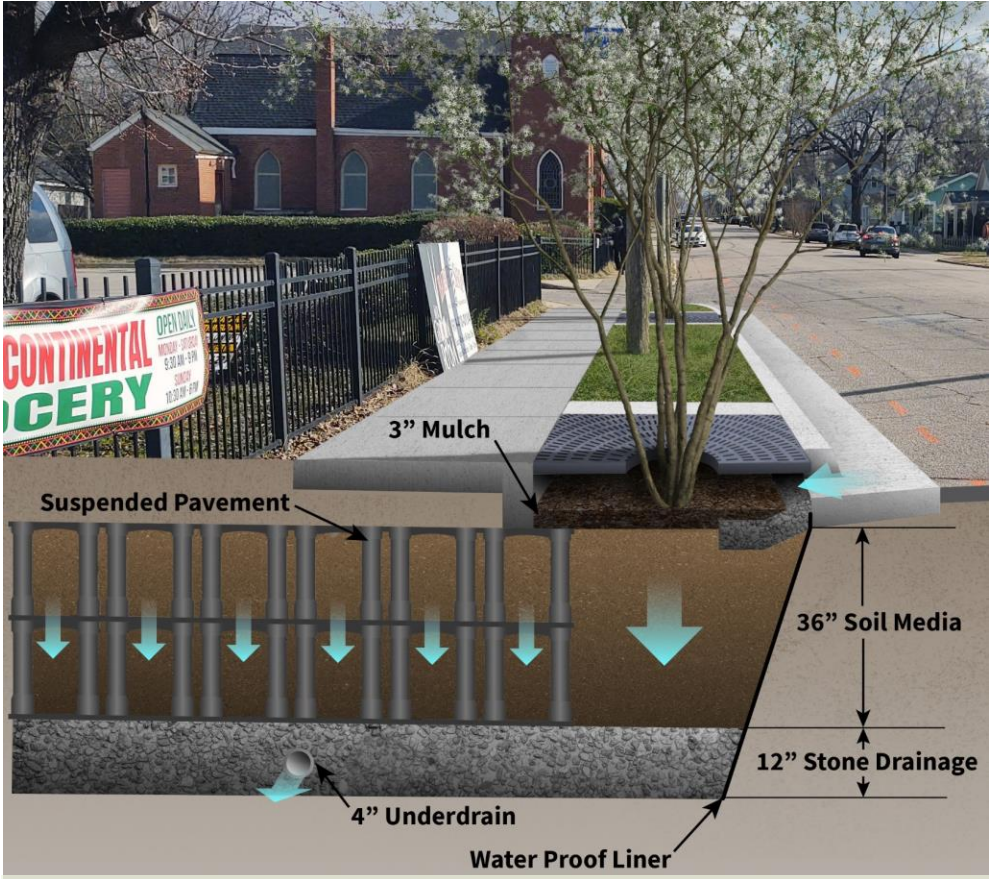


Martin Street

Attribute	Description
Nearest Address	717 E Martin Street
Proposed Green Infrastructure Type	Tree Well with Suspended Pavement System
July Evening Heat Index	84 °F



Existing Conditions



Proposed Conditions



Underground View of Suspended Pavement



Example of a Tree Well



Example Plant Palettes

CATEGORY: NATIVE SHRUBS - IMPROVE AIR QUALITY



Photo: Jennifer

Virginia Sweetspire
'Little Henry'
Itea virginica 'Little Henry'

ABOUT THIS PLANT:

- White flowers in spring
- Fall color

NATURAL BENEFITS:



Photo: David J. Strong

Inkberry Holly
'Strongbox'
Ilex glabra 'Strongbox'

ABOUT THIS PLANT:

- Evergreen leaves
- Black berries
- No thorns

NATURAL BENEFITS:



Photo: Douglas Goldman

New Jersey Tea
Ceanothus americanus

ABOUT THIS PLANT:

- White flowers in spring
- Fall color

NATURAL BENEFITS:



Photo: Ryan Hoesnecht

Winterberry
'Red Sprite'
Ilex verticillata 'Red Sprite'

ABOUT THIS PLANT:

- Bright red berries in winter
- No thorns

NATURAL BENEFITS:



Photo: Krystal Zlamek

Yaupon Holly
'Dwarf'
Ilex vomitoria 'Nana'

ABOUT THIS PLANT:

- Evergreen leaves
- Red Berries
- No thorns

NATURAL BENEFITS:



Photo: David J. Strong

Red Chokeberry
Aronia arbutifolia

ABOUT THIS PLANT:

- White flowers
- Red berries

NATURAL BENEFITS:



KEY - NATURAL BENEFITS



Example Plant Palettes

CATEGORY: NATIVE GRASSES - KEEP THE GROUND COOL



River Oats
Chasmanthium latifolium

ABOUT THIS PLANT:

- Attractive foliage and seed heads
- Year round interest

NATURAL BENEFITS:




Common Rush
Juncus effusus

ABOUT THIS PLANT:

- Evergreen leaves
- Compact shape

NATURAL BENEFITS:




Little Bluestem
Schizachyrium scoparium

ABOUT THIS PLANT:

- Attractive summer leaves
- Reddish fall color

NATURAL BENEFITS:




Purple Lovegrass
Eragrostis spectabilis

ABOUT THIS PLANT:

- Purple blooms in fall

NATURAL BENEFITS:




Pink Muhly Grass
Muhlenbergia capillaris

ABOUT THIS PLANT:

- Drought tolerant
- Pink blooms in fall

NATURAL BENEFITS:




Prairie Dropseed
Sporobolus heterolepis

ABOUT THIS PLANT:

- Adaptable
- Grows in flowing, compact shape

NATURAL BENEFITS:



KEY - NATURAL BENEFITS




Example Plant Palettes

CATEGORY: NATIVE FLOWERS - KEEPS THE GROUND COOL

 <p>Purple Coneflower <i>Echinacea purpurea</i></p> <p>ABOUT THIS PLANT:</p> <ul style="list-style-type: none"> • Purple flowers in summer/fall <p>NATURAL BENEFITS:</p> 	 <p>Blue Star <i>Amsonia tabernaemontana</i></p> <p>ABOUT THIS PLANT:</p> <ul style="list-style-type: none"> • Blue flowers in spring/summer <p>NATURAL BENEFITS:</p> 	 <p>Black Eyed Susan <i>Rudbeckia hirta</i></p> <p>ABOUT THIS PLANT:</p> <ul style="list-style-type: none"> • Yellow flowers in summer/fall <p>NATURAL BENEFITS:</p> 	 <p>New England Aster <i>Symphotrichum novae-angliae</i></p> <p>ABOUT THIS PLANT:</p> <ul style="list-style-type: none"> • Purple flowers in summer/fall <p>NATURAL BENEFITS:</p> 	 <p>Southern Blue Flag Iris <i>Iris virginica</i></p> <p>ABOUT THIS PLANT:</p> <ul style="list-style-type: none"> • Purple flowers in spring/summer • Strappy long leaves <p>NATURAL BENEFITS:</p> 	 <p>Mist Flower <i>Conoclinium coelestinum</i></p> <p>ABOUT THIS PLANT:</p> <ul style="list-style-type: none"> • Fragrant • Purple summer flowers <p>NATURAL BENEFITS:</p> 	 <p>Mountain Mint <i>Pycnanthemum pycnanthemoides</i></p> <p>ABOUT THIS PLANT:</p> <ul style="list-style-type: none"> • Fragrant • Unusual green/white flowers <p>NATURAL BENEFITS:</p> 	 <p>Common Rose Mallow <i>Hibiscus moscheutos</i></p> <p>ABOUT THIS PLANT:</p> <ul style="list-style-type: none"> • Large red flowers and large leaves <p>NATURAL BENEFITS:</p> 
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KEY - NATURAL BENEFITS

 BUTTERFLY	 POLLINATORS	 HOST PLANT	 HEALTHY SOILS	 HUMMINGBIRDS	 SONG BIRDS	 WILDLIFE
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Example Plant Palettes

CATEGORY: NATIVE TREES - PROVIDE SHADE



Photo: Donn Muller

Service Berry
Amelanchier arborea

ABOUT THIS TREE:

- Small tree
- White spring flowers
- Red berries

NATURAL BENEFITS:



Photo: David J. Stang

Carolina Hornbeam
Carpinus caroliniana

ABOUT THIS TREE:

- Small tree
- Interesting bark and trunk
- Fall color

NATURAL BENEFITS:



Photo: Mohammed Fouk

Redbud
Cercis canadensis

ABOUT THIS TREE:

- Small tree
- Purple spring flowers
- Heart shaped leaves

NATURAL BENEFITS:



Photo: Pamarrin

Sweetbay Magnolia
Magnolia virginiana

ABOUT THIS TREE:

- Mid-sized tree
- Evergreen leaves
- Fragrant white flowers

NATURAL BENEFITS:



Photo: Krzysztof Zamek

Black Gum
Nyssa sylvatica

ABOUT THIS TREE:

- Mid-sized tree
- Bright red fall foliage
- Blue berries

NATURAL BENEFITS:



Photo: Alex Lomas

Tulip Poplar
Liriodendron tulipifera

ABOUT THIS TREE:

- Large tree
- Bright green summer leaves
- Colorful large flowers

NATURAL BENEFITS:



Photo: Chris Light

Bald Cypress
Taxodium distichum

ABOUT THIS TREE:

- Large tree with narrow shape
- Deciduous leaves
- Textured bark

NATURAL BENEFITS:



KEY - NATURAL BENEFITS



Estimated Project Cost

Element	Estimated Cost
Crest Road Bioretention	\$189,000
Levister Court Suspended Pavement System	\$123,000
Gregg Street Bioretention	\$46,000
Martin Street Suspended Pavement System	\$142,000
Engineering, Design, and Permitting	\$250,000
TOTAL*	\$750,000

**This project is funded by a grant to the City of Raleigh from North Carolina’s allocation of funding from the American Rescue Plan Act.*



Anticipated Project Schedule

Element	Cost
Design and Permitting	December 2023 – July 2024
Construction Bidding and Selection	August 2024 – December 2024
Construction Bidding and Selection Deadline*	December 31, 2024
Construction	Approximately 3 to 4-month duration in early 2025
Construction Completion Deadline*	December 31, 2026

**These deadlines are set by the ARPA grant guidelines.*



For More Information

Learn More

Visit www.raleighnc.gov and search “GSI UHI.”

Contact

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