

June 15, 2023 | 1:00-2:30 pm ET

NATURE-BASED SOLUTIONS TO CLIMATE THREATS: FLOODING, BIODIVERSITY LOSS, AND HEAT

MODERATOR



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ACCREDITATION AVAILABLE FOR:



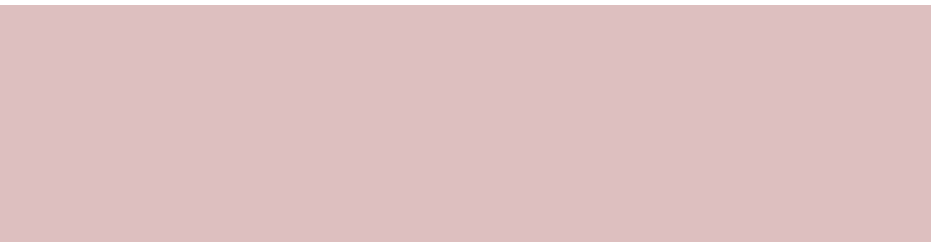
Landscape Architecture
Continuing Education System™

NEW!
General CEUs



Nature-Based Solutions to Climate Threats: **Flooding**, Biodiversity Loss, and Heat

Anna Cawrse
Principal, Landscape Architecture
City Park Alliance





**Collaboration
is in Our DNA**

Sasaki is a 300+ person interdisciplinary practice

CIVIL ENGINEERS

PLANNERS

SUSTAINABILITY PLANNERS

ARCHITECTS

DATA ANALYSTS

SOFTWARE ENGINEER

INTERIOR DESIGNERS

LANDSCAPE ARCHITECTS

GRAPHIC DESIGNERS

URBAN DESIGNERS

64 Planners & Urban Designers

81 Landscape Architects & Civil Engineers

105 Architects & Interior Designers

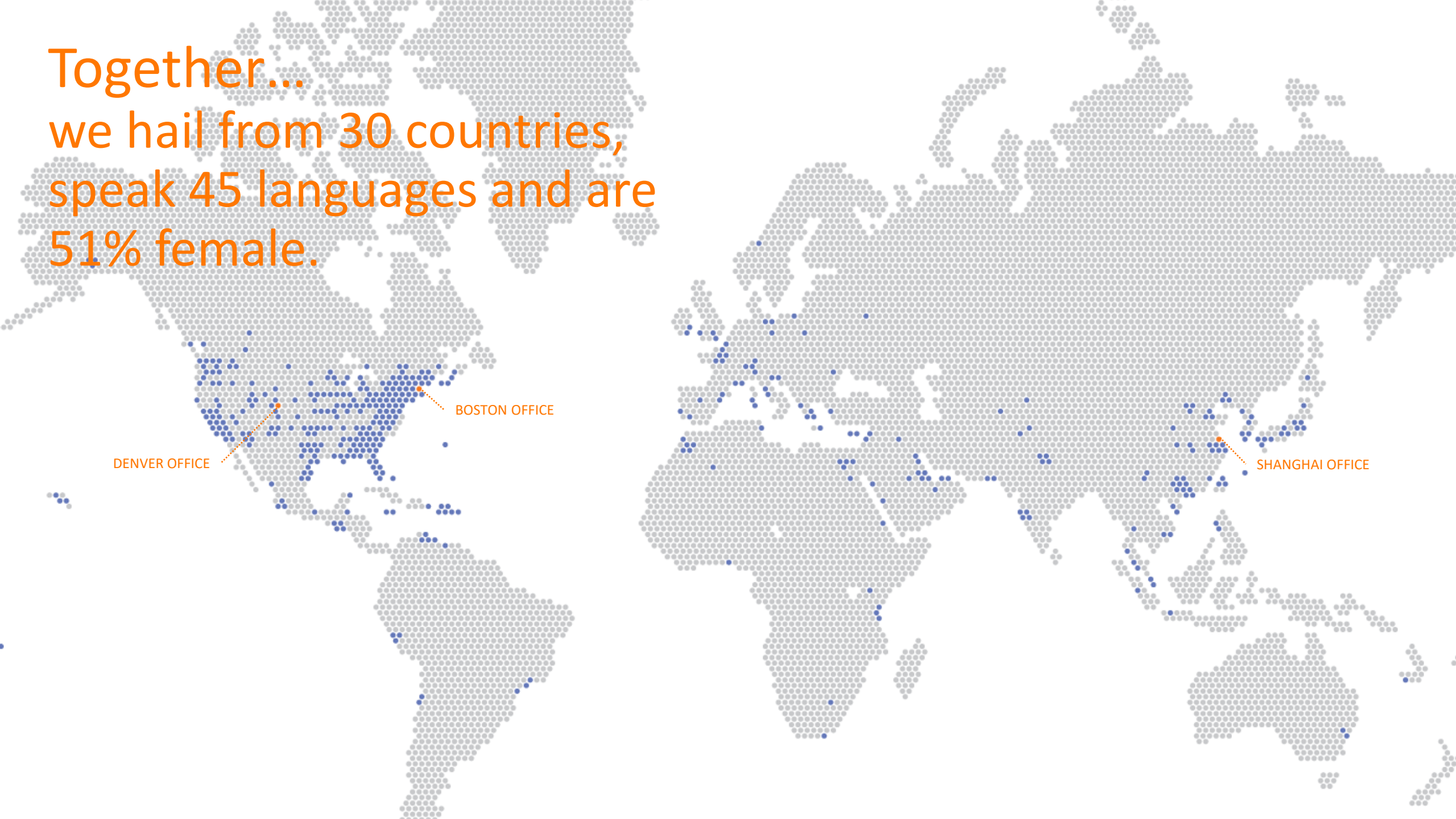


Together...
we hail from 30 countries,
speak 45 languages and are
51% female.

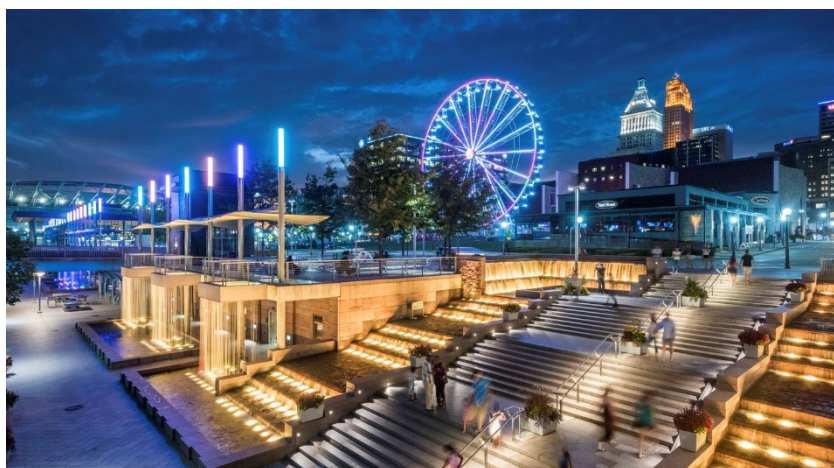
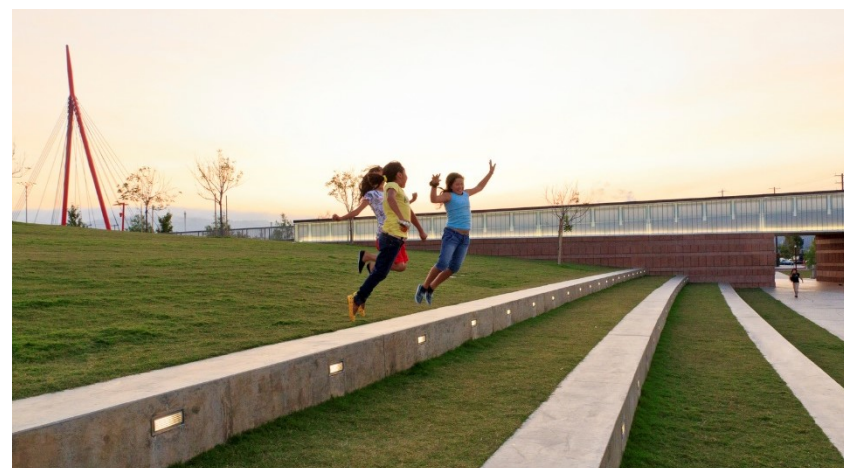
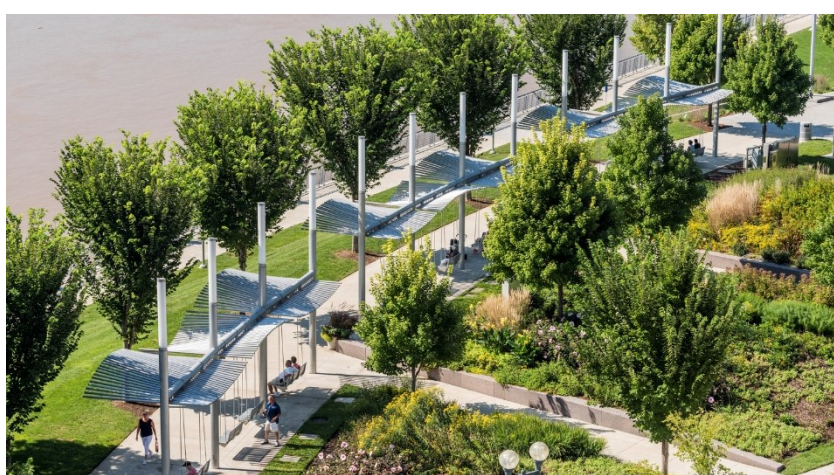
DENVER OFFICE

BOSTON OFFICE

SHANGHAI OFFICE



Our passion is Public Spaces





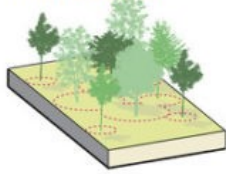




RESTORATION AS DRIVER

UNPARALLELED OPPORTUNITIES TO ENHANCE LOCAL ECOLOGY AND SUSTAINABILITY

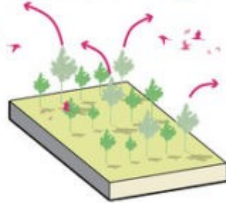
Tree Protection



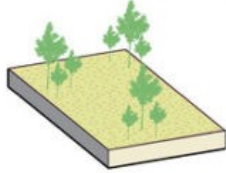
Reclaimed Biomass for Compost + Nature play



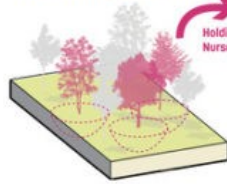
Faunal Seed Distribution Restoration Design



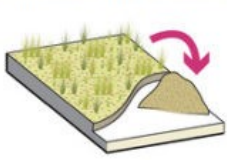
Tree Species + Age Class Diversity in Island-based Planting for National Area Restoration Design



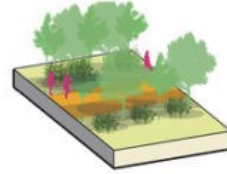
Tree Transplantation



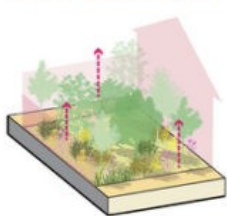
Stocked Seedbank for Grassland Restoration



Design for Shade Comfort + Nurse Tree Protection

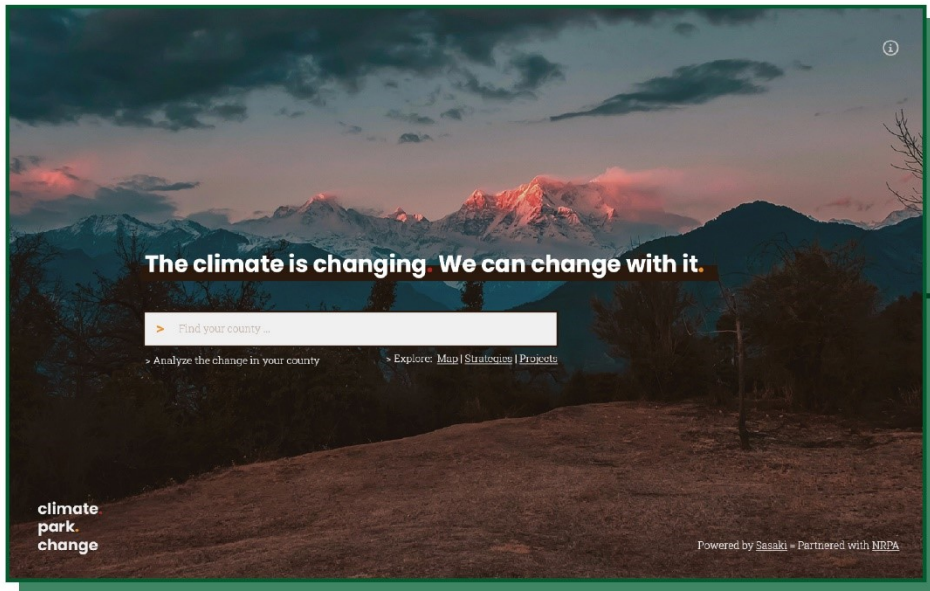


Accelerated Succession for Increased Biodiversity



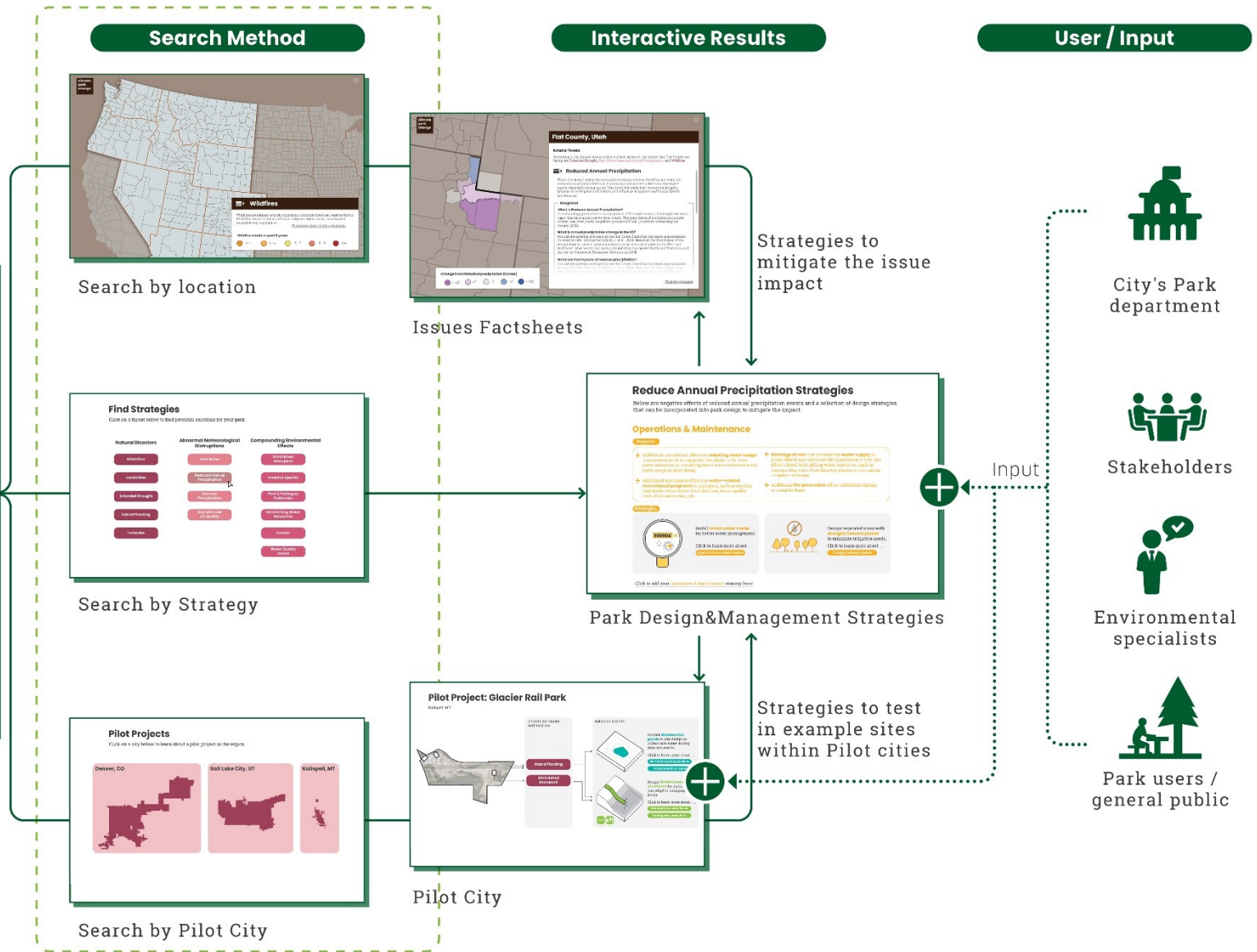
Climate Change Research

Home Page

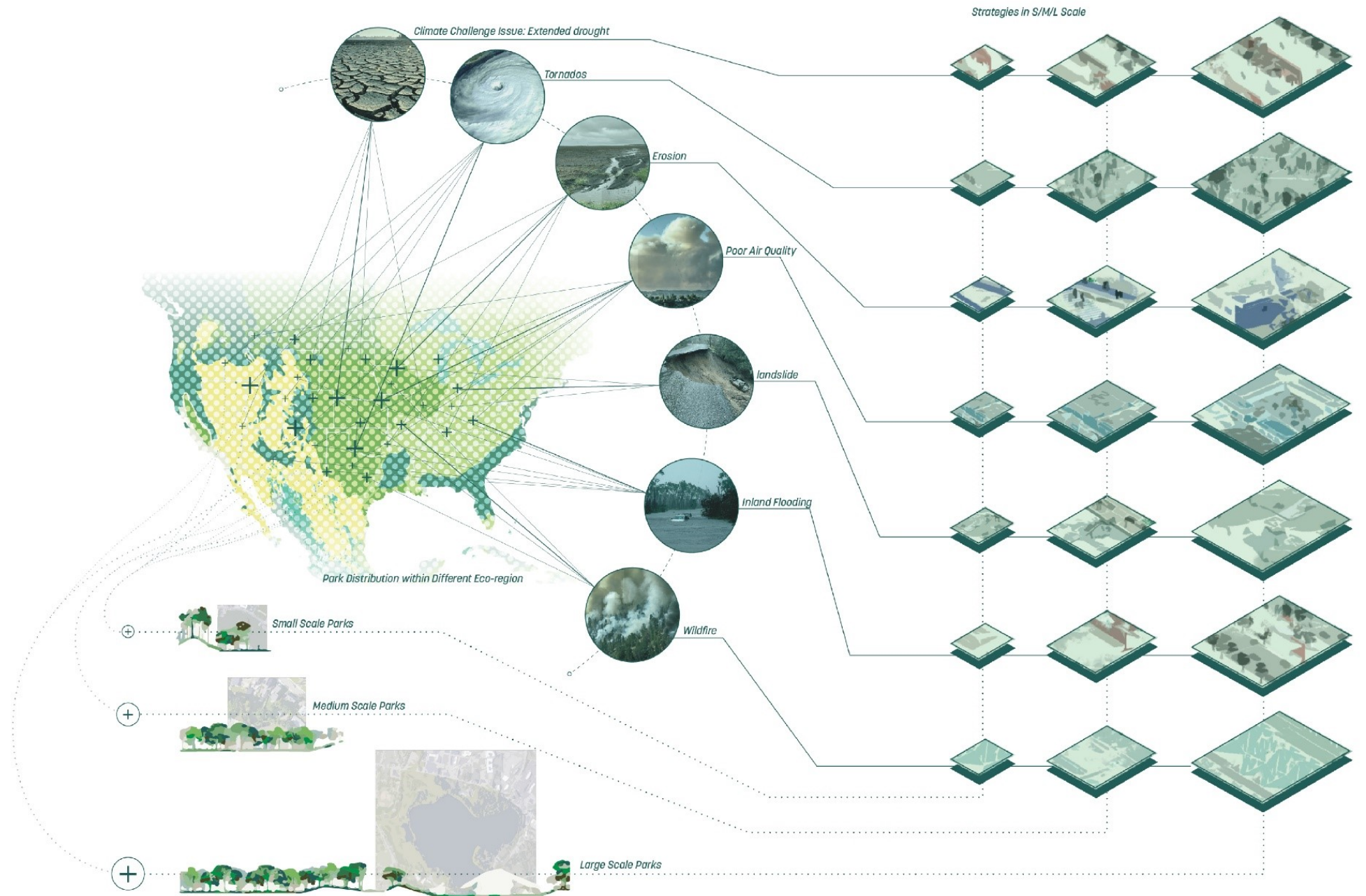


A simple search bar

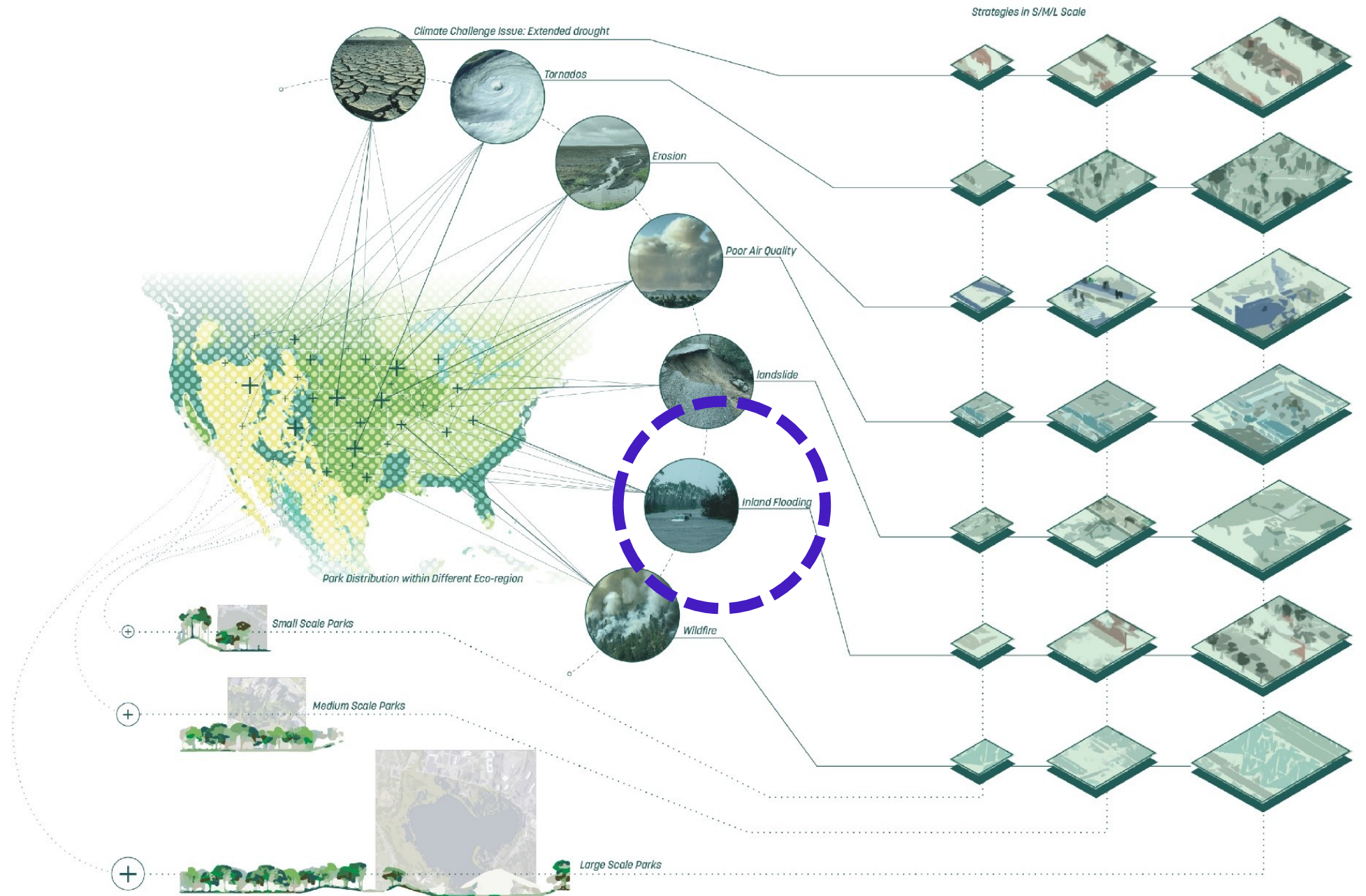
climate.
park.
change.



climate.
park.
change.



climate.
park.
change.



SASAKI

Greenwood Park Baton Rouge, LA



Landscape Architecture,
Architecture, Civil
Engineering, Planning,
Urban Design

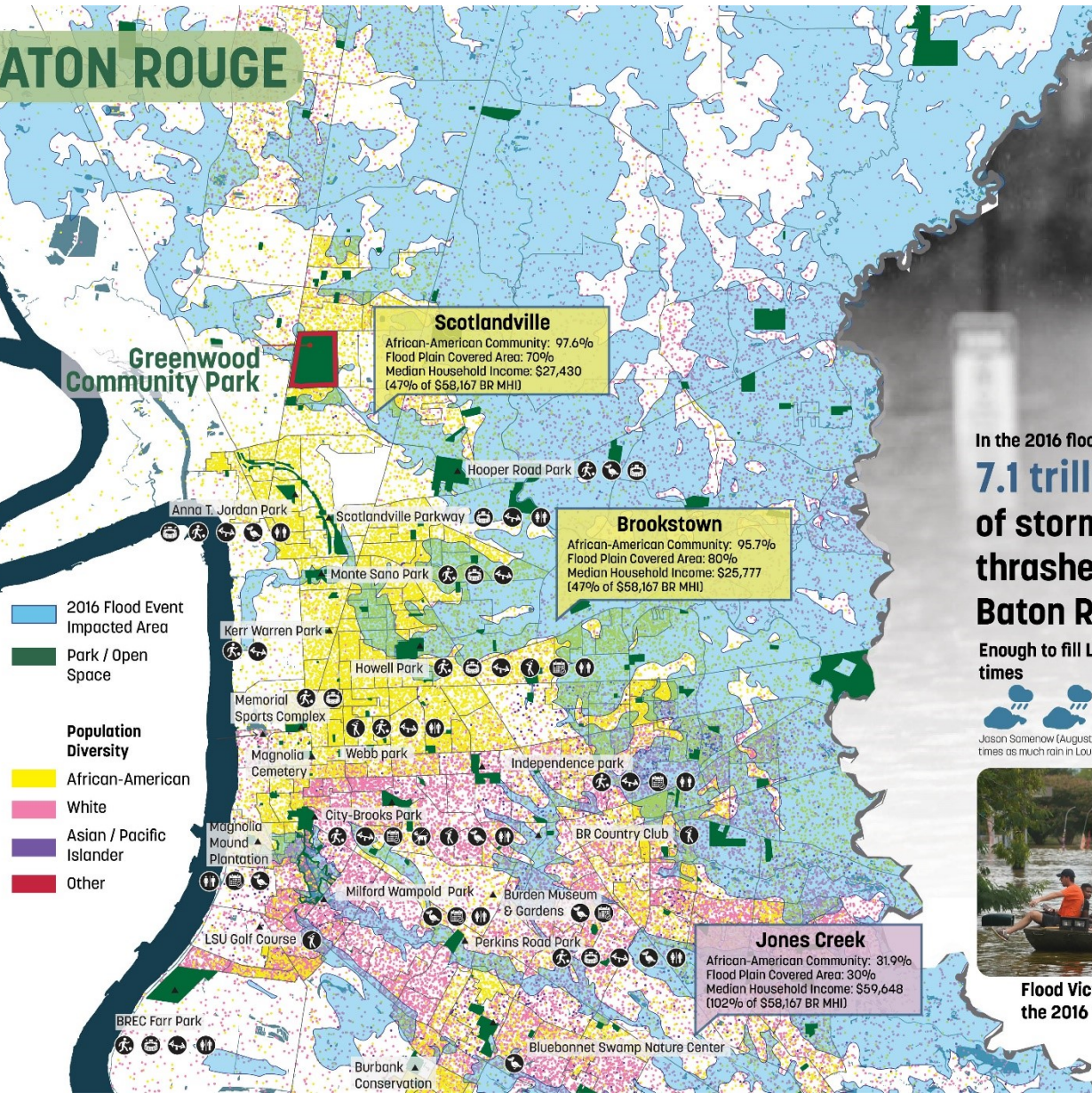


2016 Baton Rouge Floods, 1-in-1,000-year storm event



CLIMATE JUSTICE IN BATON ROUGE

Low-income and African-American communities are disproportionately affected by floods



In the 2016 flood event,
7.1 trillion gallons of stormwater thrashed East Baton Rouge

17,000 of 28,000 rental households impacted in 2016 were very low income

Enough to fill Lake Pontchartrain **4** times



Jason Samenow (August 19, 2016). "No-name storm dumped three times as much rain in Louisiana as Hurricane Katrina". Washington Post



Louisiana Office of the Governor 2016



Flood Victims in Louisiana in the 2016 flood event



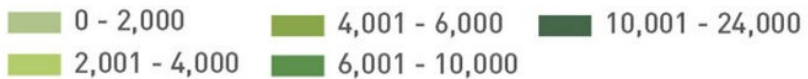
Flooded homes after torrential rainfall in Hammond, Louisiana, 2016

POPULATION DENSITY

There are 4,500 people who live within a 10-minute walk (0.25 mile), and 64,600 people who live within a 10-minute drive (5 miles).

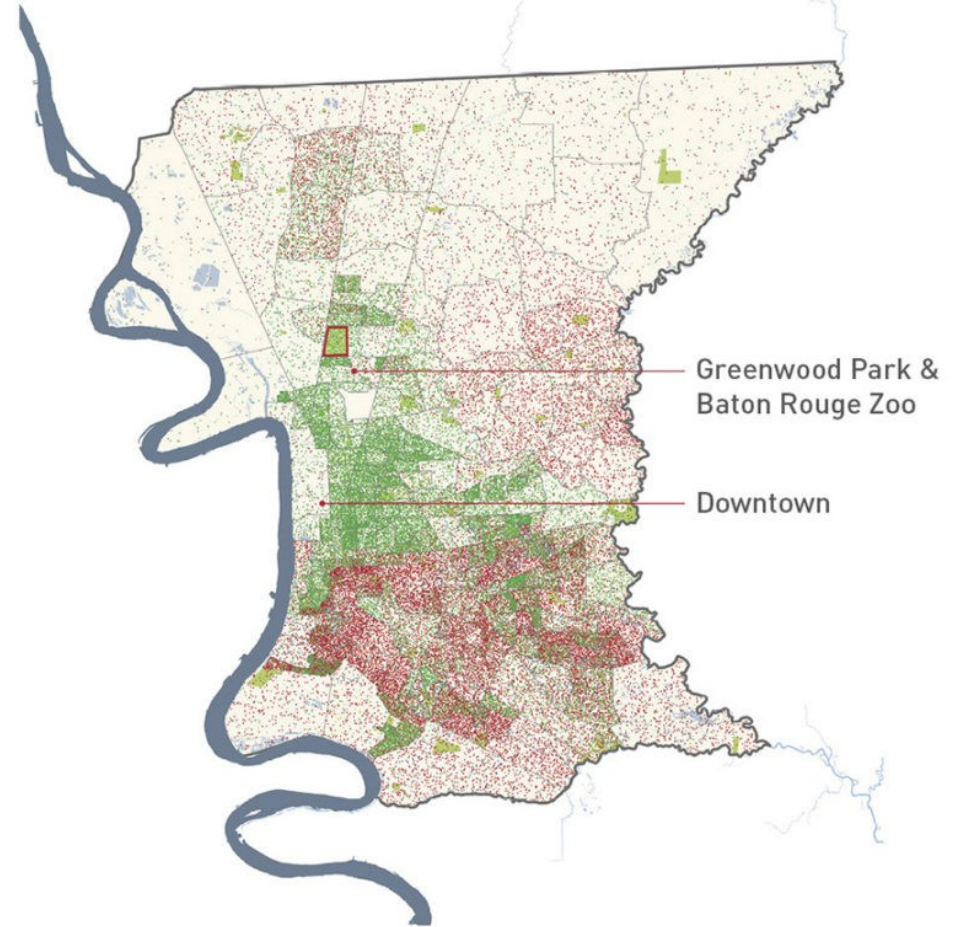


People Per Square Mile



RACE

EBR is home to a diversity of people; the distribution of people by race is concentrated in different parts of the parish.



A HISTORY OF SEGREGATION AND ECOLOGICAL DEGRADATION ON SITE

Enrich the vision for the park's future with an understanding of the past



Current park layout reflect segregation history of Golf Courses

TWO GOLF COURSES

1954 - 1964
J.S. Clark Golf Course was opened to black golfers while Beechwood Golf Course (current Dumas Memorial Golf Course) was only opened to white golfers

- Dumas Memorial Golf Course
- Activity Hub
- Baton Rouge Zoo
- J.S. Clark Golf Course
- Existing Forest

REGIONAL WETLAND

Greenwood Park is surrounded yet fragmented by other natural assets like the adjacent state-owned wetland mitigation bank.

CITY OF BAKER

21% of residents nearby are living below poverty line



100-YEAR FLOOD PLAIN

A large urban watershed that flows into the park contributes to decreased water quality, which altered ecological conditions for both upland and bottomland ecosystems.

Greenwood Park

The BR Zoo



INDUSTRIAL LANDS

With surrounding industrial uses, air quality can be poor, exacerbated by fragmented habitat and declining tree health.

HISTORICAL BAYOU

Historic alignments of Cypress Bayou reveals a direct correlation to flood storage capacity

Historical Bayou

- 1954 Bayou
- 1987 Bayou

Estimated Flood Depth

- 0-1 ft
- 10+ ft

SCOTLANDVILLE

METRO AIRPORT

Regional Highway

To Downtown



Opened in 1954, The J.S. Clark Golf Course was the first in Baton Rouge open to Black golfers.



Hydrology History on Site

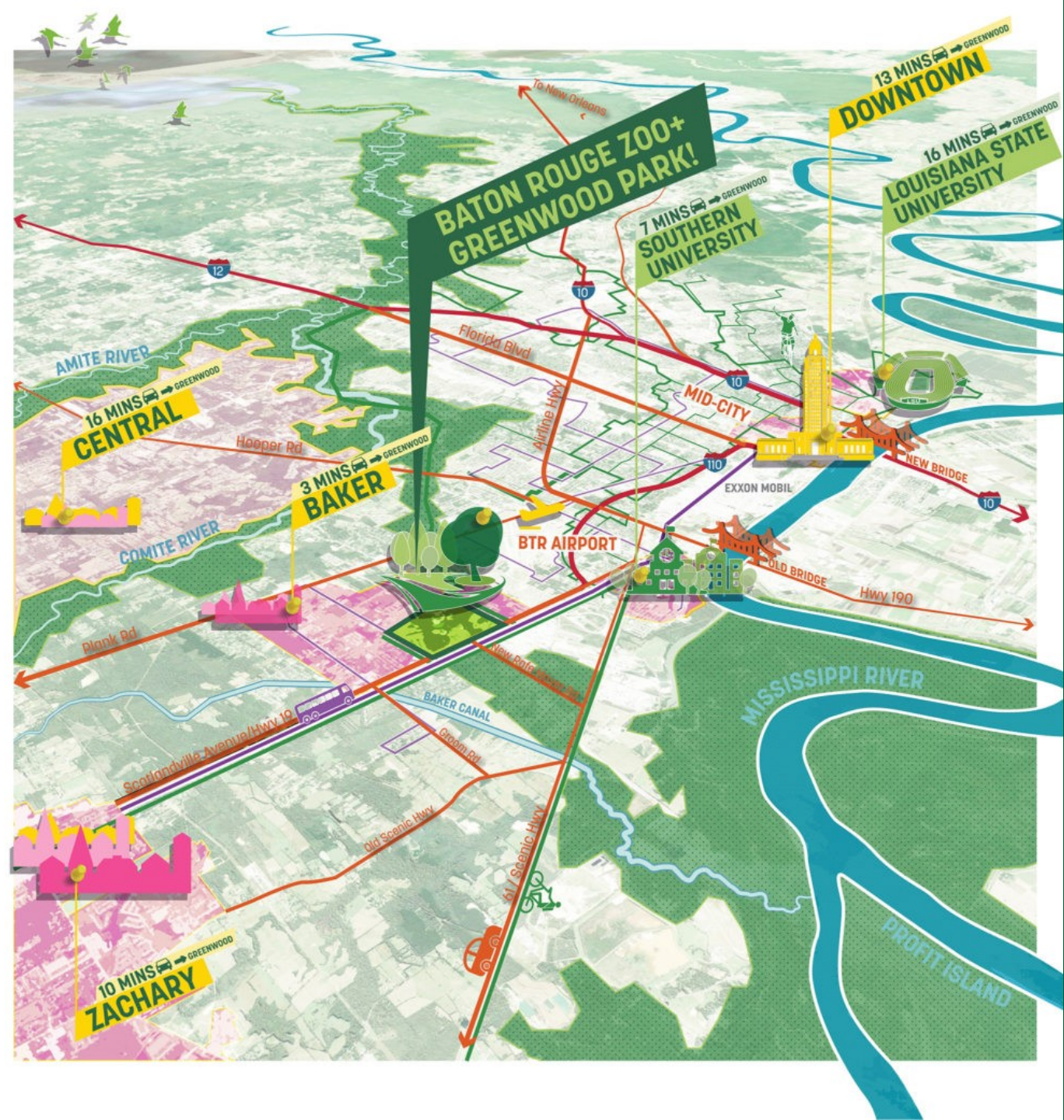


BREC's
BATON ROUGE
ZOO



Creating a Vision

The new Greenwood Park will be a neighborhood park for Baker and North Baton Rouge as well as a regional destination for EBR and beyond!



MANY CONTRIBUTING VOICES...



68 Photos taken at the Instagram activity station



Meeting featured on multiple local news channels



1,881 total gumballs placed on the program gameboard



THOUGHTFUL ENGAGEMENT THAT EMPOWERS COMMUNITY VOICE



4,000+

POINTS OF ENGAGEMENT

781

Public Open Houses +
Door-to-door Survey



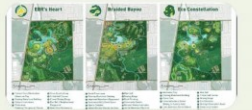
1,362

Views on Public Meeting's
Facebook Live



1,306

Online Survey
Responses



273+

Face-to-face
Encounters



400+

Responses to Various
Media Surveys



50

Stakeholder Meetings



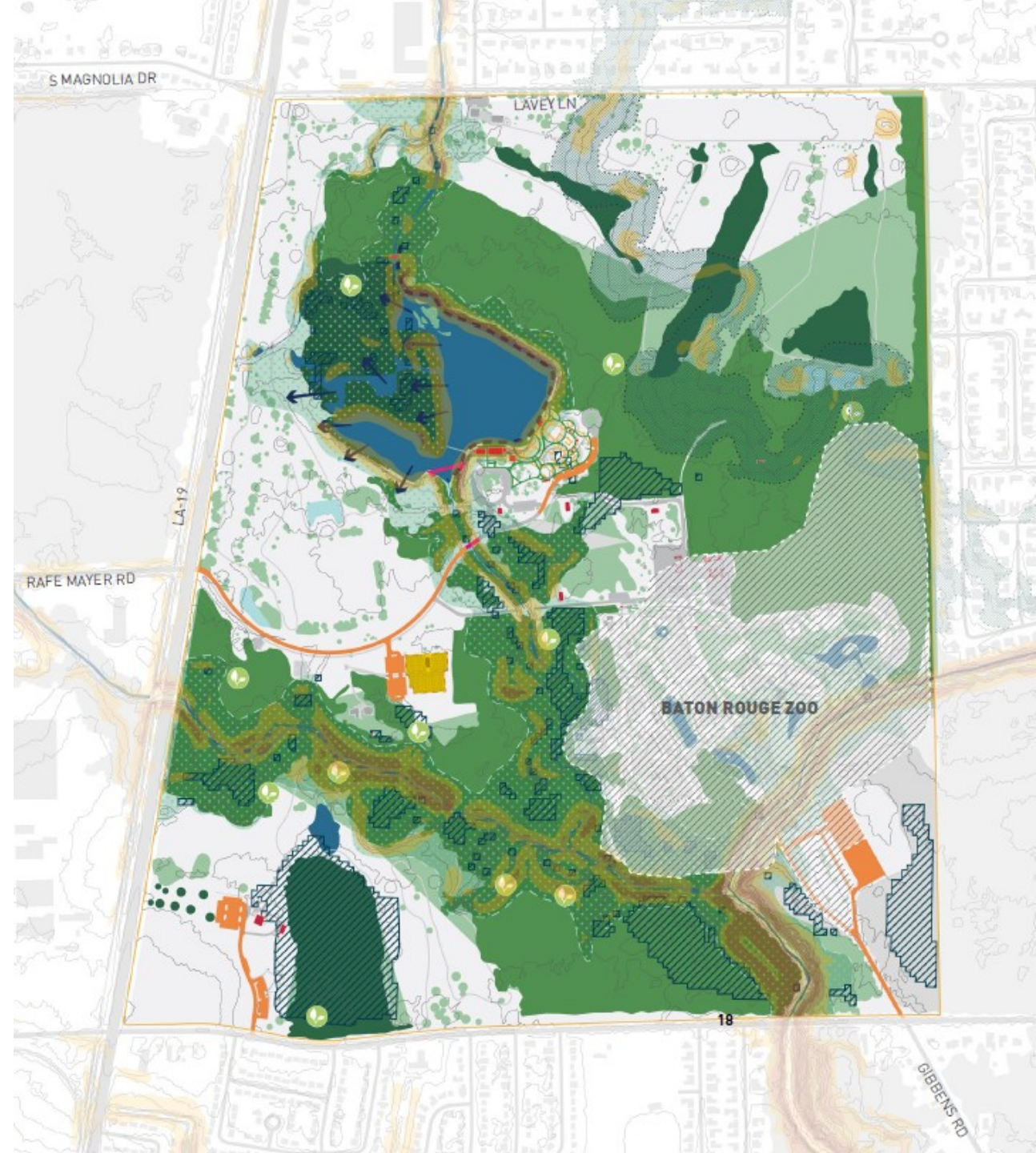
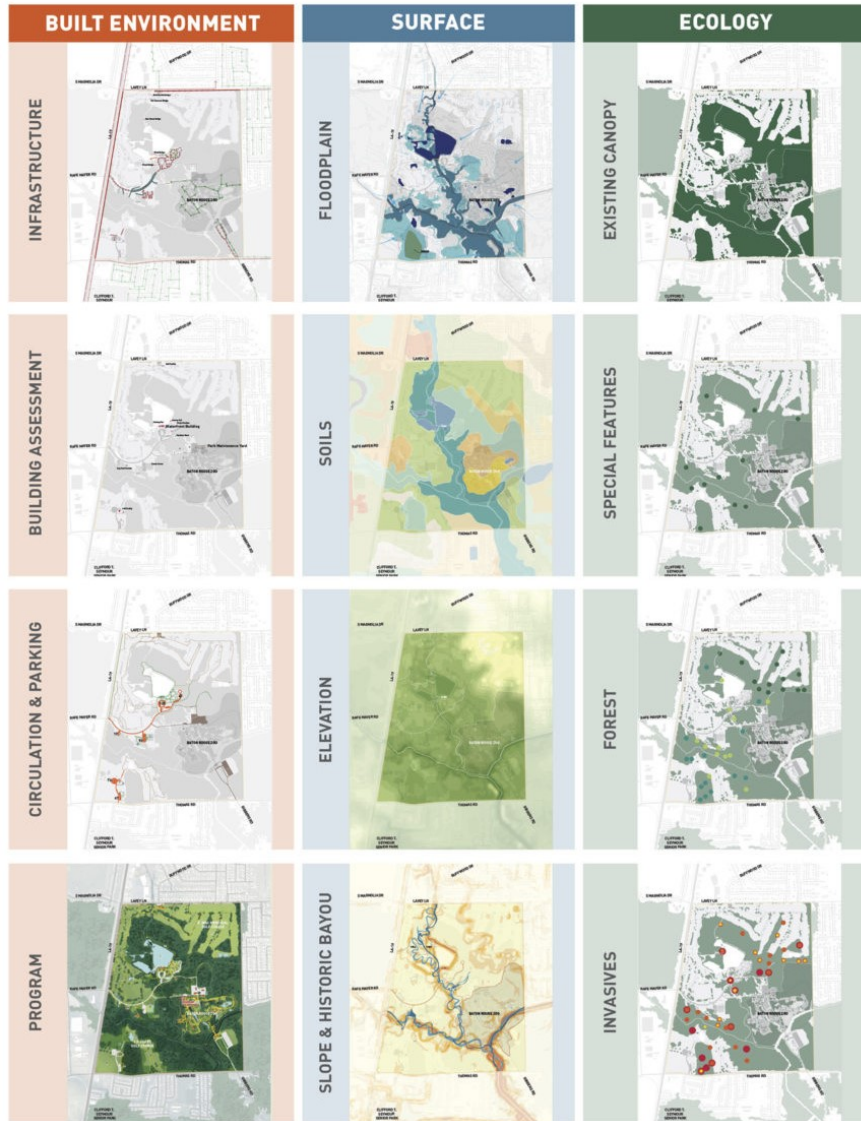
1,000+

Attendees of Party in
the Park



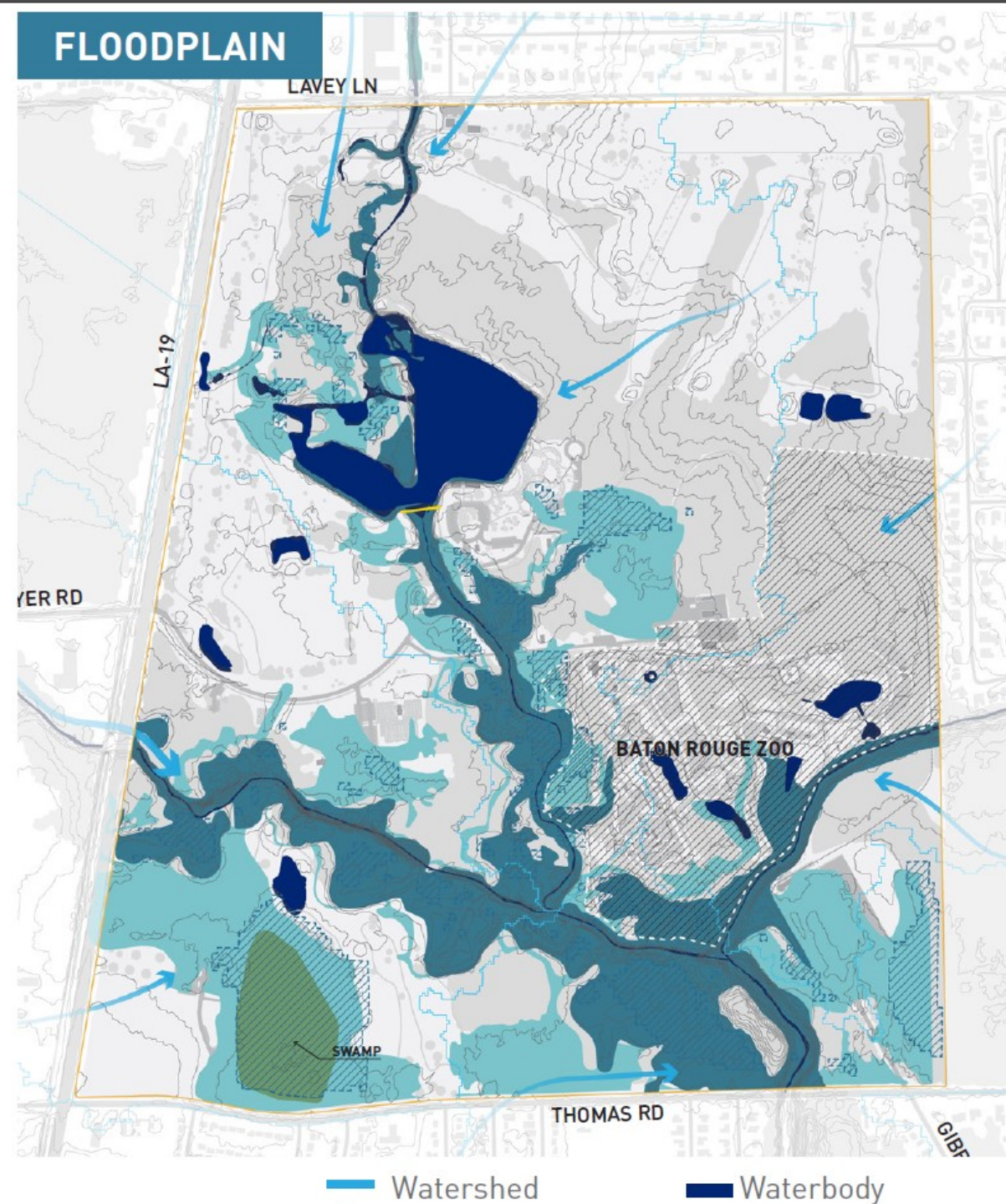
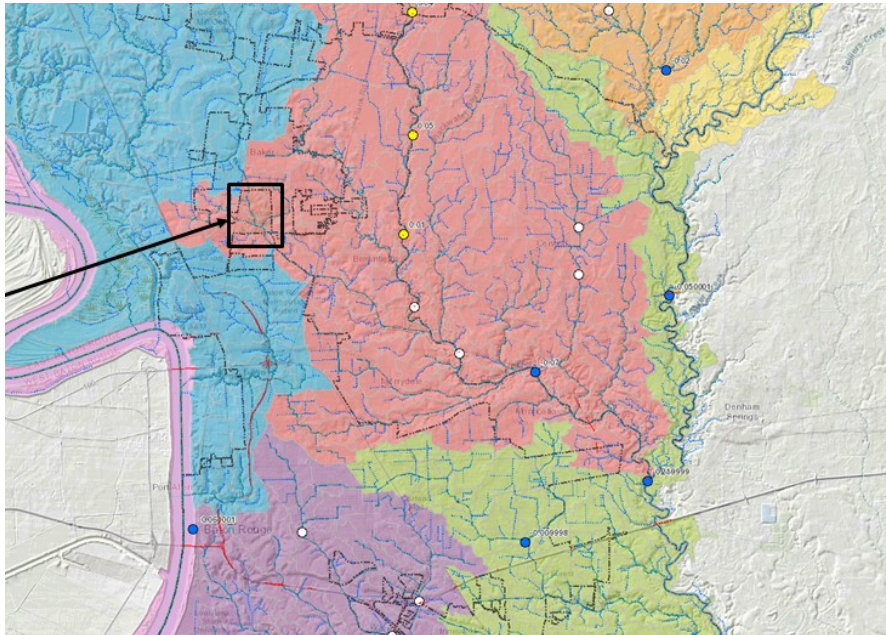
Mapping Landscape Systems

Overlaying Existing Conditions



Floodplain mapping at Greenwood Park

1. Phase 1 development will be mostly in a floodplain
2. Opportunity to create watershed impacts, not adversely impact downstream areas



Understanding the existing (old school!) engineering solutions at Greenwood Park

Getting water from point A to B as quickly as possible –
Channelization and Culverts

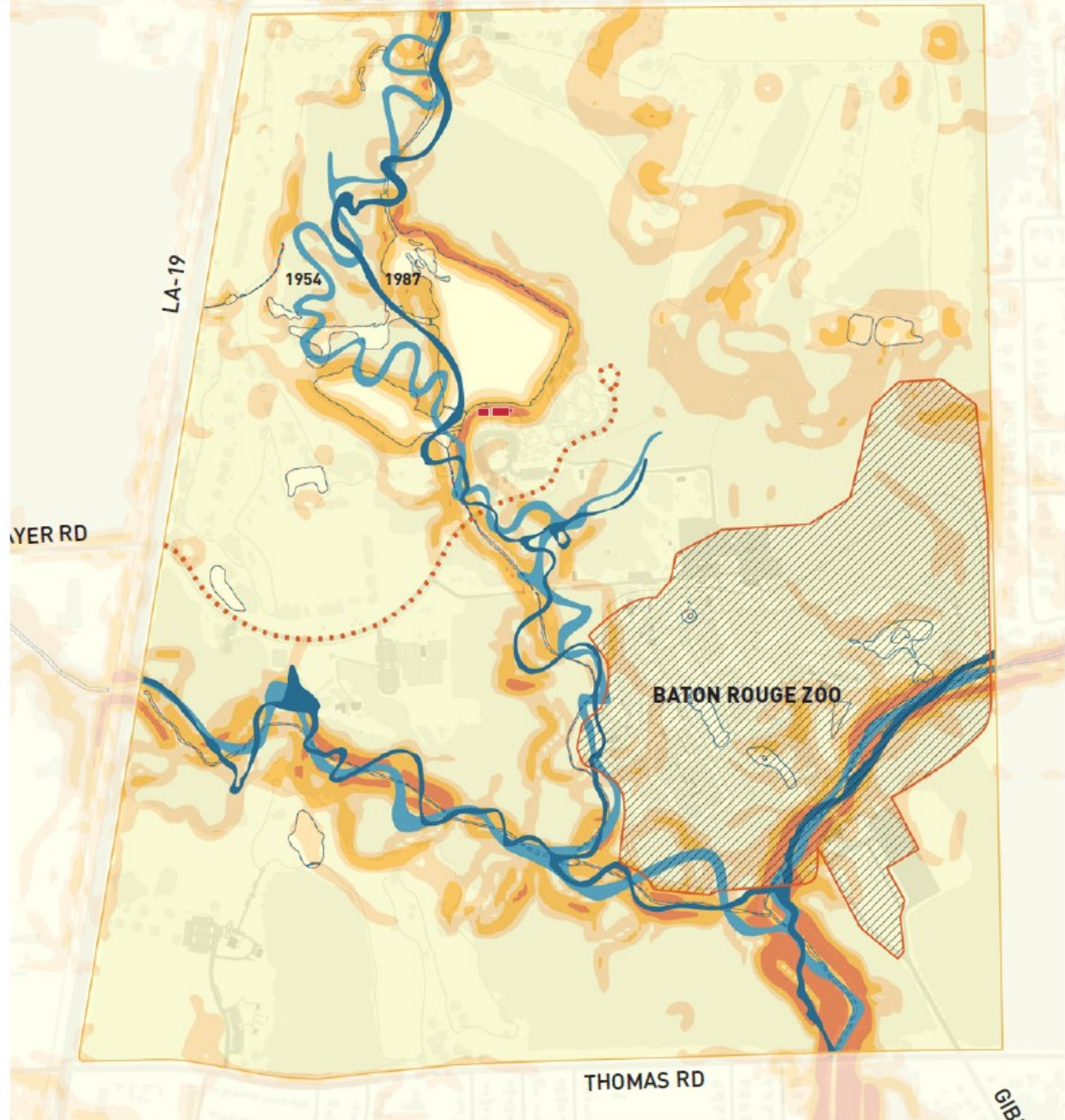


Holding back water - Dams

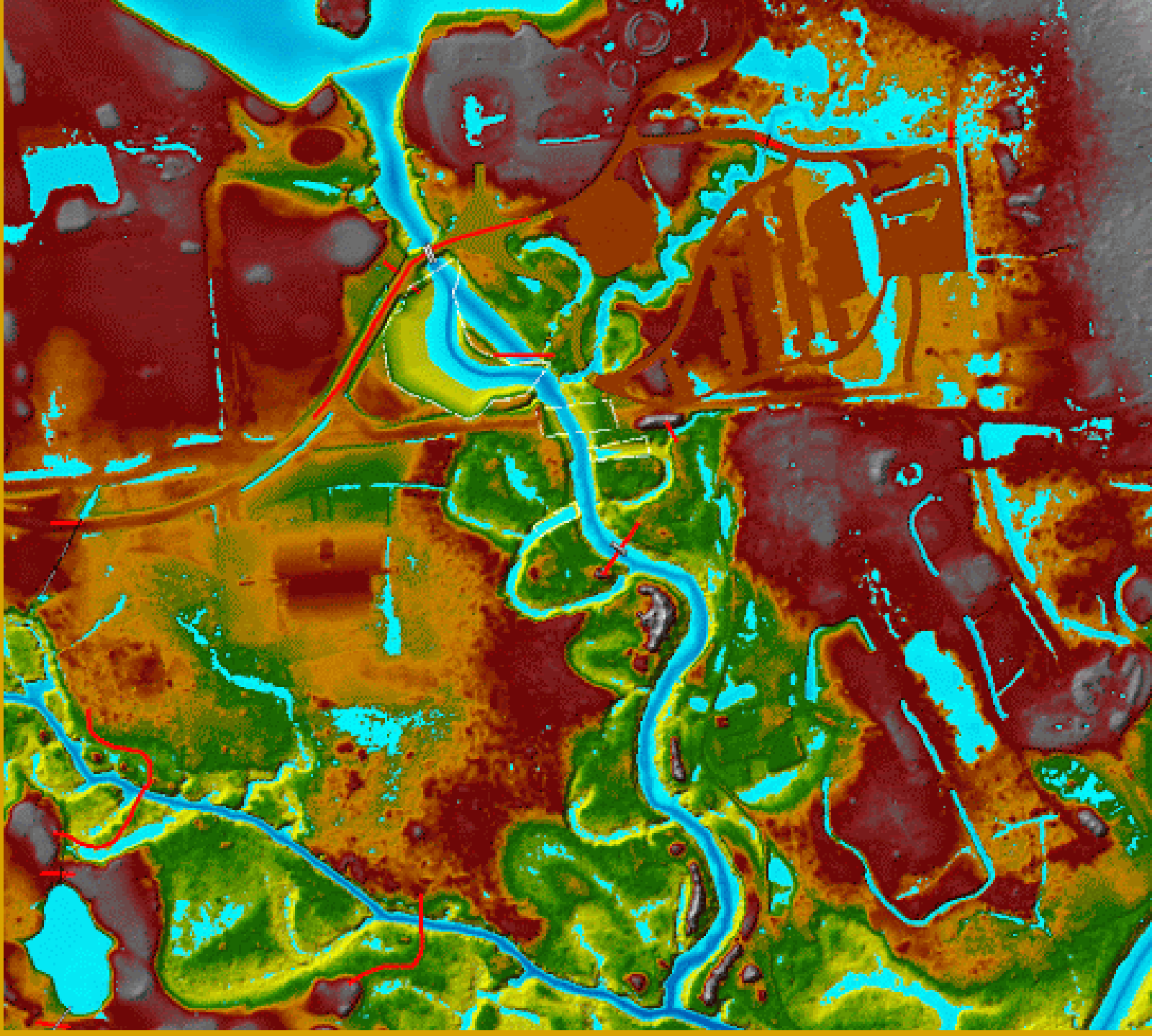


What is a Bayou?

- Native to our project site! Most notably found in the **Mississippi River Delta**
- Not a river or stream! **Flat, marshy, soggy, slow moving**
- Shallow, heavily wooded/vegetated
- **Meant to flood!** Act as a natural barrier/protection in storm surges
- Critical for sediment deposition and improved water quality of the watershed



Let's Start Problem Solving!

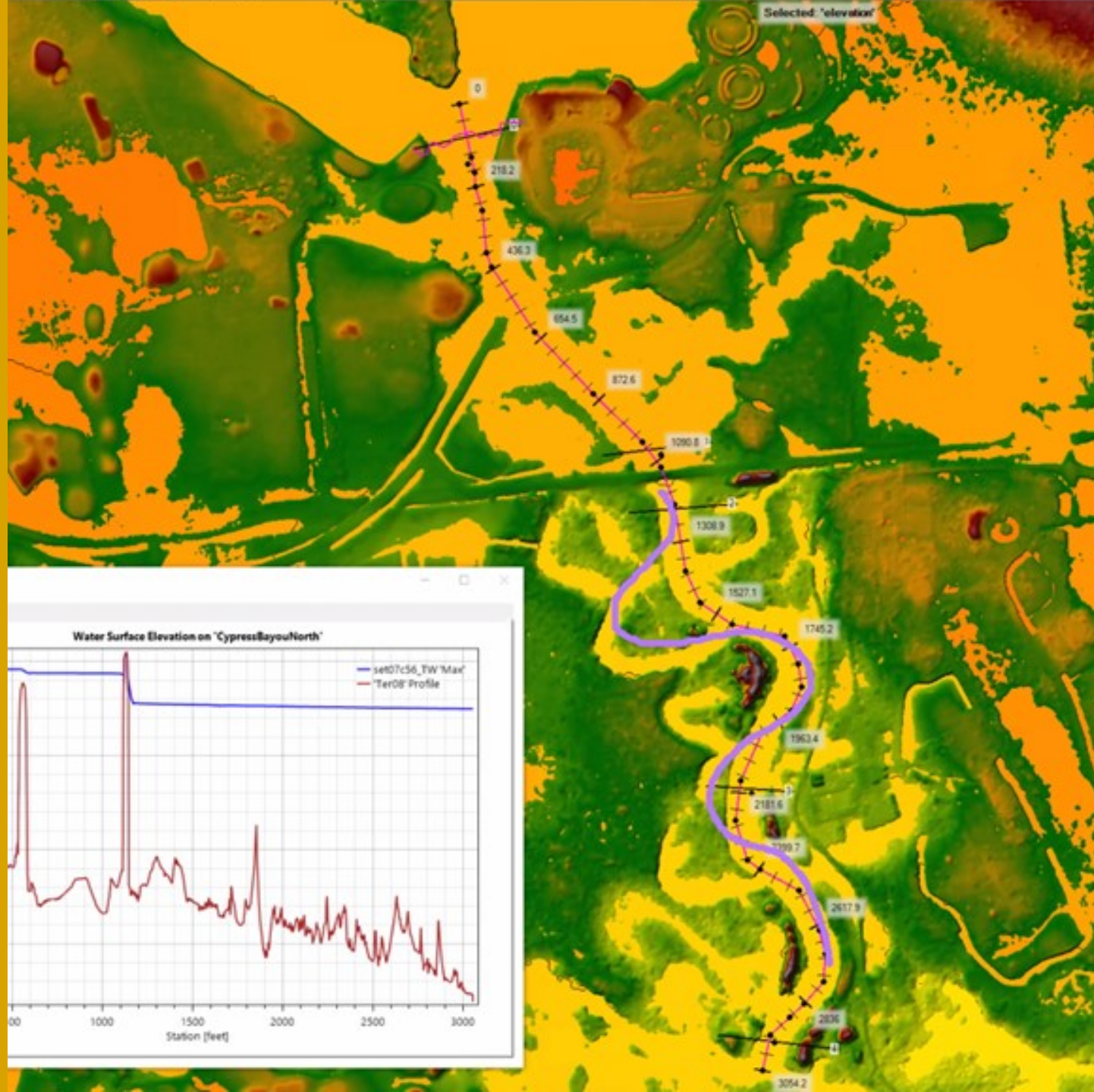


Design Goals

Decrease total slope of channel (existing slope is 0.2%)

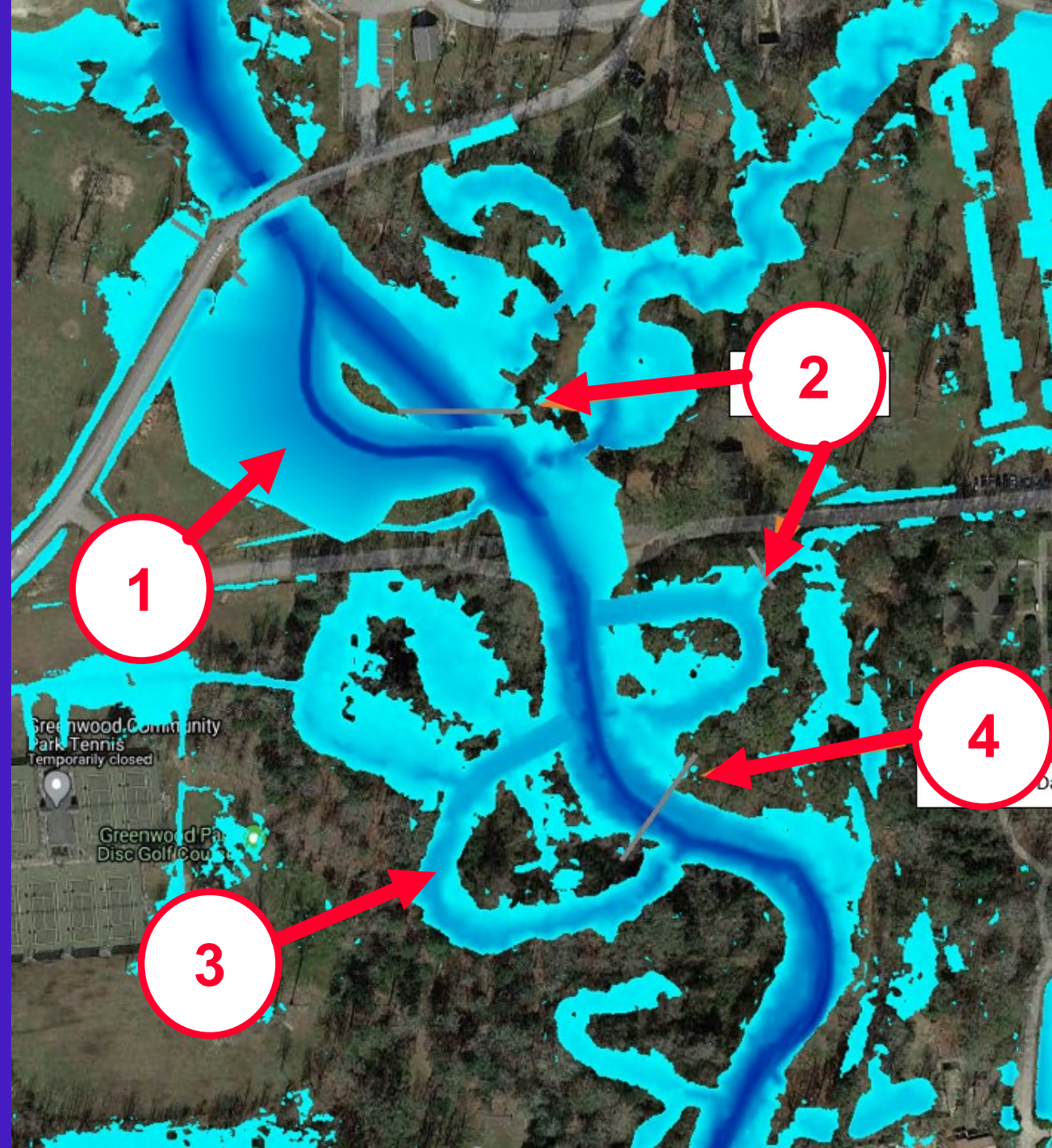
Increase total channel length

Decrease or mitigate hydraulic jumps in system



Design Results

- 1 – Major regrading effort to set back slopes and create a wetland bench
- 2 – Minor grade changes to activate bayou from site runoff
- 3 – Activate historic meanders
- 4 – Earthen dam with culverts (keep needed channelization to mitigate hydraulic jumps)
- 5 – total length increased by 160%

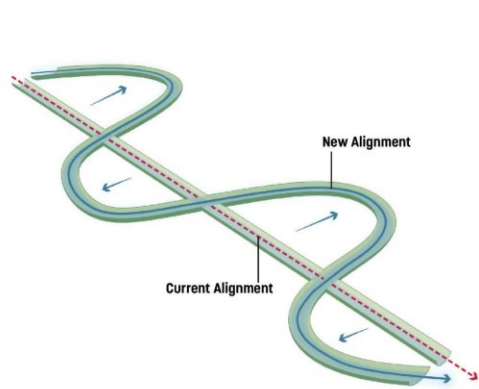


WORKING WITH LAND & WATER

Channelized bayous are connected to historic meanders previously cut off.

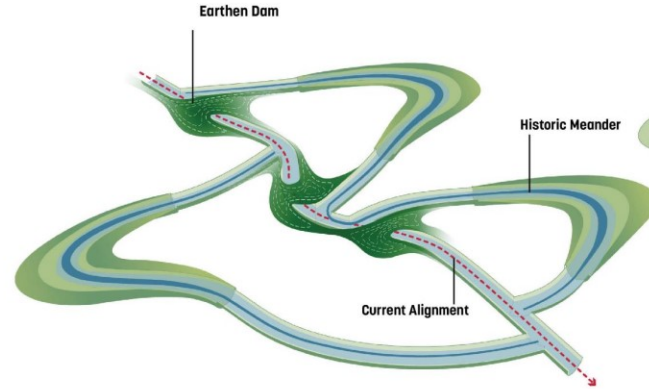
A combination of Bayou Restoration Strategies **lowers the 100-year storm elevation leaving the park by 6 inches**

- Existing Bayou Channel
- New Bayou Channel



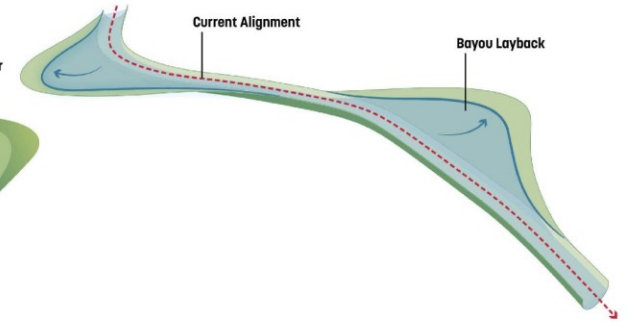
Strategy 1: Extend the Bayou

Extend the linear footage of the channel alignment to increase residence time and slow flows



Strategy 2: Reconnect the Bayou

Connecting existing channels to historic bayou meanders, adding additional storage during flood events



Strategy 3: Expand the Bayou

Layback the bayou banks to increase biodiversity and area for flood control



10-year Storm



20-year Storm



50-year Storm



100-year Storm

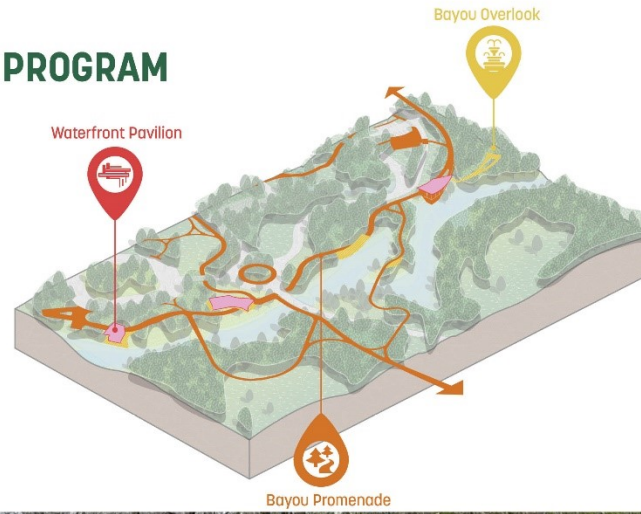
Fine Tuning Modeling Results: H&H Analysis of Proposed Cypress Bayou Realignment

BAYOU RESTORATION

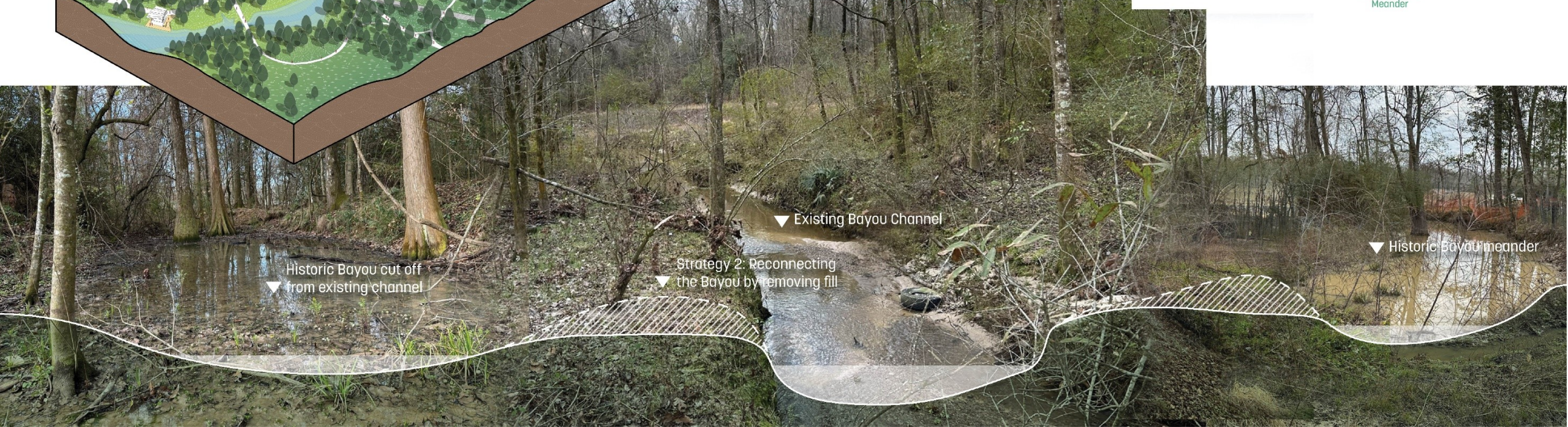
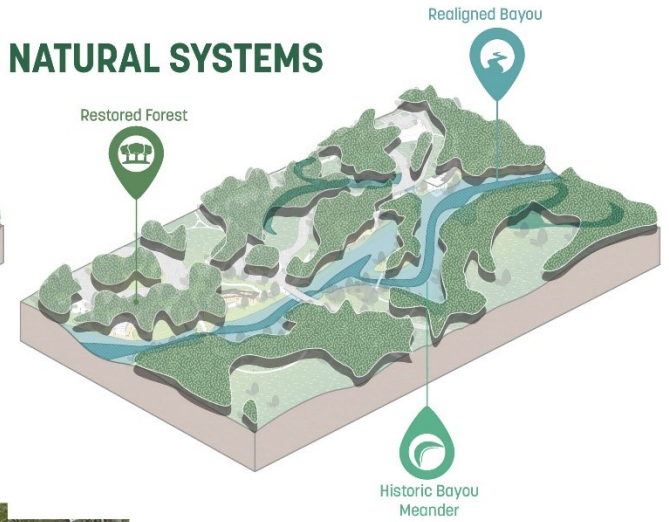
Expanding flood capacity with increased public access to native habitats



PROGRAM



NATURAL SYSTEMS



RESTORING ECOLOGIES

Strategic restoration efforts manage invasive species and promote long-term ecosystem health with native habitats.

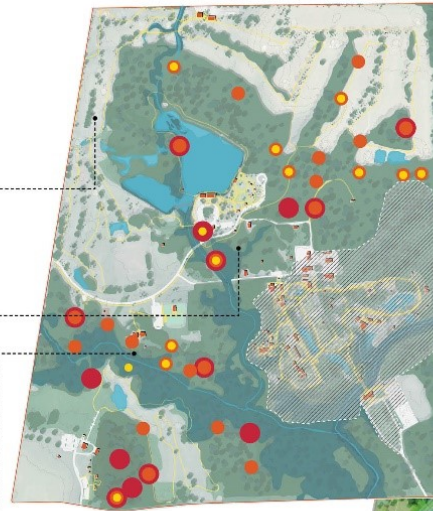
40% of Existing Site is Mowed Golf Course



Existing Hardwood Slope Forest



Invasives Species Assessment

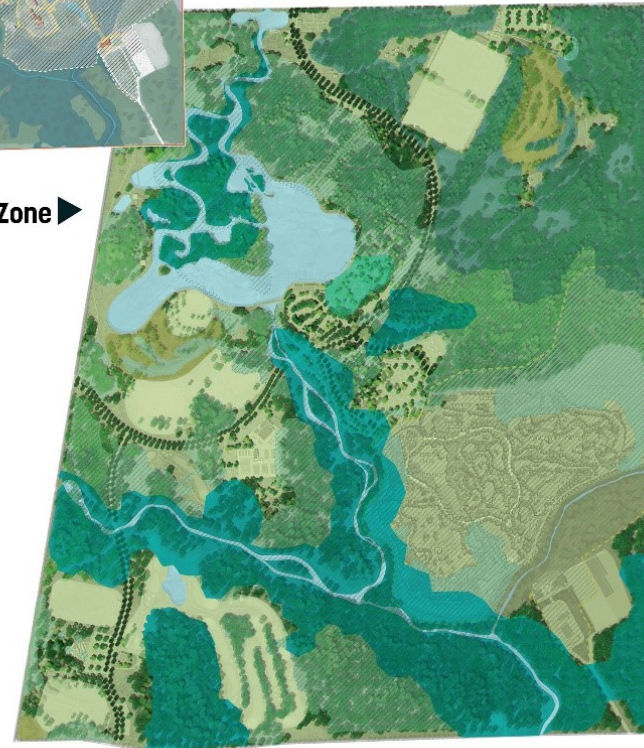


Existing Forest and Invasive Species Map

- Existing Forest
- Golf Course
- Zoo
- Activity Hub
- Herb Invasives
- Shrub Invasives
- Tree Invasives

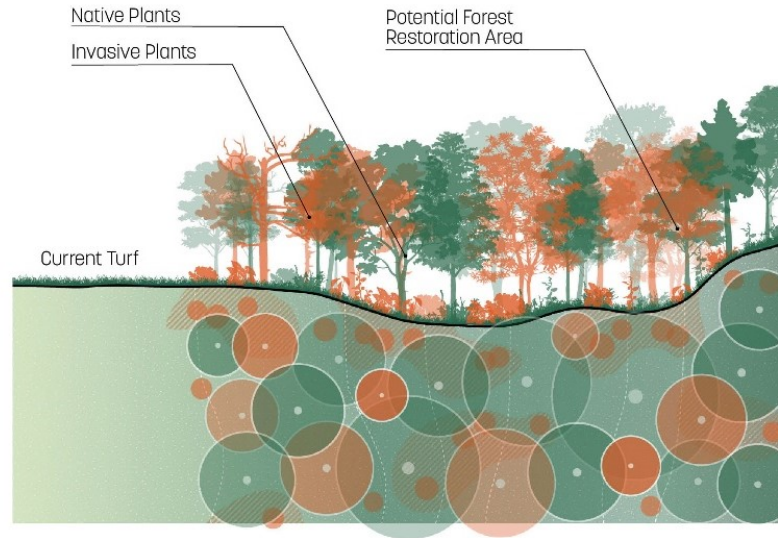
Proposed Ecological Zone

- Upland Forest
- Bottomland Hardwood Forest
- Wetland
- Water body
- Native Meadow
- Botanical Landscape
- Programmed Lawn
- Low-mow Open Grassland
- Existing Forest Zone

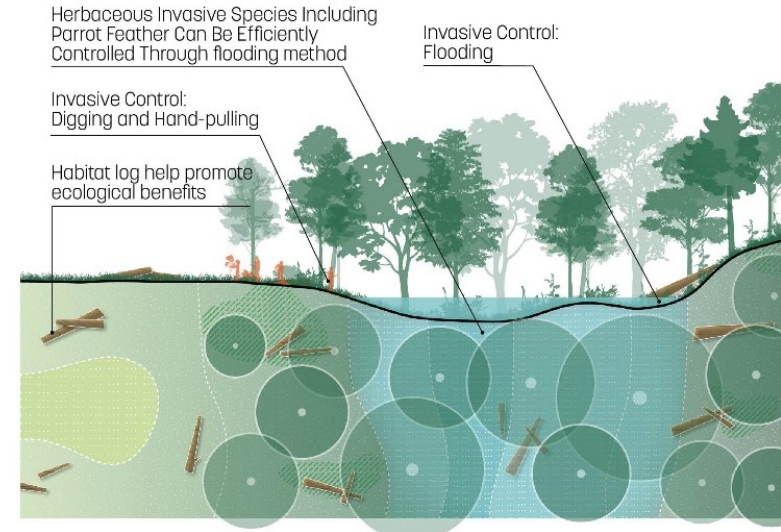


FOREST RESTORATION PROCESS

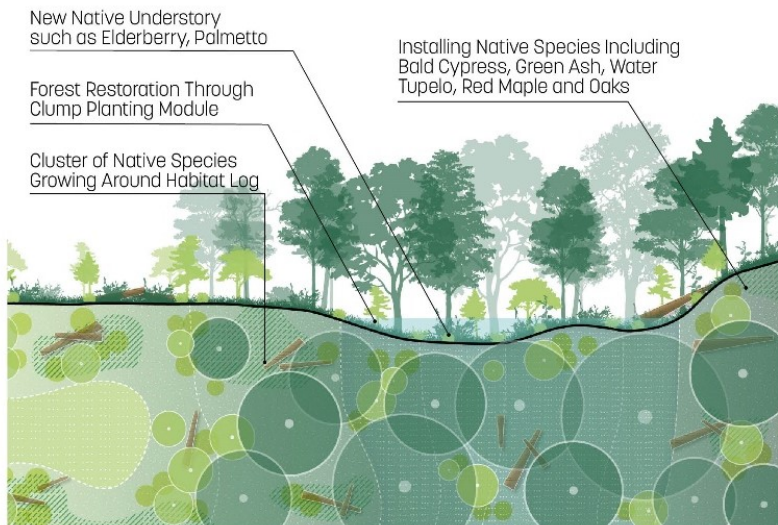
Step 0 - Existing Forest with Invasive Species



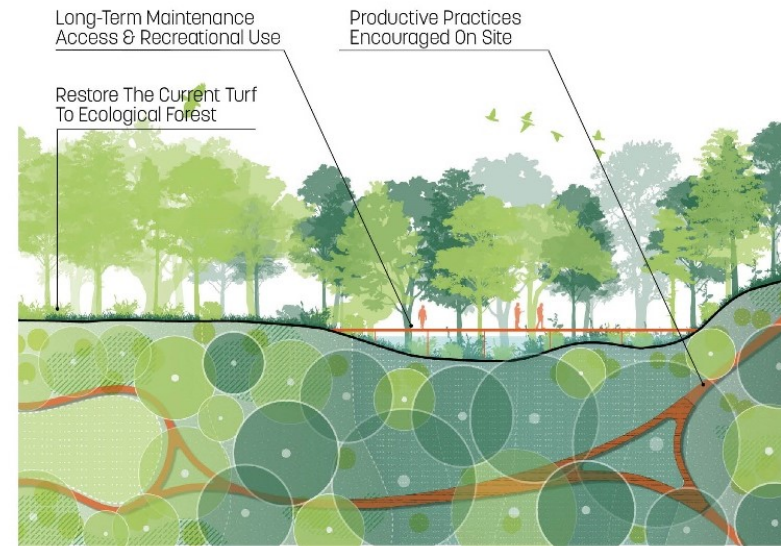
Step 1 - Control Invasive Species through Landscape Process



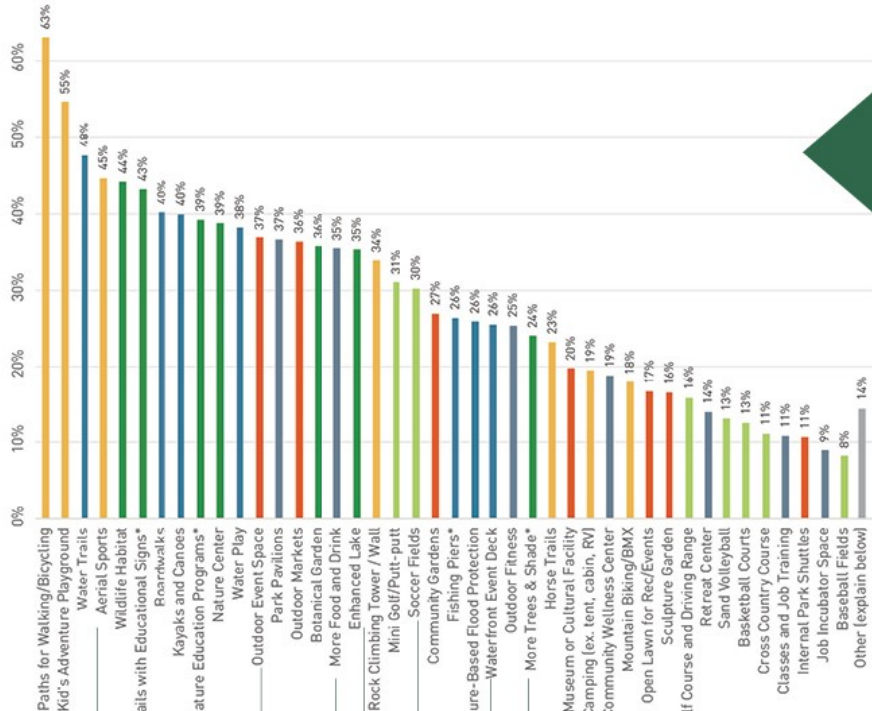
Step 2 - Propagate and Install Native Species



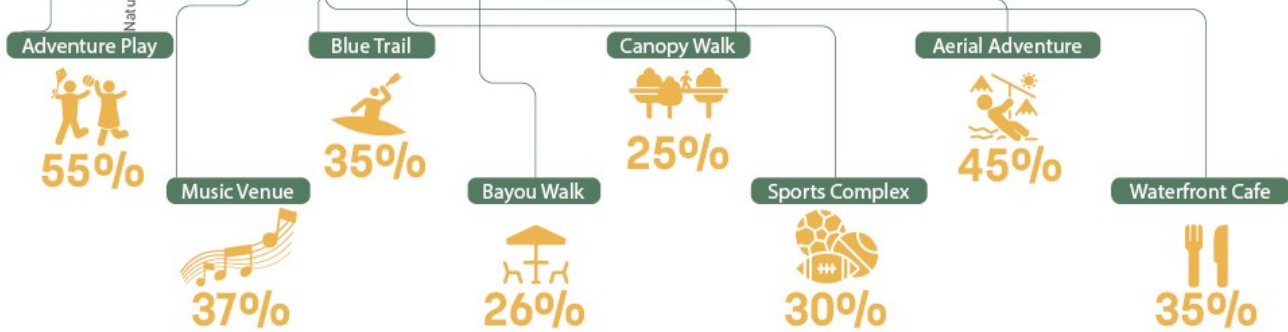
Step 3 - Long-term Forest Restoration



Park Impacts: Filling a Gap in Recreation and Outdoor Experiences



Community Engagement and Market Analysis were brought together to develop a robust metrics driven program for the park.

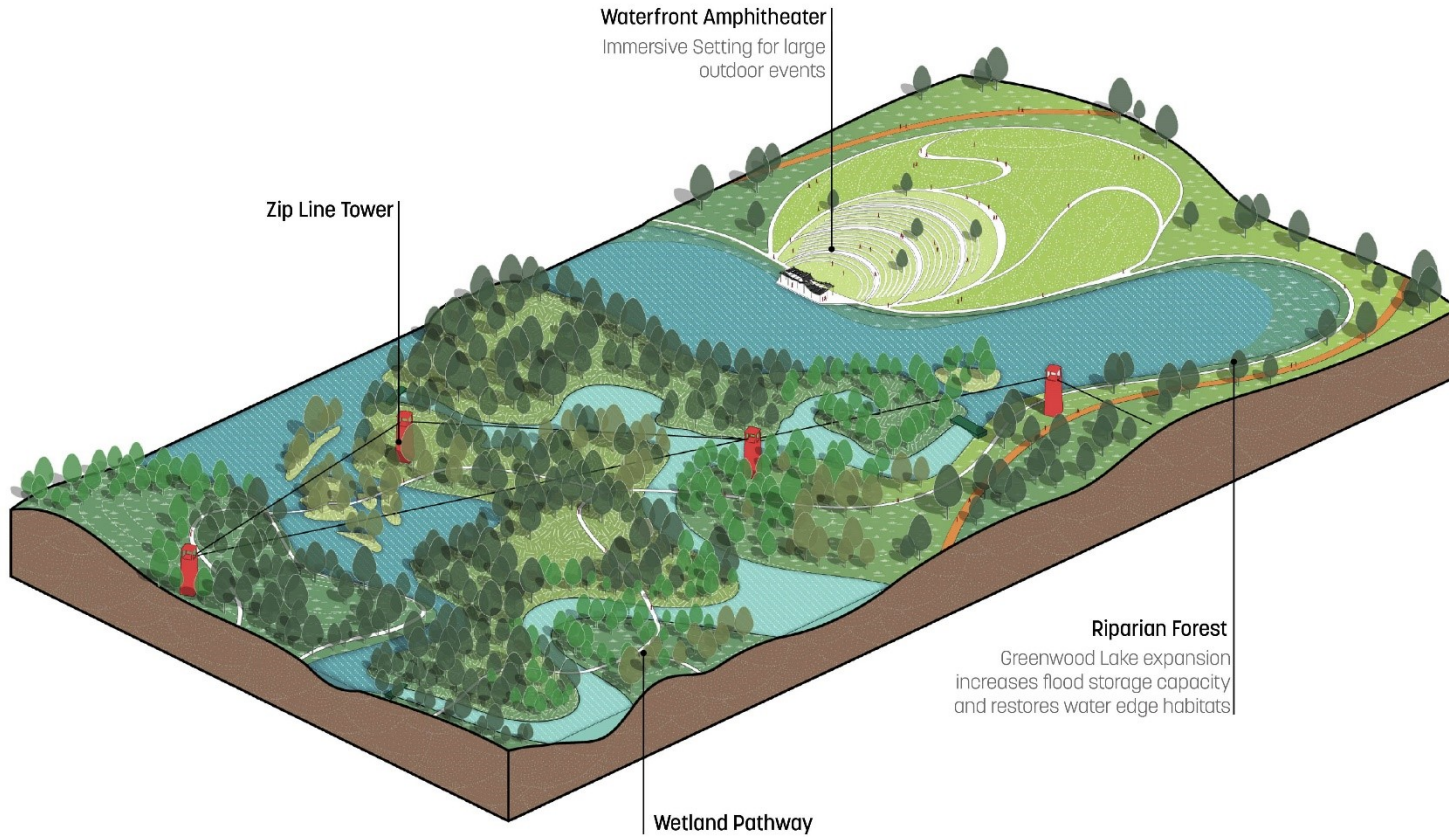


- Environmental Engagement
- Outdoor Adventure/Recreation
- Play and Recreation
- Arts and Culture
- Water Activation
- Other Community Amenities

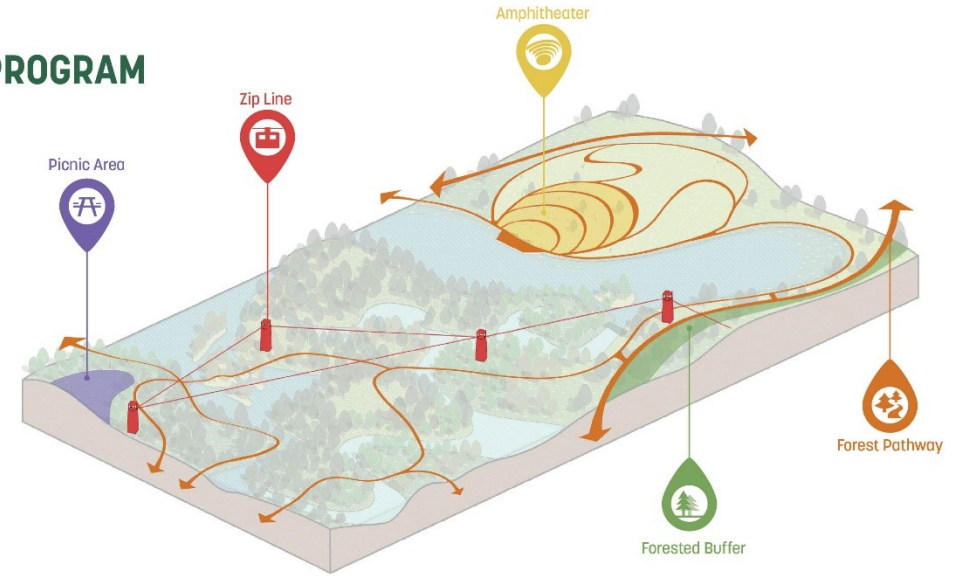


MAJOR MOMENTS

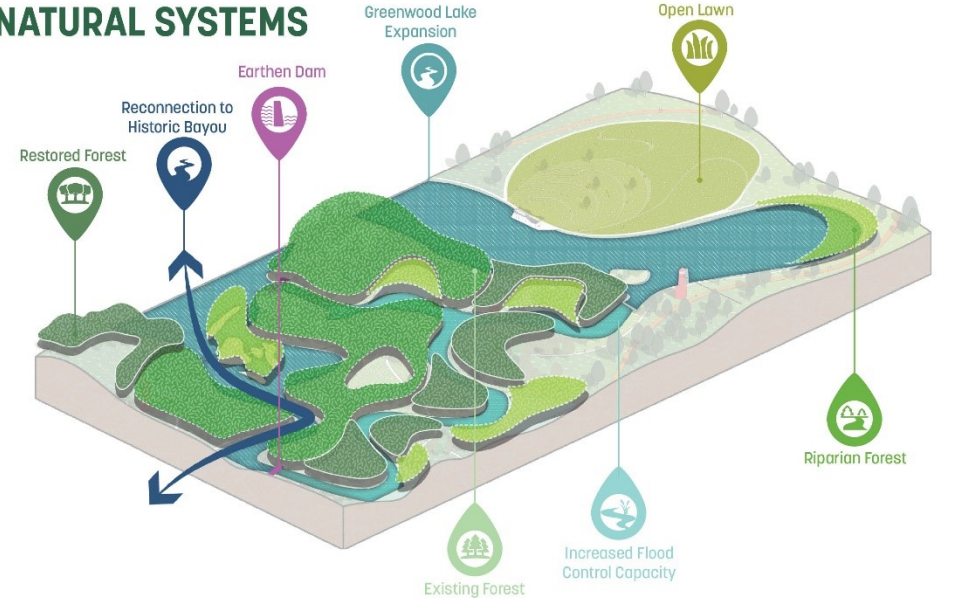
Combining New Regional Destinations with Major Infrastructural Upgrades



PROGRAM



NATURAL SYSTEMS



THE BIG DAY



Restored Bayou

Zip Line Towers

Greenwood Lake Expansion

Outdoor Event Venue

Amphitheater

Accessible Pathways

A NEW HEART

Connecting the Zoo and Park in a Grand Celebratory Moment

Restore Lost Native Habitat Types

Preserve Existing Prairie Tree Canopy

Provide Space for Regional Schools

Connect to the Park and Local Communities

Demonstrate Commitment to Sustainability

Celebrate the Local Baton Rouge Flora and Fauna



ACCESS TO NATURE

Program and circulation facilitate public exploration and education

◀ Preserve Existing Trees

Provide Learning Opportunities in Nature

Accessible Gatherings Spaces Along Cypress Bayou

Connect the Park to the New Zoo Entry

Enhance Bayou Habitat ▶

Nature walks connecting to habitat

◀ Existing Condition



THE EVERYDAY

Large-scale children's
adventure play environment

Sensory Gesture For People
With Movement Restriction

Louisiana Black Bear
Themed Play Environment

Multi-generational
Environments For Families

Nature Based
Exploratory Play

Fully Accessible
Play Environment



BUILDING LONG-TERM COMMUNITY OWNERSHIP & TRUST

“How a failed effort to move the Baton Rouge Zoo pitted officials and citizens against one another...”

April 27, 2018



HOW A FAILED EFFORT TO MOVE THE BATON ROUGE ZOO PITTED OFFICIALS AND CITIZENS AGAINST ONE ANOTHER

By Benjamin Lopez | April 27, 2018

Local news, April 27, 2018

2018-2019

Greenwood Master Plan and Engagement Process Started



“BREC’s critics, supporters cheer plans for Baton Rouge Zoo and Greenwood Park... It’s like a Dream.”








Local news, April 16, 2019

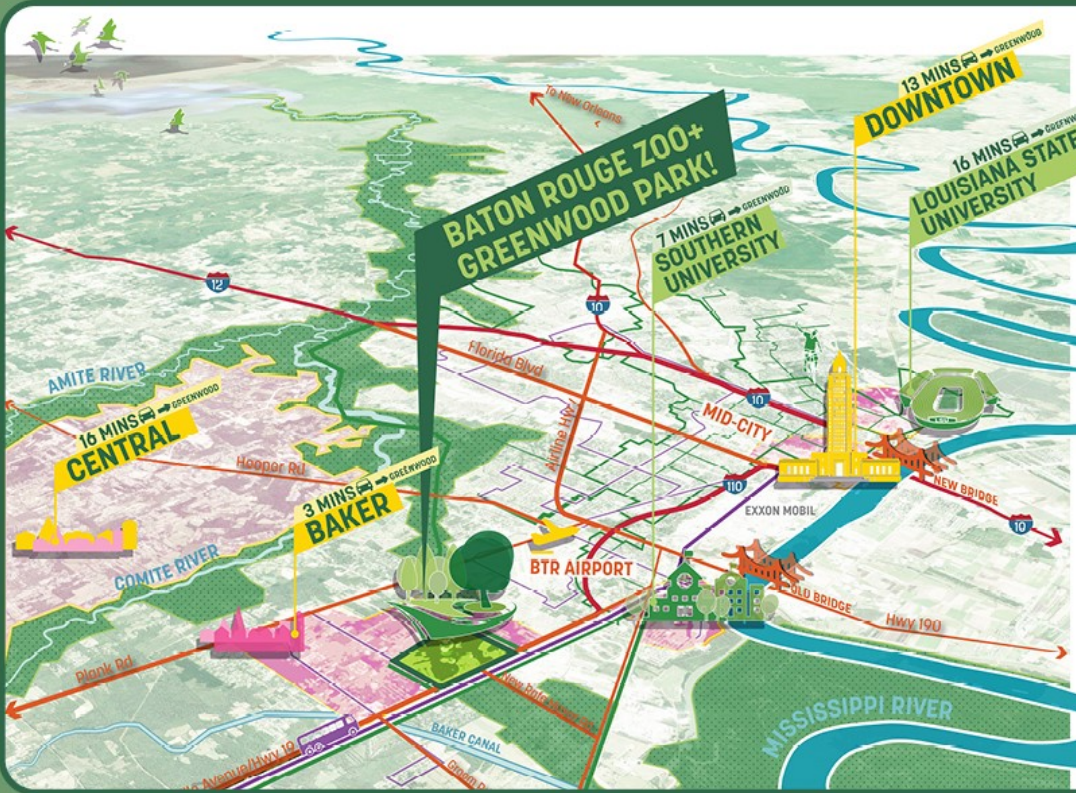
Flip the Script... April 18, 2019

Park Impacts: Implementation in a Way that Provides Local Good, Not Displacement

Goals for Community Investment

Strategies

	 G1 Celebrate the Unique Community	 G2 Provide Amenities + Opportunities	 G3 Connect People to the Park	 G4 Grow Long-Term Economic Strength	 G5 Catalyze Growth by Supporting Others
S1 Mission-Aligned Program Opportunities	+	+		+	+
S2 Revenue Generation Opportunities	+	+		+	+
S3 Infrastructure Upgrades		+	+	+	+
S4 In-Park Catalytic Development	+	+		+	+
S5 Select Opportunity Sites		+	+	+	+
S6 Long-Term Land Use Changes + Challenges			+	+	+



200%
Reduction in
Maintained
Turf Grass

10 mi
In New Trail
Connections

25%
Reduction in
Downstream
Flood Output

30%
DBE/SBE/MBE
Contractor
Participation
in Phase 1

500%
Increase in
accessible
program spaces

\$47M
Phase 1
Construction
Value

News Article

BREC gets \$4.7M for Cypress Bayou flood mitigation project

DATE: Jul 12, 2021

PUBLISHED IN: [Baton Rouge Business Report](#)

BREC has secured funding for a Louisiana Watershed Initiative project to help reduce flood risk in areas surrounding the Cypress Bayou watershed, which is just south of Baker and includes BREC's Greenwood Community Park.

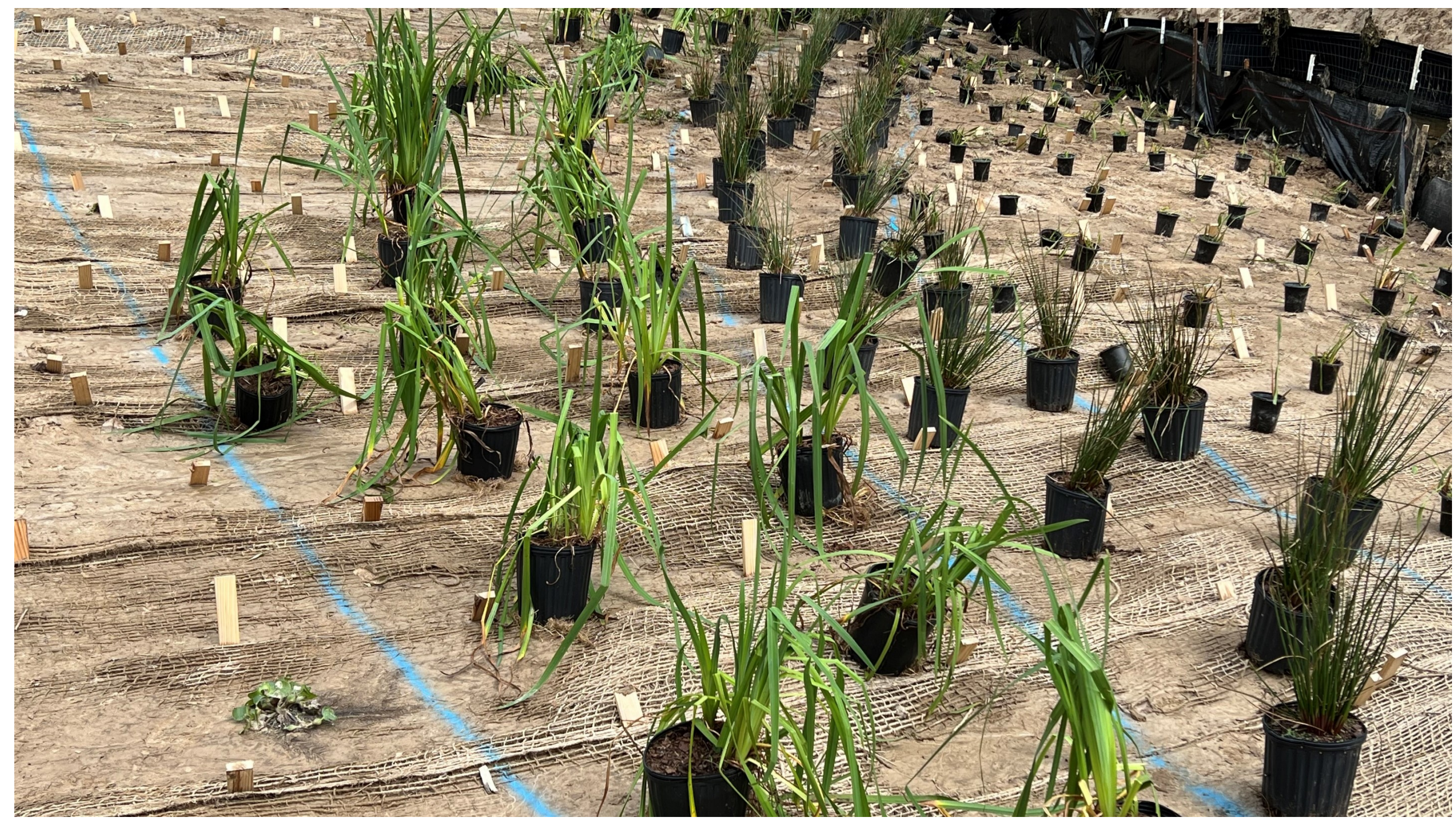
The agency today received official notice that it has secured about \$4.7 million in funding for the Cypress Bayou green infrastructure project. Plans include retaining water in the 660-acre Greenwood Community Park and flushing or releasing water slowly downstream, resulting in flood risk reductions to approximately 14,000 residents in the north Baton Rouge and Baker areas.

In a prepared statement, BREC Superintendent Corey Wilson says the funding will help mitigate the impact of rising construction costs, which are affecting not only this park improvement project, but dozens currently underway parishwide.

"The project will reroute stormwater from the surrounding waterways and drainage systems, store and cleanse millions of gallons of diverted stormwater, allow stormwater to infiltrate into the ground, capture runoff from surrounding streets and provide educational opportunities for the community to better understand the value of well-planned green infrastructure," Wilson says.



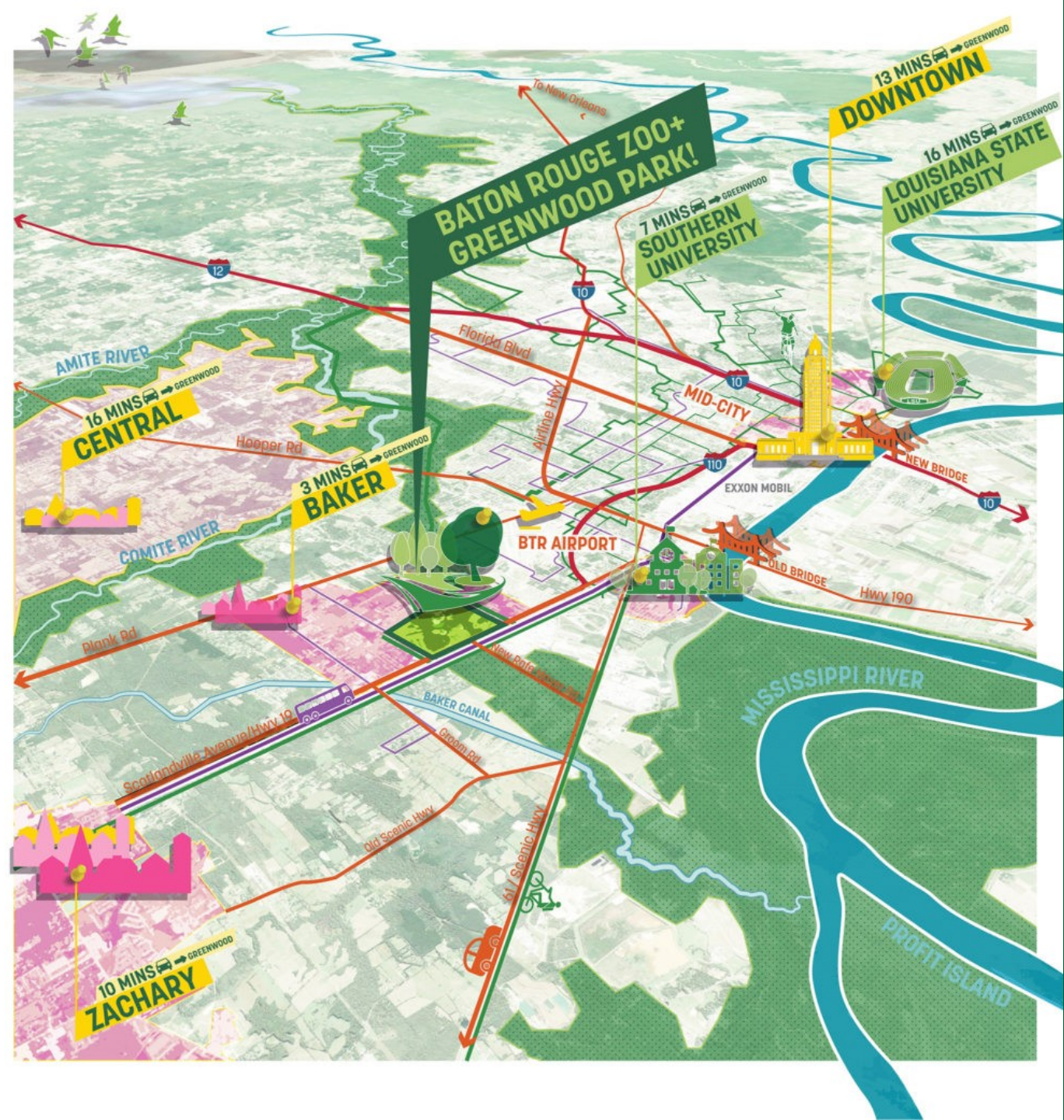






Lessons Learned

- Understand the history of the site, all histories
- Build trust through listening first
- Explore the technical challenges early in the process
- Iterate, iterate, ITERATE!
- Be bold



SASAKI

A vibrant, green-tinted illustration of a park or nature trail. A wooden boardwalk winds through a dense forest of tall trees. In the foreground, a woman in a white dress is kneeling on the boardwalk, taking a photo. A man is crouching nearby, holding a child on his shoulders. A large bird is perched on the boardwalk. In the background, a wooden pavilion with a slanted roof is visible, with people walking and sitting. The sky is filled with many birds in flight.

Thank You!

Anna Cawrse

Email: acawrse@sasaki.com

LinkedIn:



MEMORIAL
PARK
CONSERVANCY

The Nature of Innovation

Transforming Memorial Park, Transforming Houston

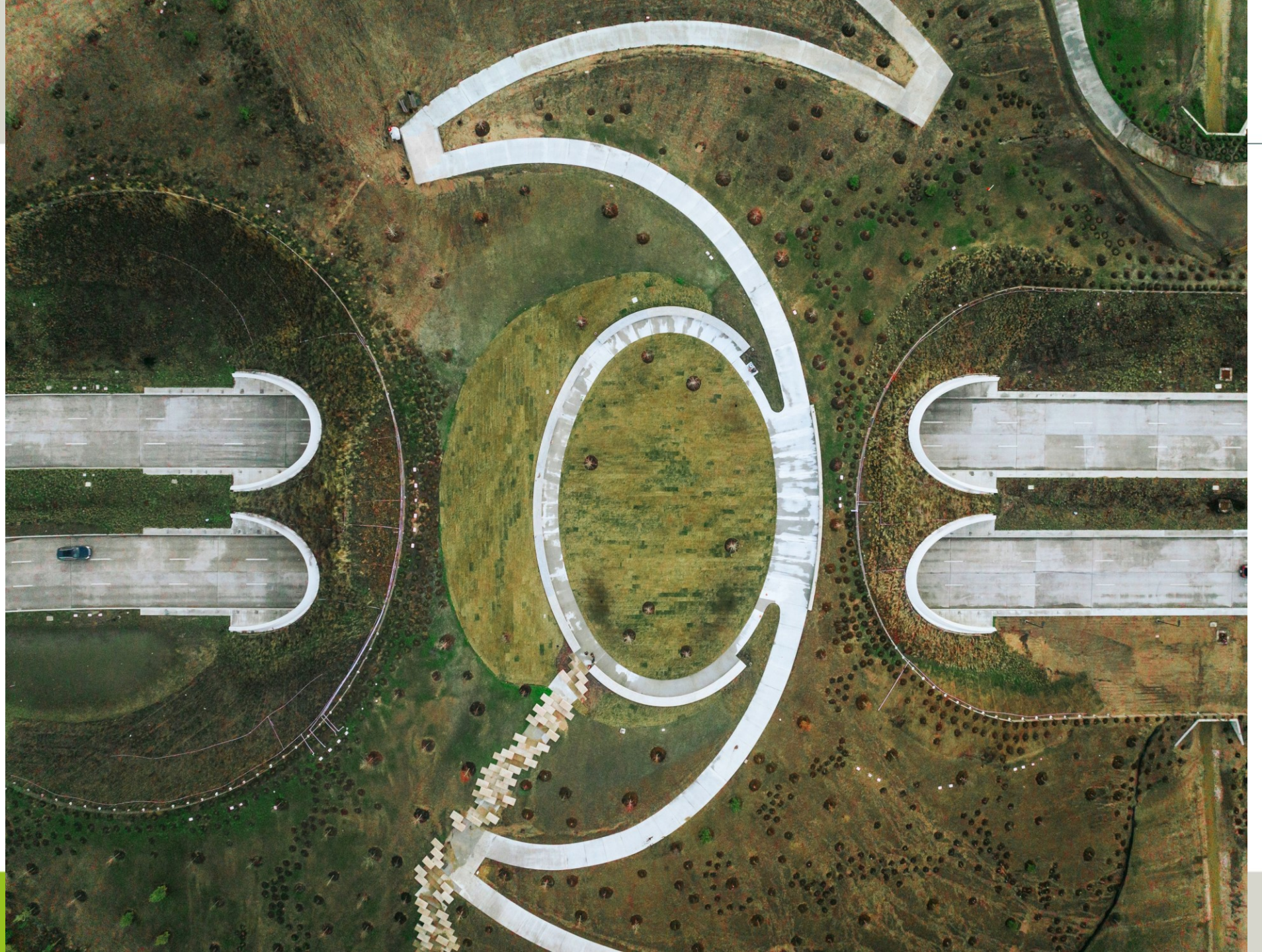
City Parks Alliance
June 15, 2023

Presentation by Shellye Arnold

AGENDA

1. Context
2. Research and Design
3. Delivery

Photo by Nick Hubbard, 2023
Courtesy of Nelson Byrd Woltz
Landscape Architects



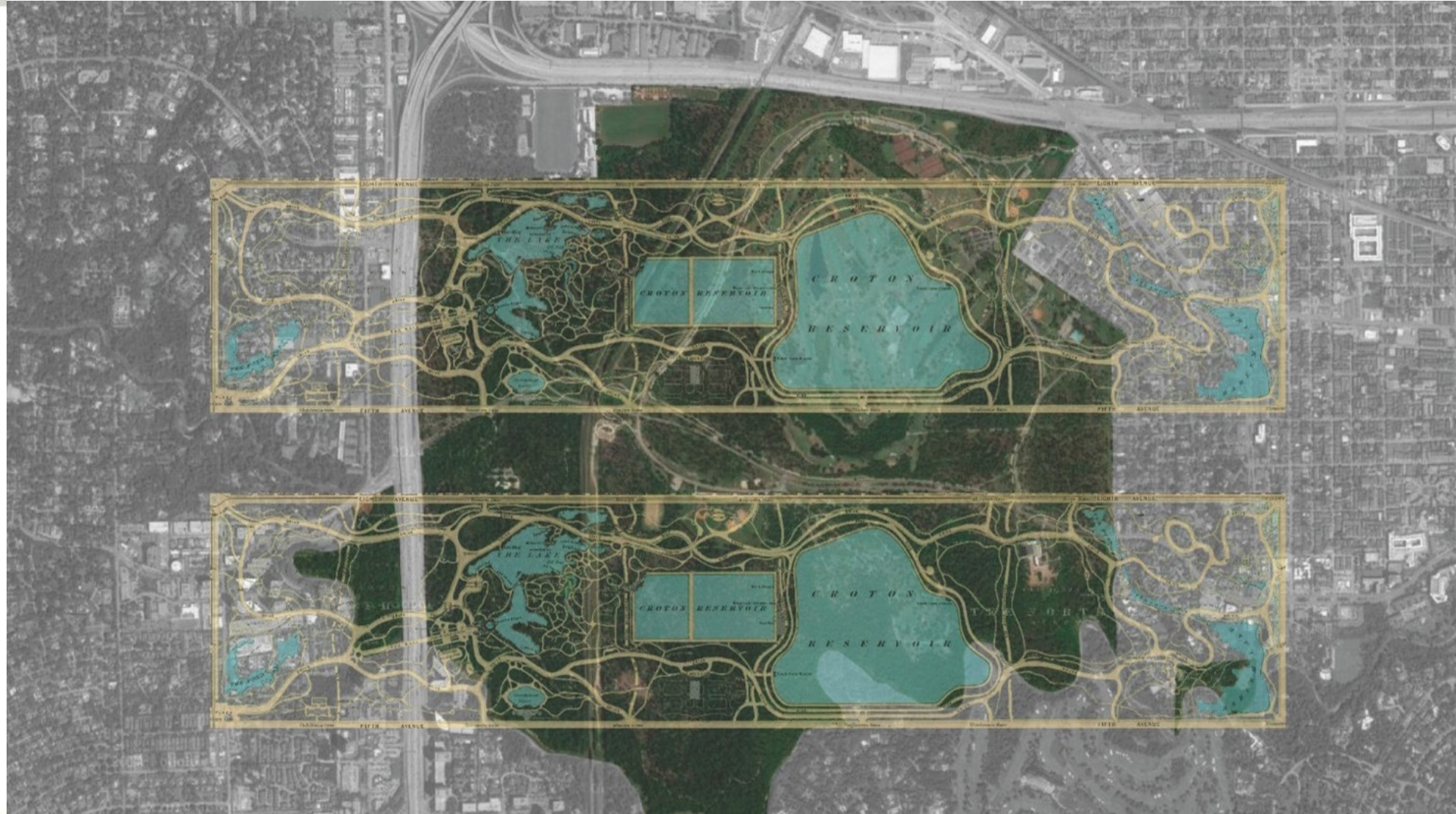
Houston's Memorial Park: Distinctive Locally and Nationally

1. Houston's:

- Largest urban Park
- Largest urban wilderness
- Largest free public health asset

2. Unique nationally as large urban wilderness park

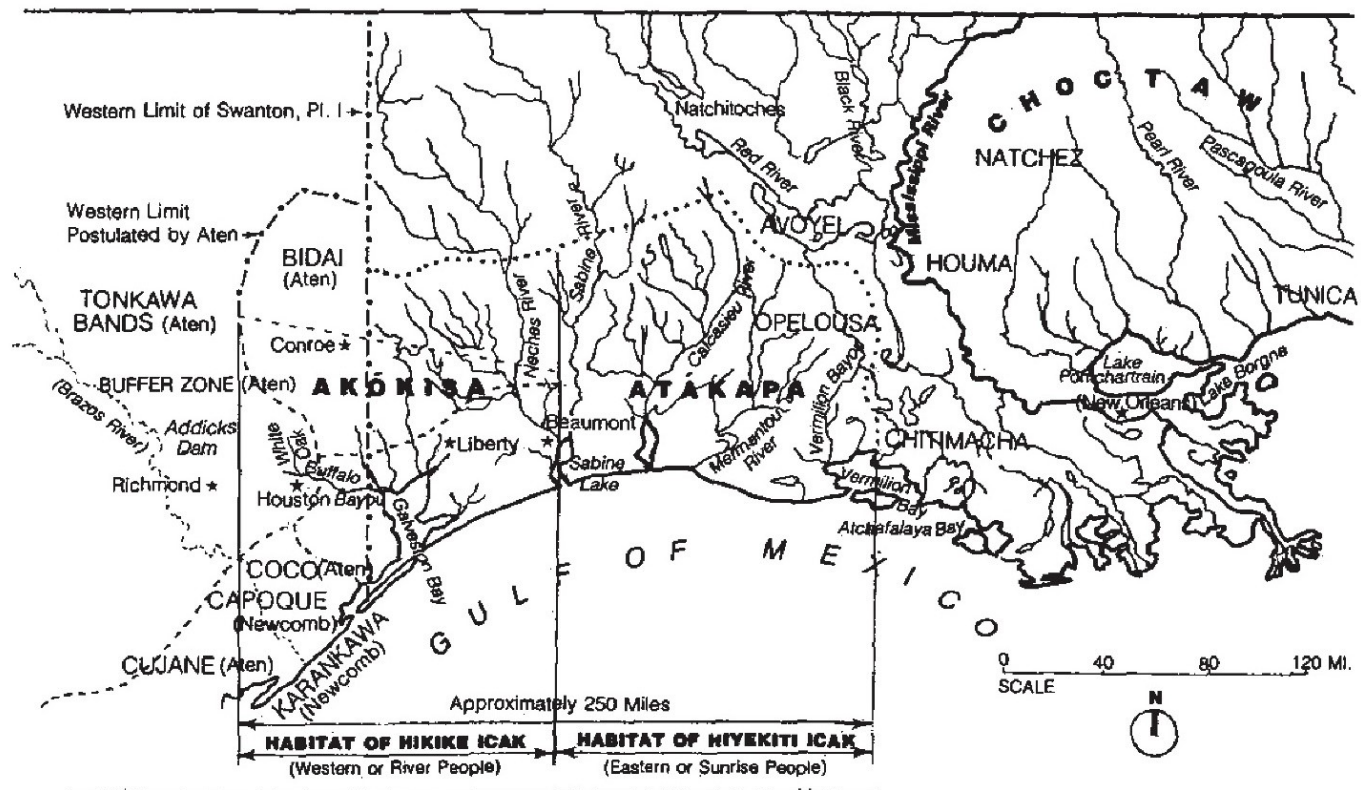
3. At 1,500 acres, ~2x Central Park



Human Impact on the Land – Karankawa

RANGE OF ATÁKAPAN LINGUISTIC STOCK IN SOUTHEAST TEXAS

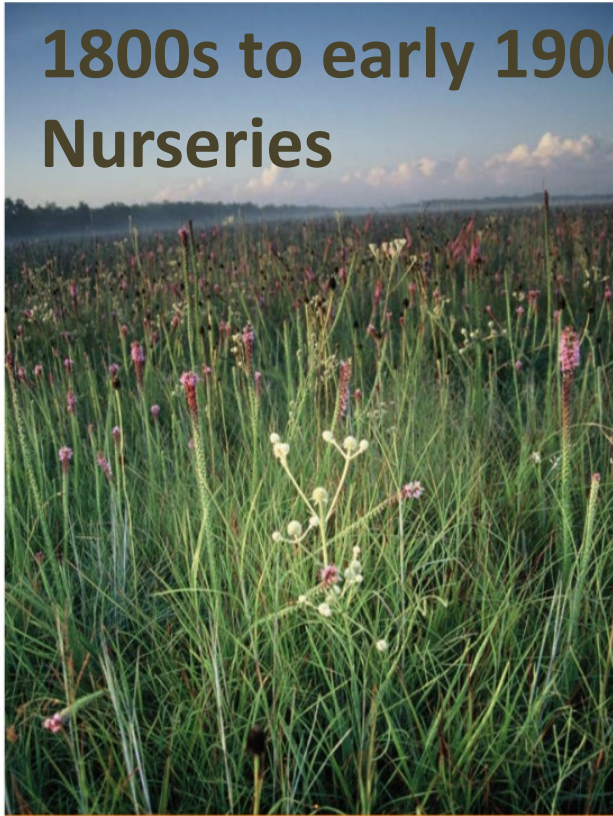
At the Opening of the Historic Period, Circa 1528 to Circa 1722



Base map, rivers and names after Swanton (1911): Plate I, except where noted.
 - - - - - Geographic limits after Aten (1983): Fig. 3.1, "Reconstructed territories of native groups in the early eighteenth century."
 Geographic limits of the Atákapan linguistic stock after Swanton (1911): Plate I.

source: Ancient Houstonians, James L. Glass and Ray Olachia, 2010

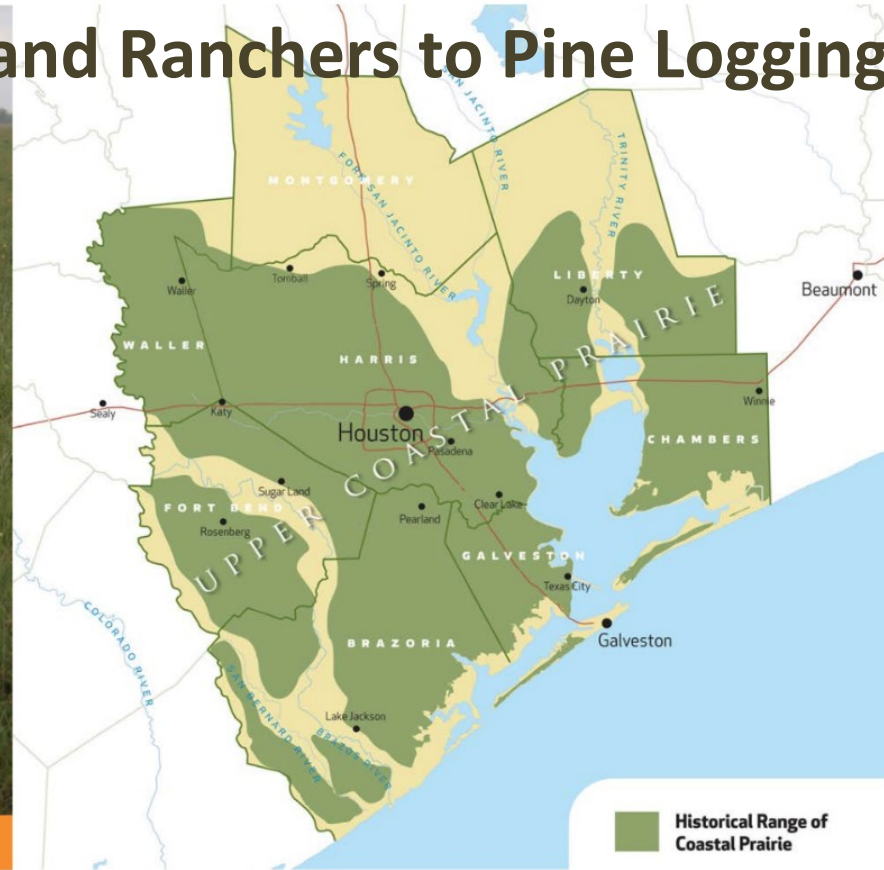
1800s to early 1900s -- from Cowboys and Ranchers to Pine Logging and Nurseries



Coastal Prairie in Summer



Coastal Prairie in Spring

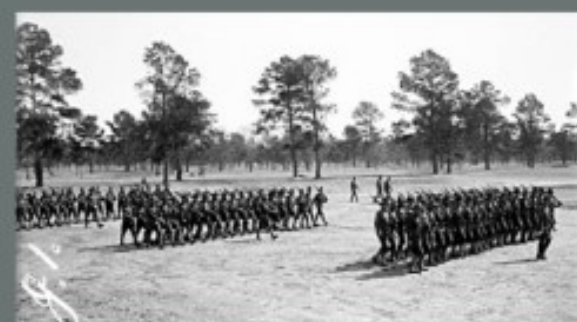


Cowboys on the Coastal Prairie near Angleton, TX in 1900

Slide courtesy of Jaime Gonzalez, The Nature Conservancy

Photo Credit: Brazoria County Museum

Memorial Park – Camp Logan Opened in 1917



CAMP LOGAN

PHOTOGRAPH SOURCES:
<http://www.jingill.net/gil/ww1pages/notes/places/camp.html>
<http://www.memorialparkconservancy.org>



Memorial Park as Houstonians Knew It – 1924 – 2011



Photo courtesy of Stacey Holden,
“People of Memorial Park”

Drought Killing At Least Half Of Memorial Park Trees

As Houston's drought continues, one of the city's most pristine urban parks and most popular recreational areas is slowly changing. Millions of trees are dying across the city, but in Memorial Park that problem is even



Drought accelerated demise of the pine - hardwood forest

2020-2023 Opened 4 Park Projects → 200 Acres of Green Infrastructure

- ✓ **100-acre Clay Family Eastern Glades - Opened July 2020**
- ✓ **Sports Complex Phase 1 - Opened October 2022**
- ✓ **Seymour Lieberman Trail and Bridges Segment - Opened April 2022**
- ✓ **100-acre Kinder Land Bridge and Cyvia and Melvyn Wolff Prairie - Opened February 11, 2023**

Photo courtesy of Visit Houston
by Lance Childers, 2023



02-14-23

Houston just covered part of its highway with a massive park

A highway has bisected Houston's Memorial Park since the 1950s. Now, a set of gently sloping land bridges lets both people and small animals cross over.



Key Success Drivers

A large group of people, approximately 100-150 individuals, are posed for a group photo on a wide, green grassy field. They are arranged in several rows, with some standing and some kneeling or sitting in the front. The background features a dense line of trees, and beyond that, a city skyline with various skyscrapers under a clear blue sky. The overall scene is bright and open.

1. Vision

2. Partnerships

3. Community

4. Research

5. Systems

Key Partnerships

Project Partners

KINDER FOUNDATION



And Many Others* ...



**SIERRA
CLUB**



* List not comprehensive

Prior to Starting Design, We Listened ...

3,300 Houstonians participated in the Master Planning process through:

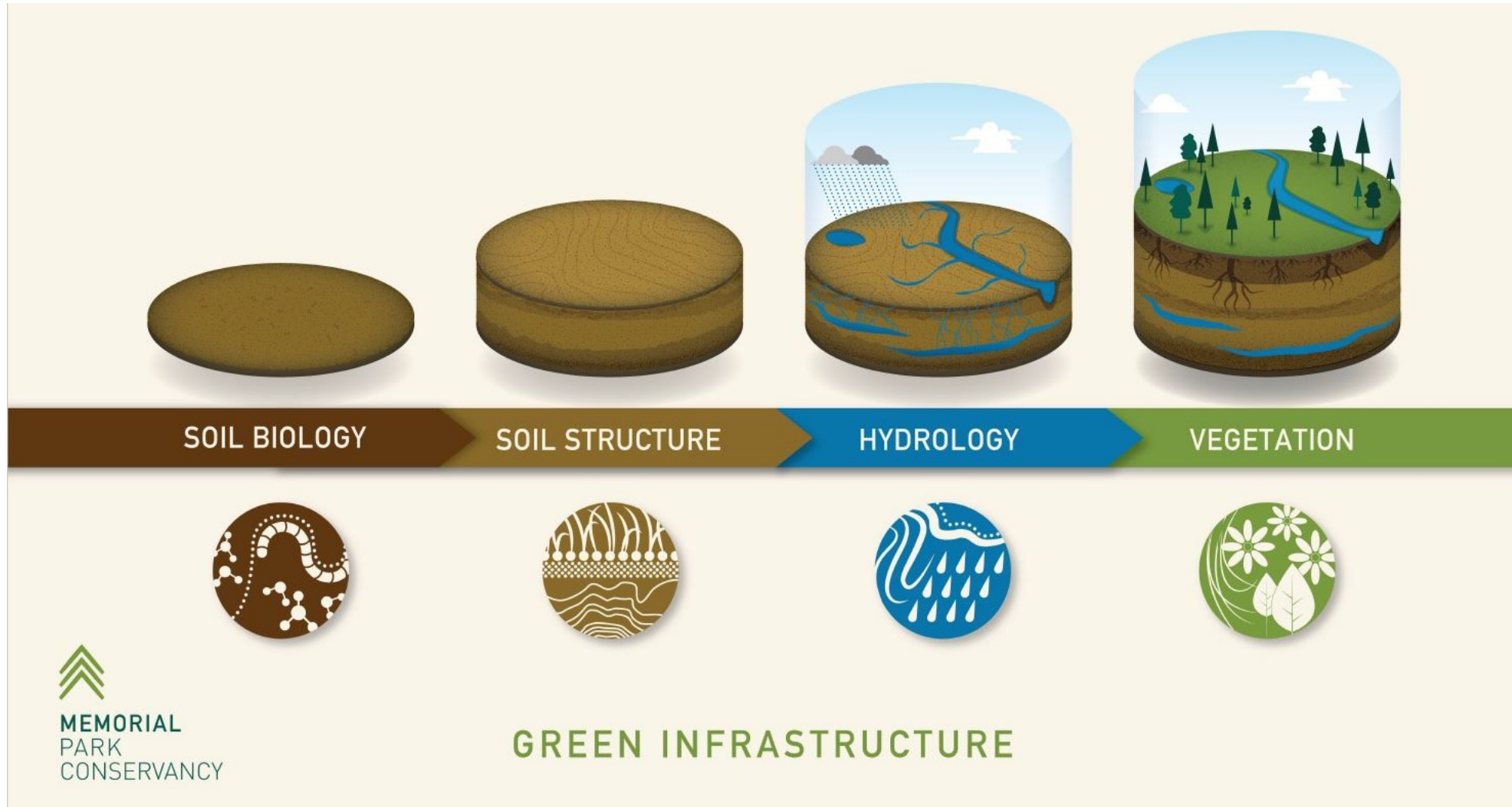
- 8 public meetings
- 20 workshops
- A 3-month online survey
- \$100K



... We Included

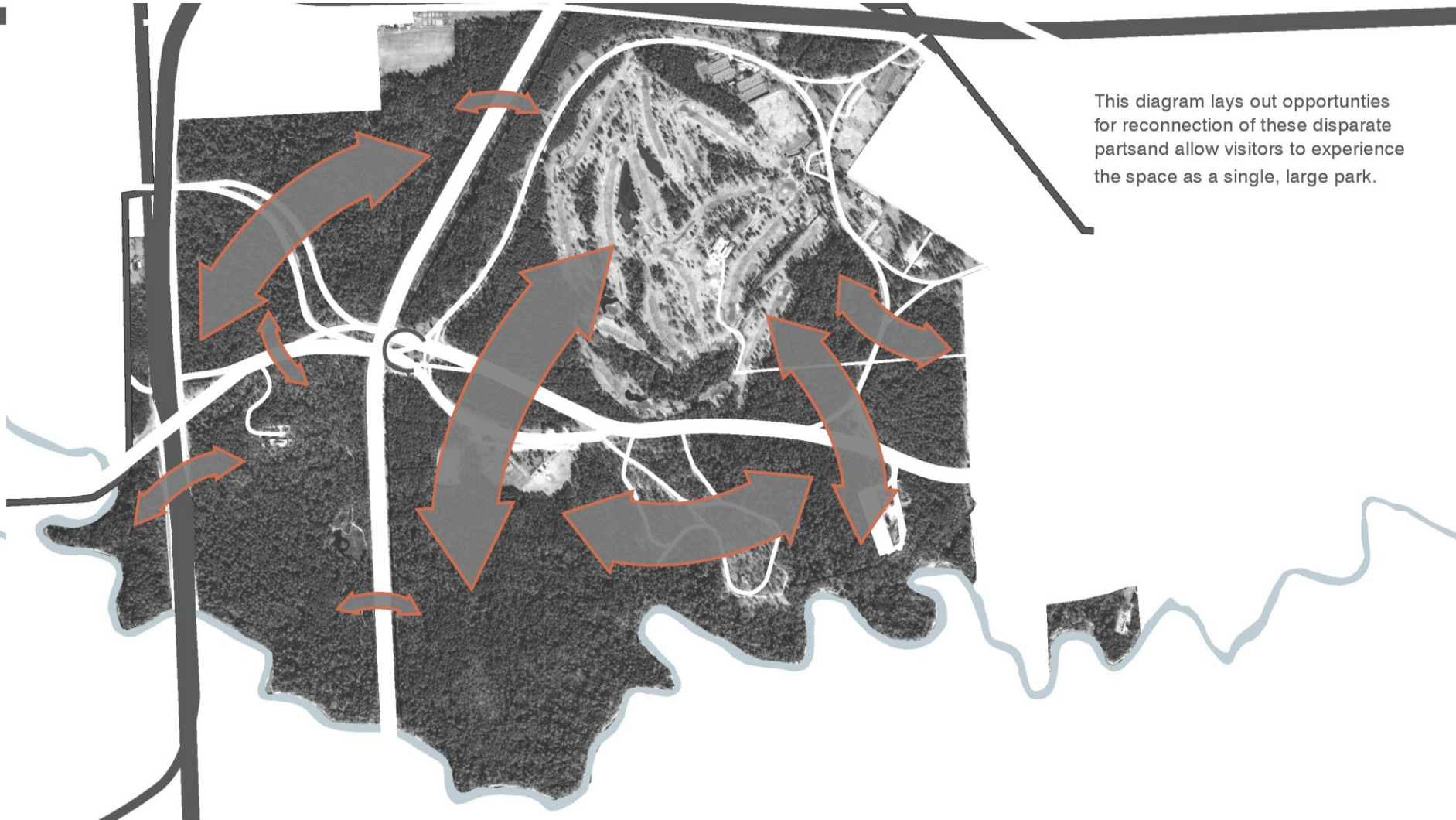
← An “EcoTech Panel” consisting of 25 Ecological scientists and experts informed the Master Plan

← Our research addresses the whole ecosystem, from the soils to the water to the wildlife



... We Ground-Truthed

- Over the past 90 years, the Park had been divided into 25 pieces
- A key challenge is how to connect the Park back together and to other parks and greenspaces



This diagram lays out opportunities for reconnection of these disparate parts and allow visitors to experience the space as a single, large park.

... We Baselined

- 2016 Biological Assessment documented what lived in the Park's trees, grasses, waters, soils by zone
- This provides a baseline to measure future impact on biodiversity
- Cost: \$300K
- Initiated 8-year national study of the endangered Alligator Snapping Turtles by the University of Missouri and others



Photo courtesy of Turtle Survival Alliance

... We Learned



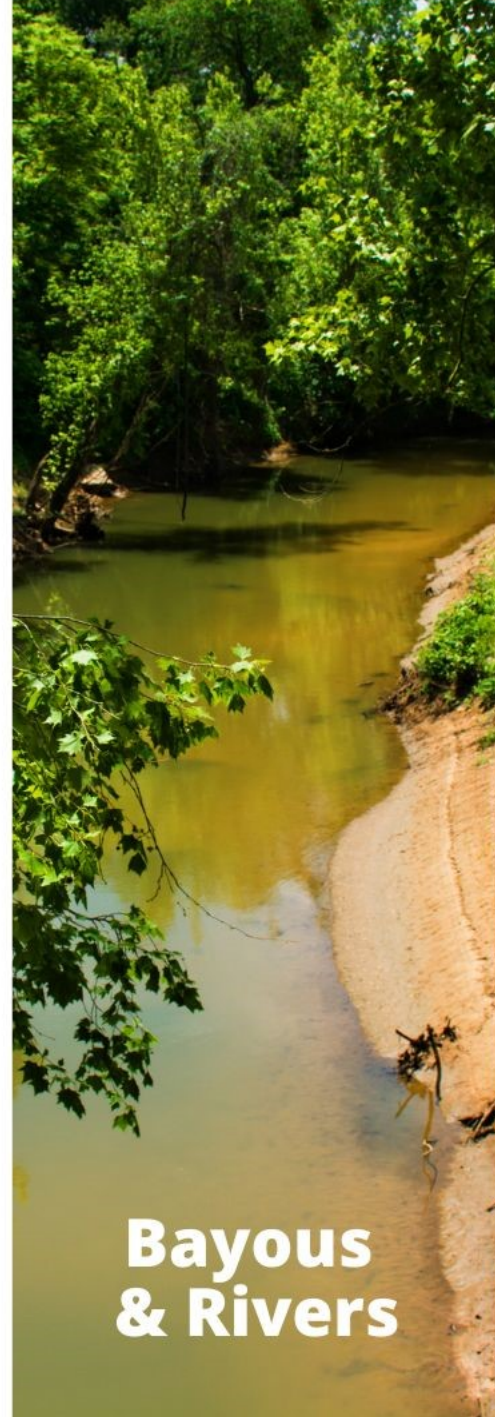
**Post Oak
Savanna**



**Coastal
Prairies**



**Freshwater
Wetlands**



**Bayous
& Rivers**



**Pine/Oak
Forests**

GUIDING PRINCIPLES

RECONNECT...

the land, waterways, trails, people, and memories.

CONSOLIDATE...

compatible uses together in appropriate areas.

RESTORE...

the ecology of the park and our connection to it.

ENHANCE...

the overall park experience and its amenities.

TEND...

the land and our cultural history and maintain balance through responsible management.

2018 Memorial Park Ten-Year Plan Projects

Project Partners:

- Kinder Foundation
- Houston Parks and Recreation Department
- Memorial Park Conservancy
- Uptown Development Authority



Design Started with the Soils

Drought trees, invasive plants and other greenery are creating new life in Memorial Park

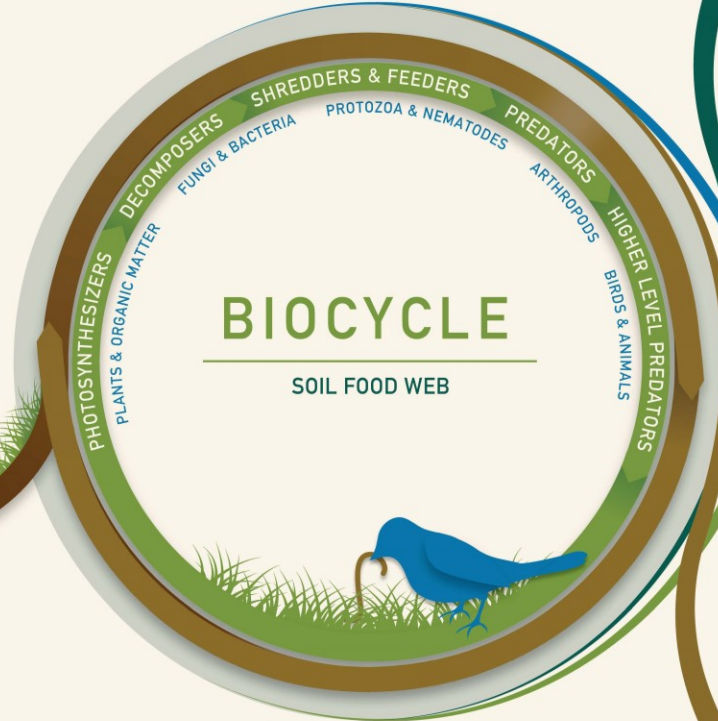
DEGRADED FOREST

- > Dominated by Invasive Species
- > Dense Thicket without Rejuvenative Forest Floor
- > Nutrient Deficiencies
- > Vulnerable to Disturbance

40,000
DEAD or UNHEALTHY
TREES

Resulting from Hurricanes and Drought
2008-2012

MULCHED & DECOMPOSED



FOREST



SAVANNAH



WETLAND



PRAIRIE

2014 Conditions: Vegetation Composition

Vision: Diverse Ecological Corridors

Legend

-  Riparian Forest
-  Riparian Edge & Barranco Forest
-  Pine-Hardwood Forest
-  Pine-Hardwood Savannah
-  Native Prairie
-  Wet Savannah and Prairie
-  Naturalized Golf Course
-  Bog Areas
-  Ponds and Stream Corridors



source: Berg Oliver Associates

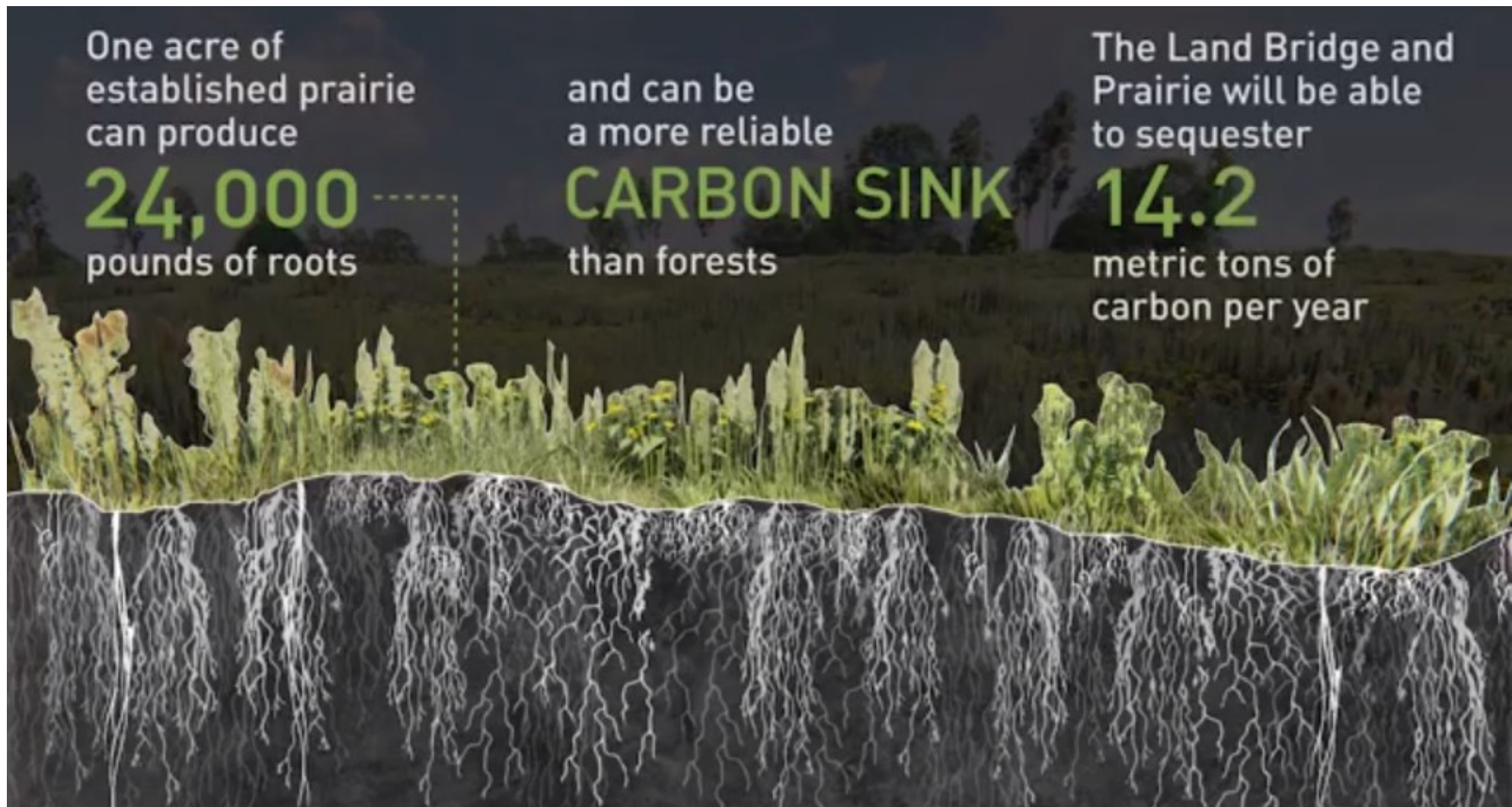
source: NBW with Berg Oliver Associates

Based on existing hydrology and topography of site

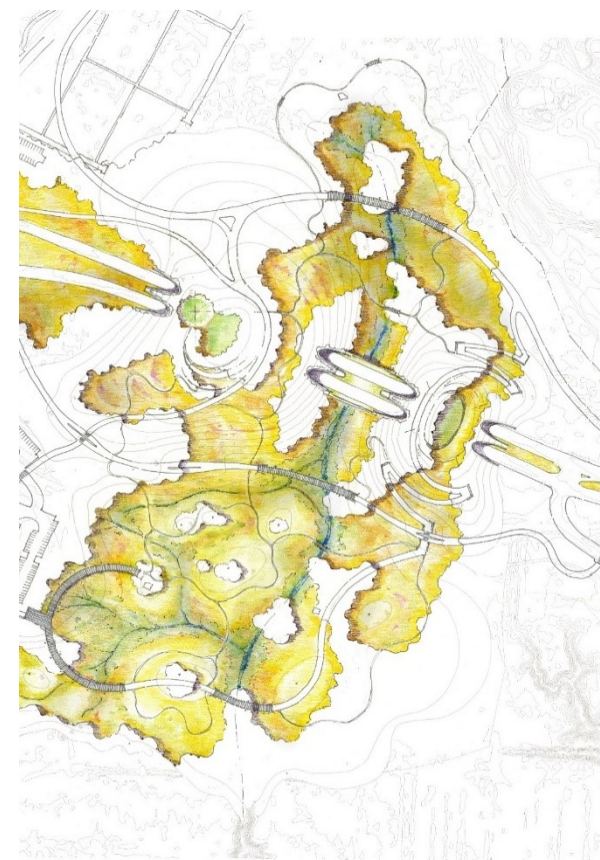
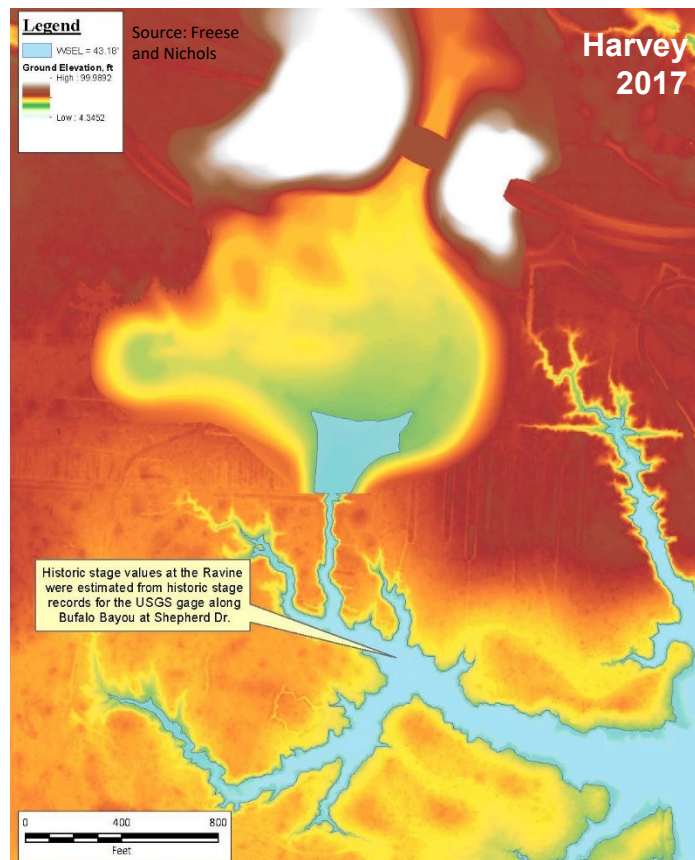
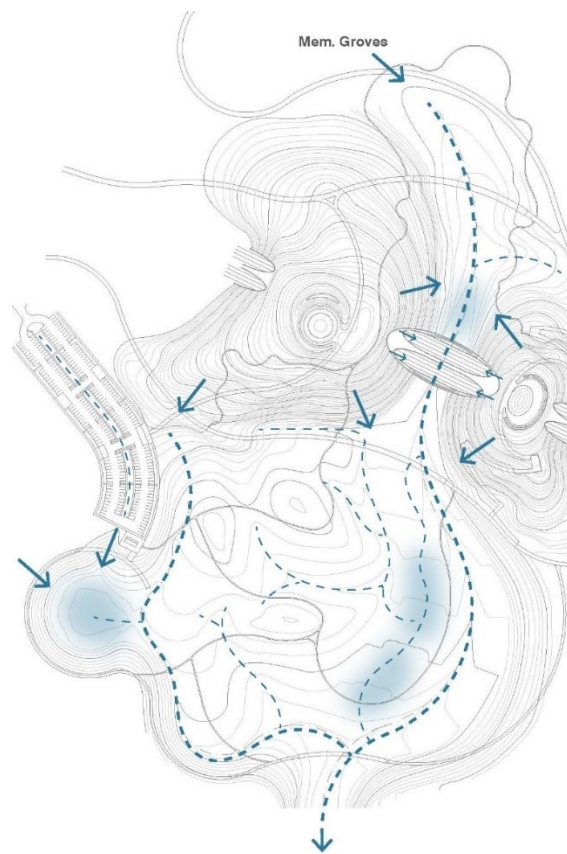
Design Addressed Multiple Needs and Opportunities Comprehensively ...

Gulf Coast Prairie ...

- Once extended for over 9 million acres from Corpus Christi to Lafayette, LA
- Less than 1% of native prairie remains
- **Most resilient, sequesters most stormwater and CO₂, helps with sediment reduction in the bayou, cleans the water and fosters biodiversity**



Design Considered Detention Capacity of Ecologies Related to Projects



Detention Capacity Study for Land Bridge and Prairie - Hurricane Harvey



Community



Water



Animal



Bike



Pedestrian



While Designing We Built Our Team

- From 3 in 2013
- Today 60
- With on-staff expertise
 - Forestry
 - Arborcare
 - Grasslands
 - Horticulture
 - Greenhouse production
 - Operations and maintenance
 - Fundraising
 - Programming
 - Visitor Services
 - Financial management
 - HR
 - And more





MEMORIAL
PARK
CONSERVANCY

Two “Green Infrastructure” Projects

Clay Family
Eastern Glades
Opened

*Opened
July 2020*

Photo by Nick Hubbard, 2023
Courtesy of Nelson Byrd
Woltz Landscape Architects





Photo by Nick Hubbard, 2023
Courtesy of Nelson Byrd
Woltz Landscape Architects

- Least Grebe
- Biodiversity “win”
(observational)
- Formal study
pending

Photo by Tom Hopwood



- 2021 – Storm Euri
- More issues with plumbing than plantings
- Importance of native plants



Kinder Land Bridge
and
Cyvia and Melvyn Wolff
Prairie

*Opened
February 11, 2023*

Photo by Nick Hubbard, 2023
Courtesy of Nelson Byrd Woltz
Landscape Architects





Photo by Nick Hubbard, 2023
Courtesy of Nelson Byrd Woltz
Landscape Architects

- Immersion
- Understanding
- Value

Photo by Nick Hubbard, 2023
Courtesy of Nelson Byrd Woltz
Landscape Architects





In Sum – Transforming Memorial Park, Transforming Houston

Key Success Requirement	Description
Vision	<ul style="list-style-type: none"> • Advances organizations’ mission • Anchored in strategic plan • Advances to city’s future
Partnerships	<ul style="list-style-type: none"> • Top talent → the best of the best • Full value chain • Find leverage
Community	<ul style="list-style-type: none"> • Clear, sincere, ongoing, multifaceted • Take adequate time • Helps secure and maintain buy-in
Research/data	<ul style="list-style-type: none"> • Informs strategy and decision-making • Builds credibility • Helps defend decisions
Integrated systems	<ul style="list-style-type: none"> • Wholistic, not “piece parts” • Integrates and balances • Dynamic

Key Strategies

- Be appropriately bold and differentiating
- Secure early wins and momentum
- Build trust

Thank you!





Storm to Shade
City of Tucson Green Stormwater
Infrastructure Program

Nature-Based Solutions: Heat

City Parks Alliance
June 15, 2023

Greg Jackson, Deputy Director Parks & Recreation
Blue Baldwin, S2S Program Manager





TUCSON – IT'S ALL ABOUT HEAT



- The Sonoran Desert : heat & drought
- Average 11" of rain per year
- 3rd fastest warming city in the US
- SHADE is a hot commodity



TUCSON – IT'S ALL ABOUT HEAT

Tucson Parks and Recreation

- 132 Parks
- 3,357 acres of parkland

Heat Mitigation in Parks

- 19 splashpads being developed
- 77 shaded playgrounds
- Shade standards for playgrounds



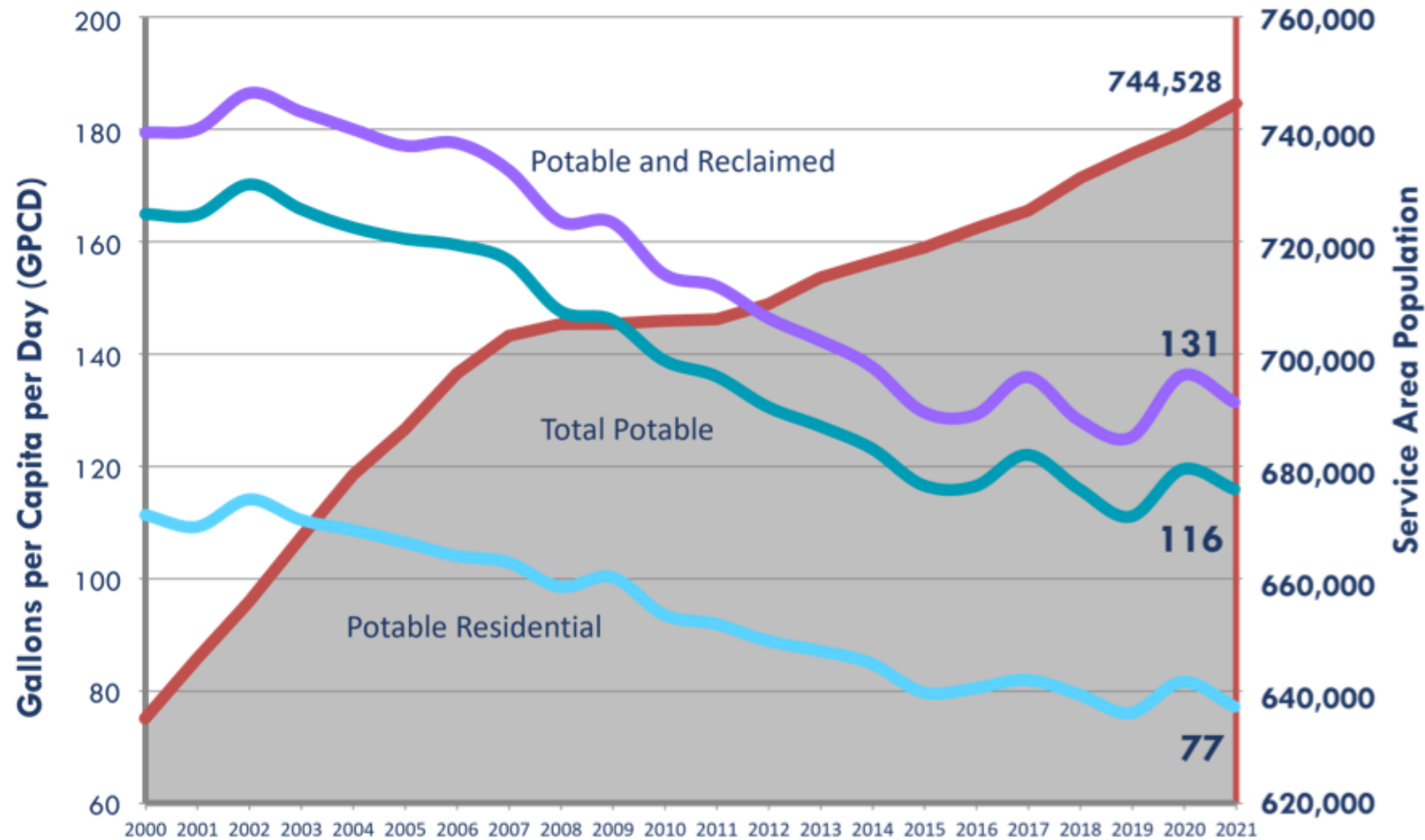
TUCSON – IT'S ALL ABOUT HEAT

Tucson Water

- Serves ~ 745,000 customers
- Robust Conservation Program
 - **Rebates**
 - low-flow appliances, gray water systems, active and passive rainwater harvesting systems
 - **Educational programming**
 - **Water Smart landscaping classes**
- Coming soon: Ornamental turf ban & turf reduction rebates!



CONSERVATION IMPACT



TW presently serves the same overall quantity of water annually as it did in the 1990s, but with 250,000 more customers!



TUCSON CLIMATE ACTION AND ADAPTION PLAN



Climate Action Hub

Resilient Together

Tucson Million Trees

Electric Vehicles

Storm to Shade

More ▾

- **Climate Emergency declared in 2020**
- **Climate Action Plan adopted March 7, 2023**
- **Climate Initiatives**
 - **Electric Vehicle Roadmap**
 - **Urban Forestry Program & Tucson Million Trees**
 - **Green Stormwater Infrastructure Program**

EQUITY



THE CITY OF TUCSON'S GSI PROGRAM: STORM TO SHADE

- In 2020 Mayor & Council voted to approve the creation of a GSI program for Tucson
- Dedicated funding source -- Water Utility Bill
 - .13 cents per ccf of water consumed
 - Average monthly cost to customer ~ \$1/mo
- Residential & commercial utility customers within city limits
- Non-regulatory driven
 - Voluntary, beneficial re-use
 - One Water philosophy



THE STORM TO SHADE PROGRAM SHALL:

- 1) Establish a Capital Improvement Program to build GSI throughout the city
- 2) Maintain existing and new GSI



Storm to Shade

City of Tucson
Green Stormwater
Infrastructure Program

What is GSI?

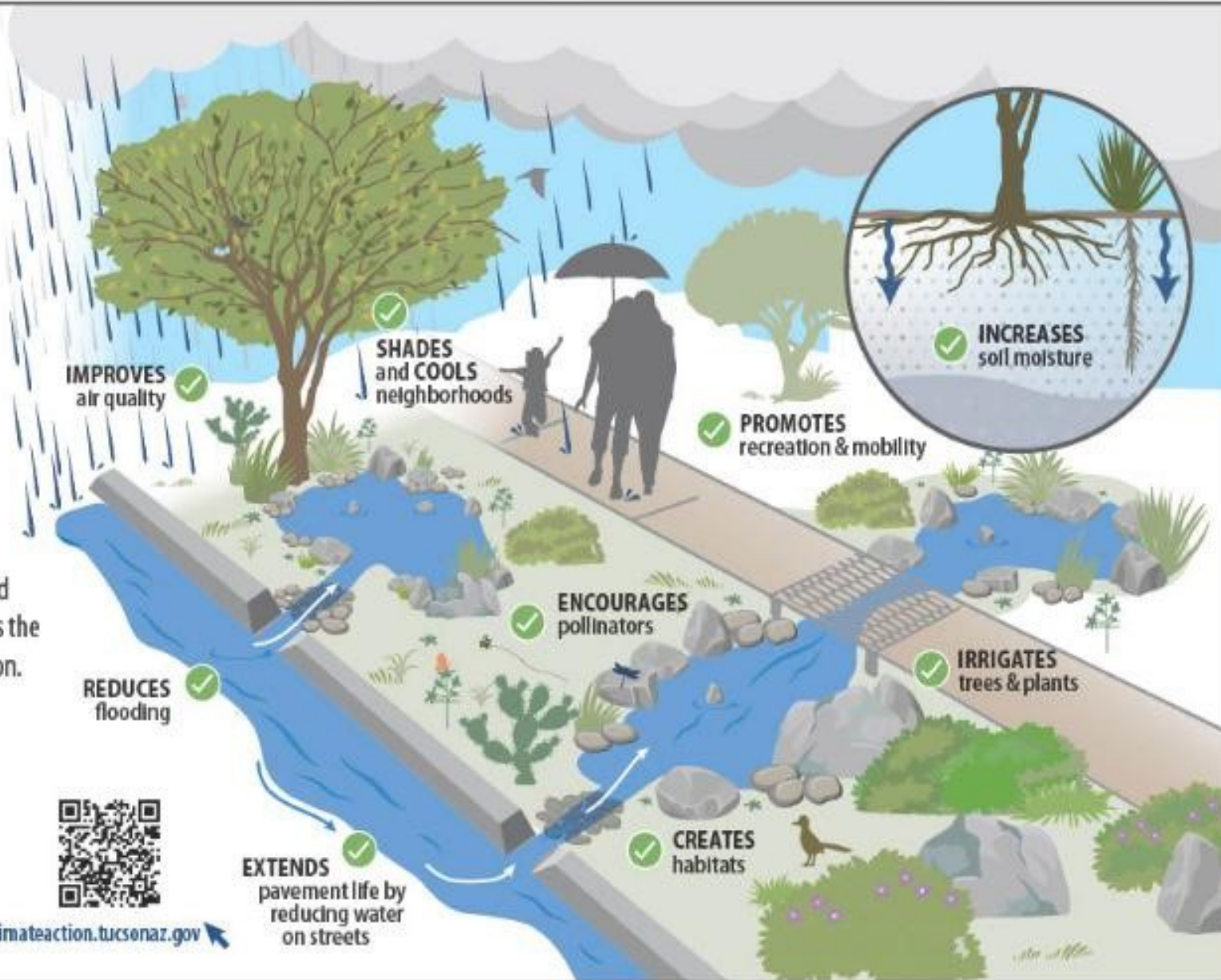
Green Stormwater Infrastructure (GSI) directs stormwater runoff from streets, parking lots, and rooftops into landscaped areas where it infiltrates the soil to support vegetation.

Find GSI at

- ✓ Parks
- ✓ Greenways
- ✓ Neighborhood streets
- ✓ Bike boulevards
- ✓ Public parking lots
- ✓ Traffic circles



climateaction.tucsonaz.gov



IMPROVES
air quality

SHADES
and COOLS
neighborhoods

PROMOTES
recreation & mobility

INCREASES
soil moisture

REDUCES
flooding

ENCOURAGES
pollinators

IRRIGATES
trees & plants

EXTENDS
pavement life by
reducing water
on streets

CREATES
habitats

EQUITY



CAPITAL PROCESS & PROJECT PRIORITIZATION

- Leveraging funds with existing COT improvement projects
 - Prop 407 Parks & Connections
- Ward Office input
- **Tree Equity Score**



TREE PLANTING COST

Three Scenarios



IN STREET

\$2250-\$3750 per tree
= 267-444 trees

BEHIND CURB

\$375-\$625 per tree
=1600-2667trees



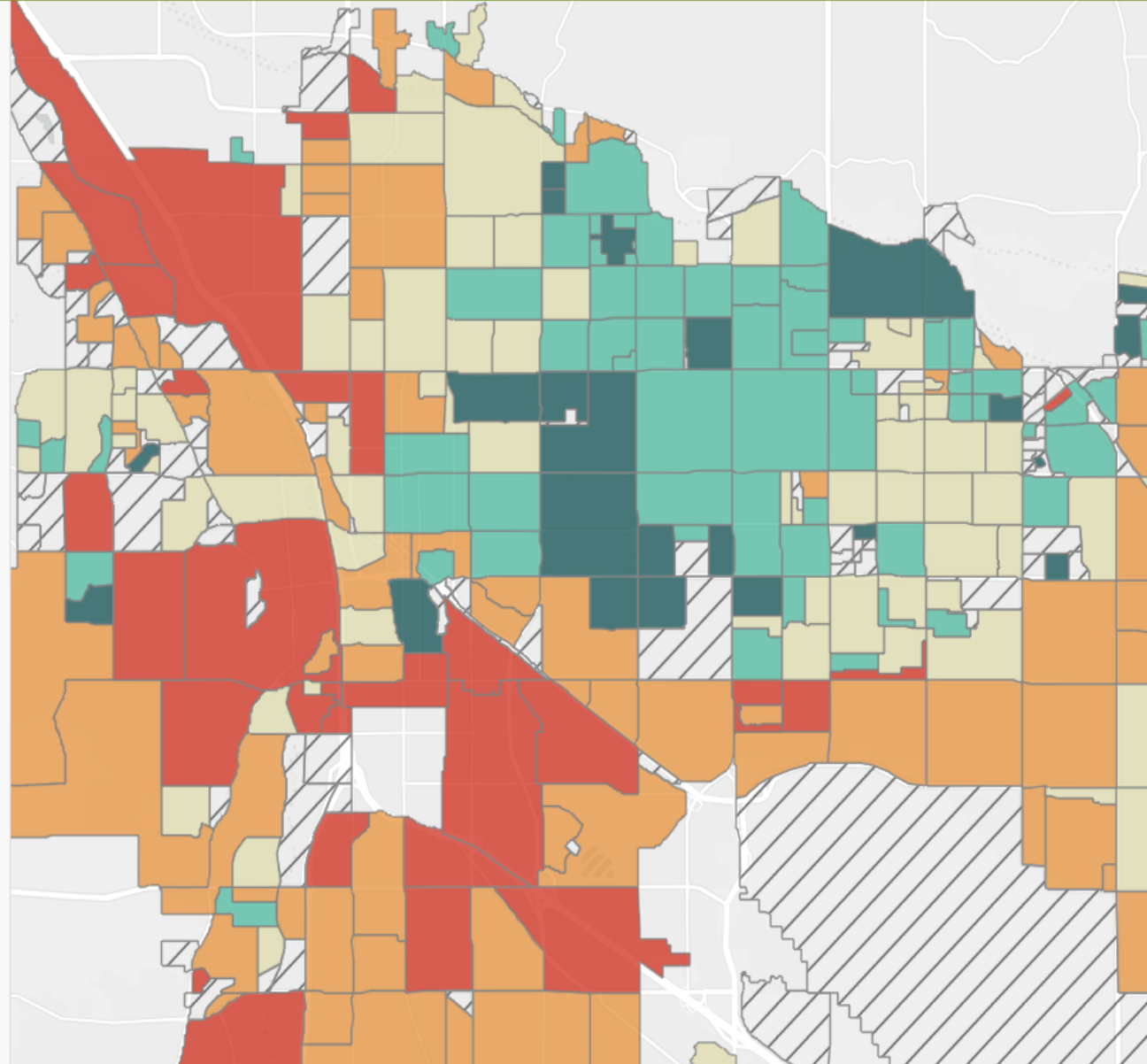
IN A PARK

\$200- \$360 per tree
=2,778-5K trees



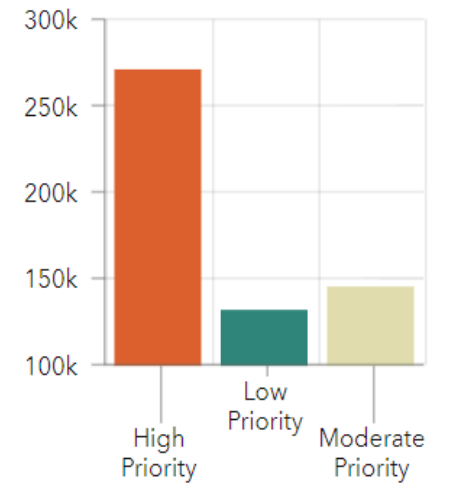
Tree Equity Scores for Tucson neighborhoods

This dashboard was developed using American Forests' Tree Equity Score methodology. The scores are a metric that informs the city on how well we are delivering equitable tree cover to all our residents. The score combines "measures of tree canopy cover need and priority for trees in urban neighborhoods. It is derived from tree canopy cover, climate, demographic and socioeconomic data." ([American Forests, 2020](#))



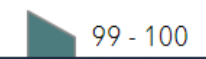
30

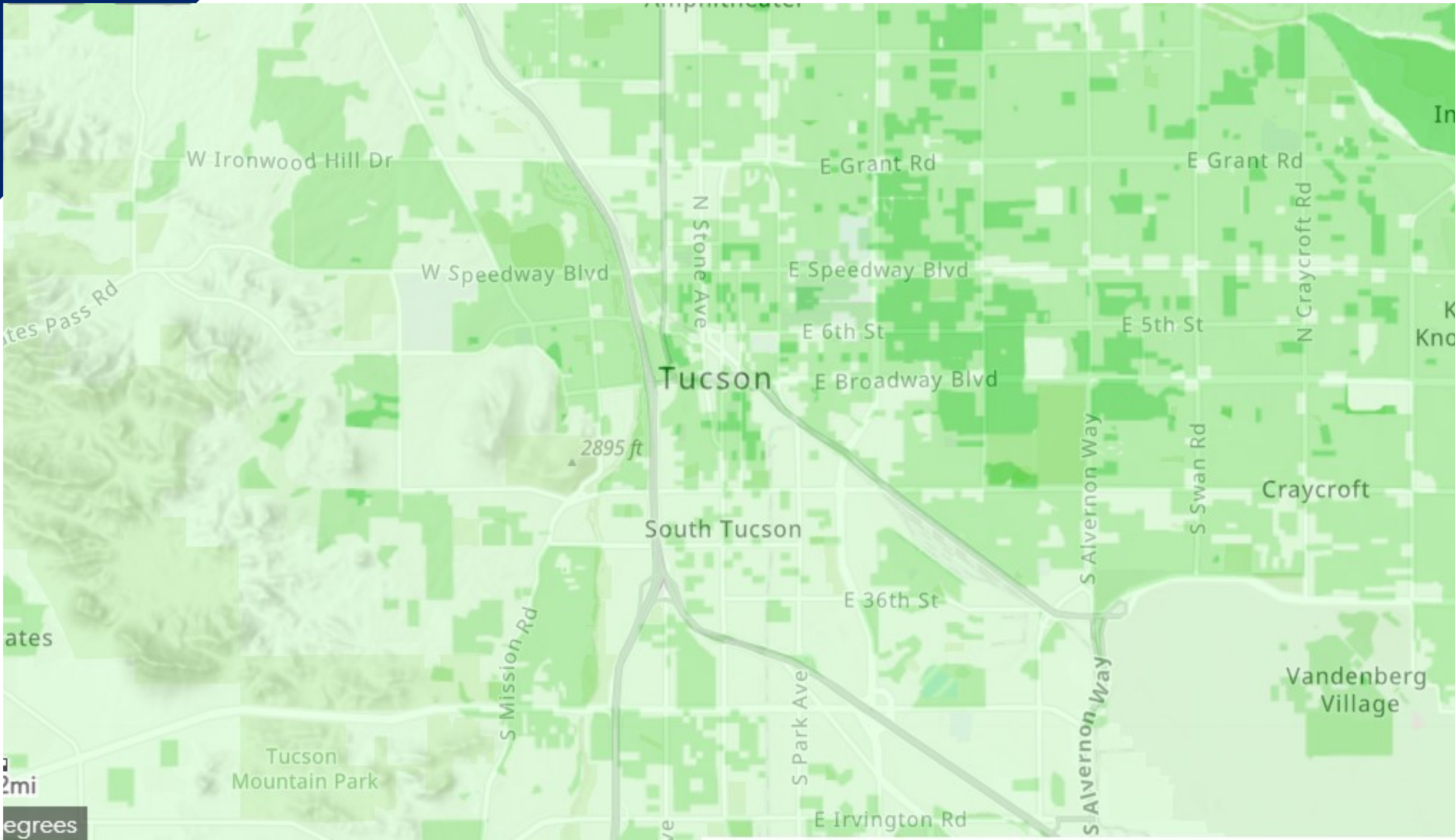
of 466 neighborhoods



Priority by Population

Tree Equity Scores by Neighborhood





W Ironwood Hill Dr

W Speedway Blvd

Tucson

South Tucson

Tucson Mountain Park

Craycroft

Vandenberg Village

2895 ft

mi

degrees

E Grant Rd

E Grant Rd

E Speedway Blvd

E 6th St

E 5th St

E Broadway Blvd

E 36th St

S Park Ave

E Irvington Rd

S Alvernon Way

S Alvernon Way

S Swan Rd

N Stone Ave

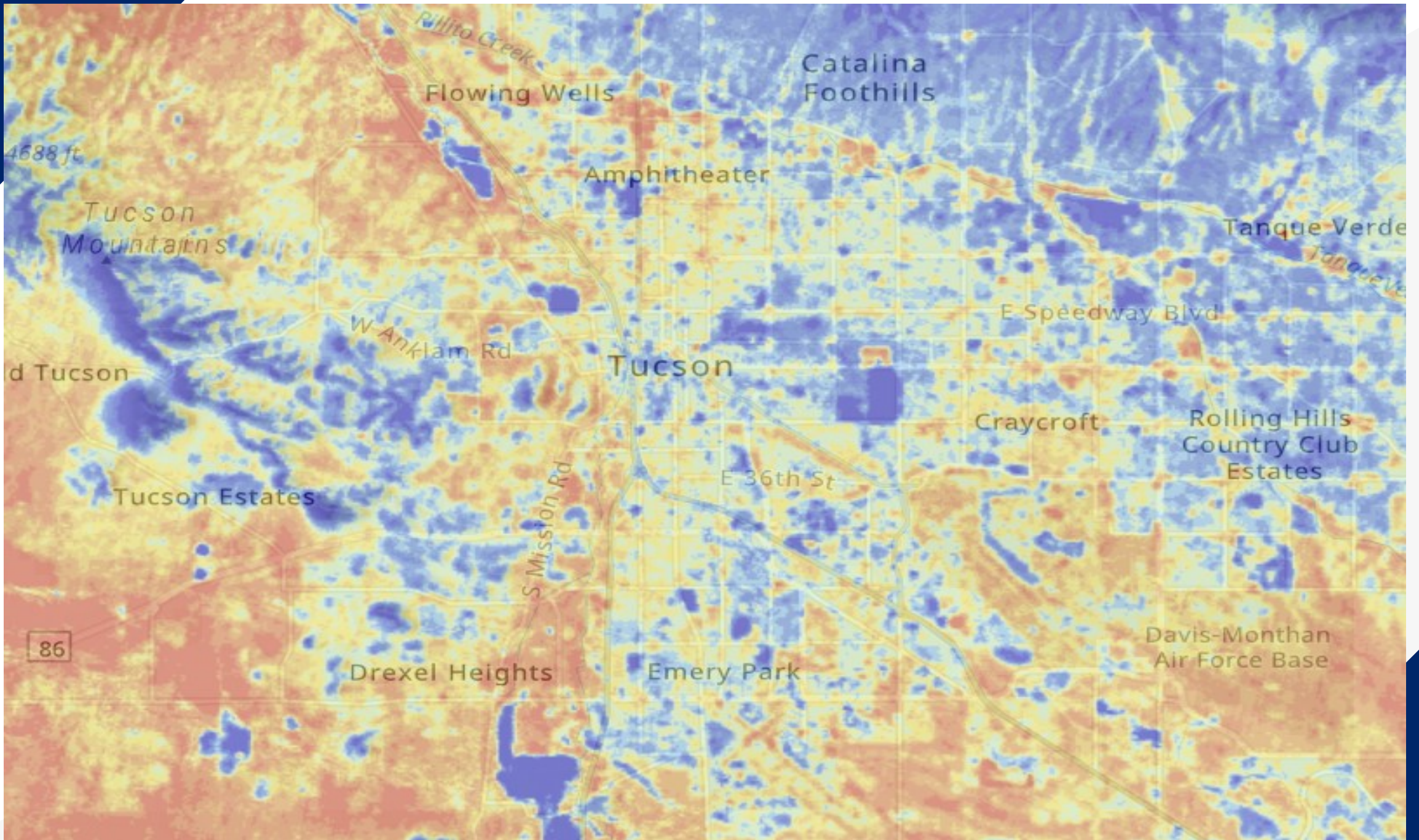
N Craycroft Rd

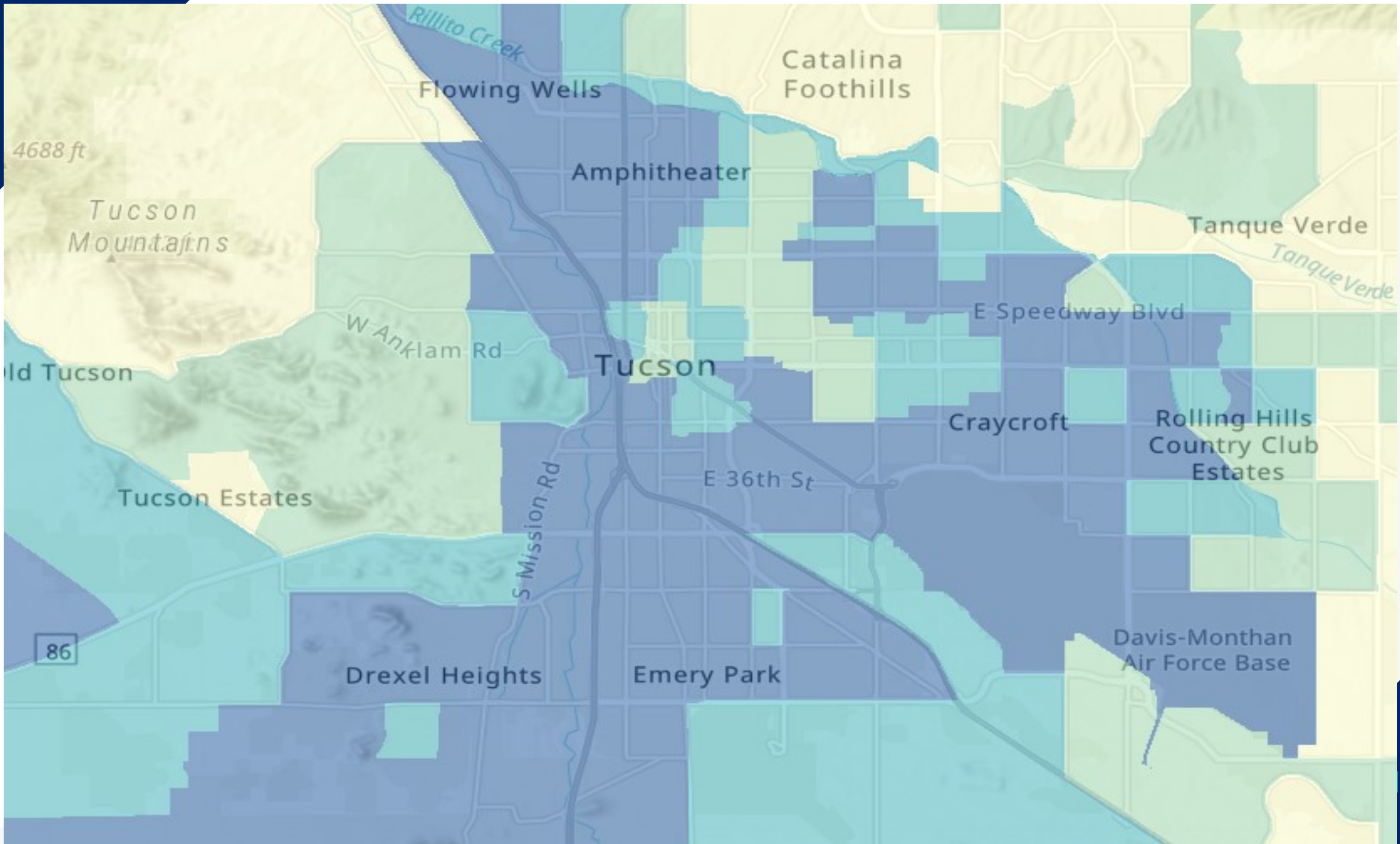
ates Pass Rd

ates

In

K
Kn





4688 ft

Tucson
Mountains

Flowing Wells

Catalina
Foothills

Amphitheater

Tanque Verde

Old Tucson

W Anklam Rd

Tucson

E Speedway Blvd

Tucson Estates

S Mission Rd

E 36th St

Craycroft

Rolling Hills
Country Club
Estates

86

Drexel Heights

Emery Park

Davis-Monthan
Air Force Base

PARK PLANNING INITIATIVES

- Incorporating GSI into designs
- Reducing turf & increasing tree canopy
- Reducing use of potable water/adding reclaimed
- Functional turf
- Long term policy & planning



GSI AT GUNNY BARRERAS PARK



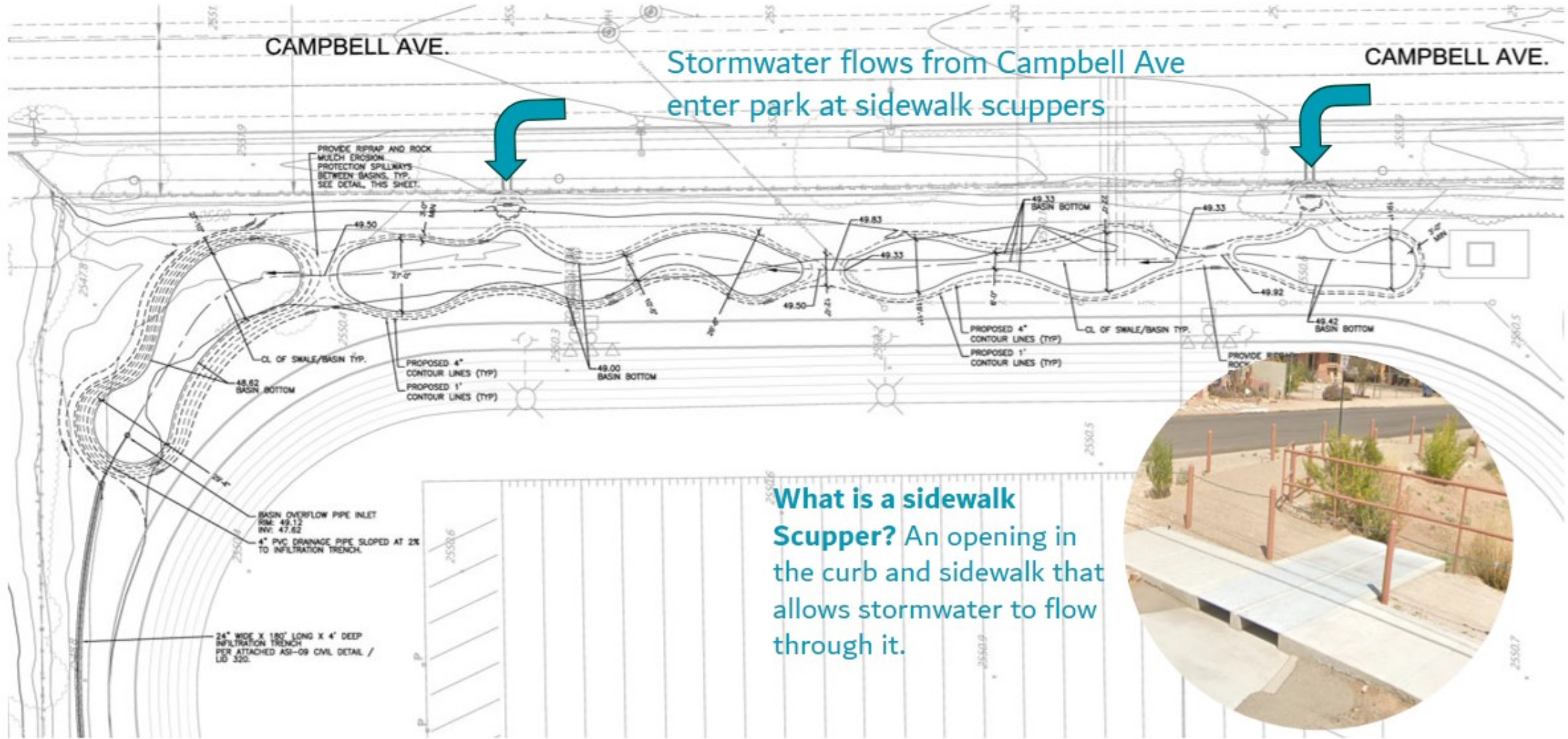
*Additional small GSI features throughout the park

GSI AT GUNNY BARRERAS PARK

- Project origin
 - Prop. 407
 - Low TES/high priority area
- GSI Features
 - Vegetated basins & bioswales, scuppers, native trees & shrubs
- GSI size
 - ~30,000 sq.ft.



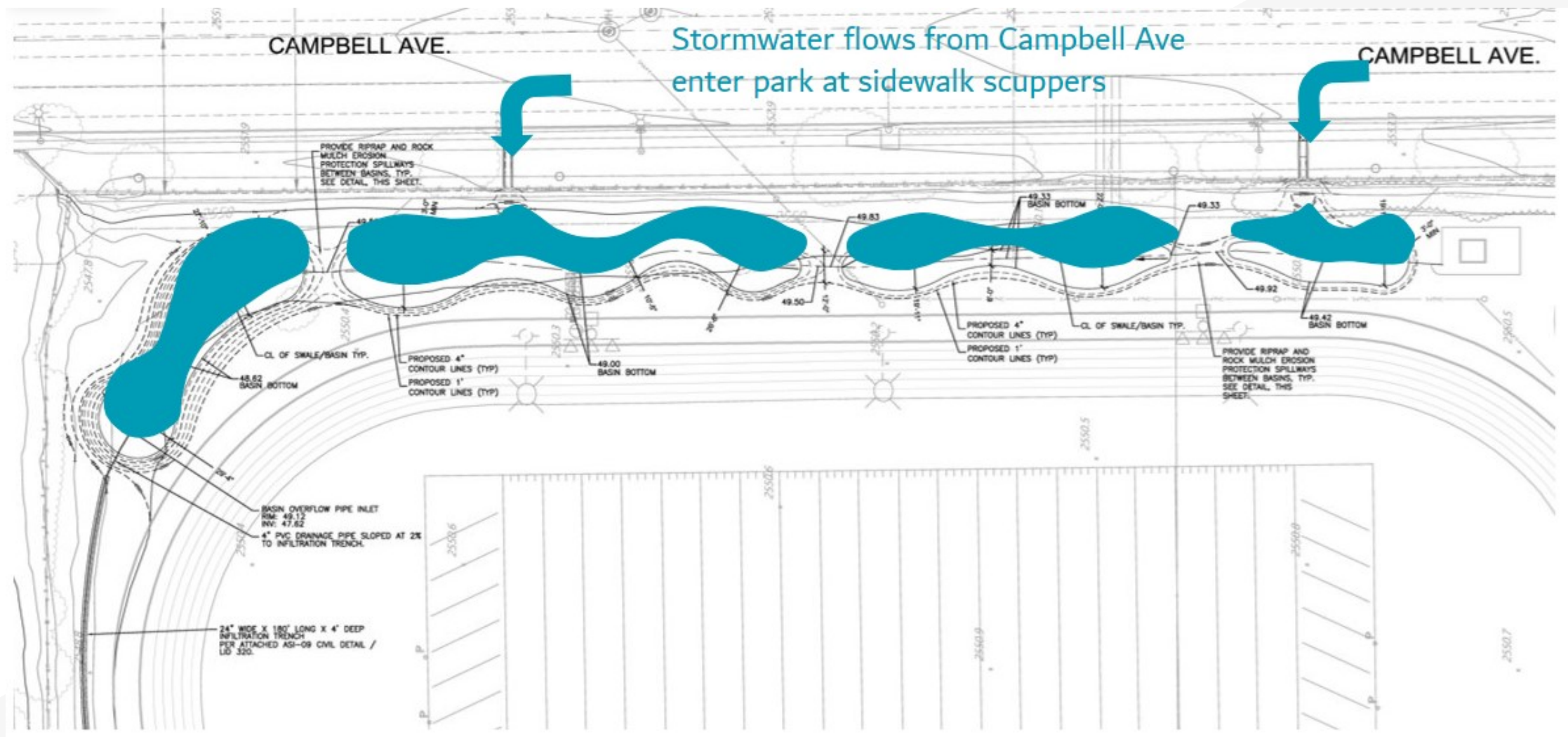
HOW IT WORKS : HARVESTING STORMWATER FROM ADJACENT STREET



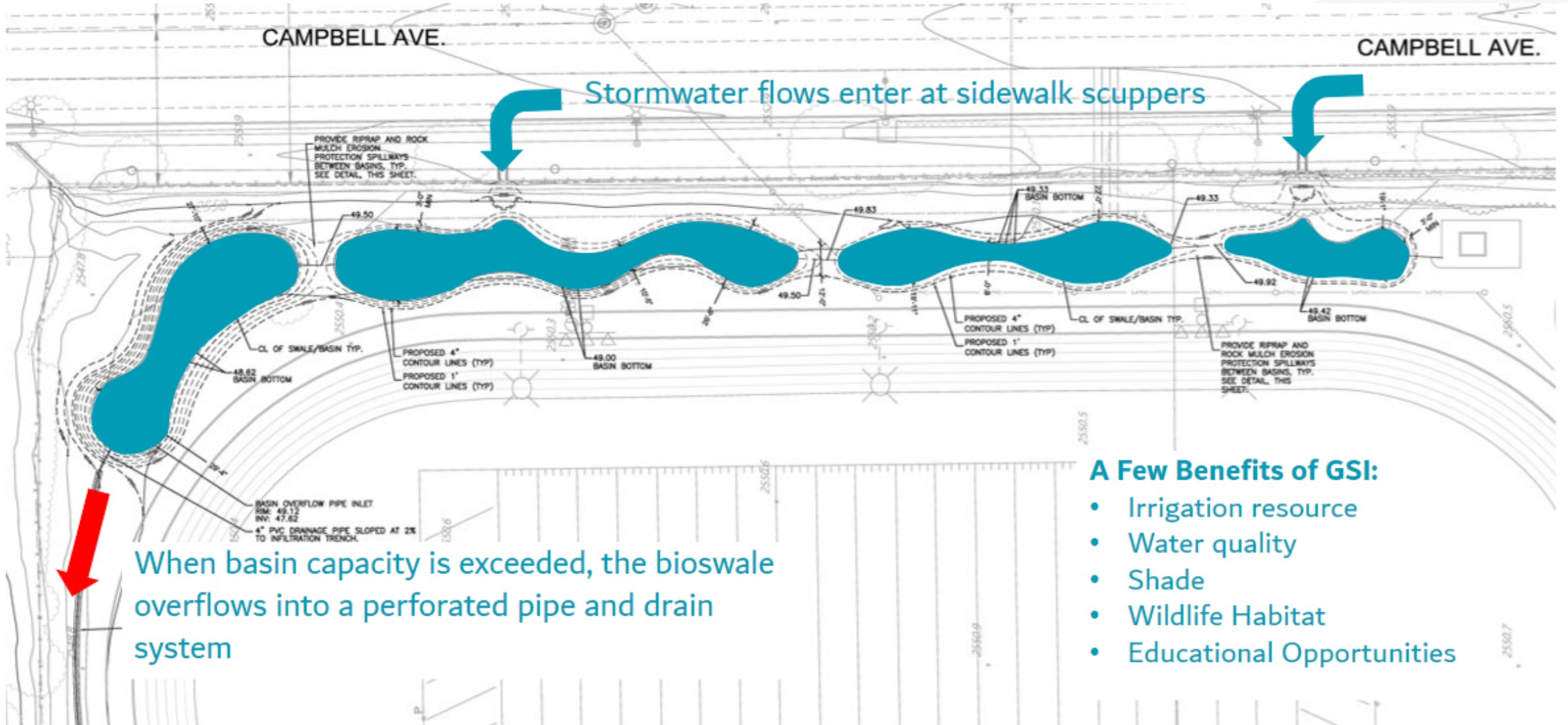
What is a sidewalk Scupper? An opening in the curb and sidewalk that allows stormwater to flow through it.



HOW IT WORKS : BASINS FILL WITH STORMWATER



HOW IT WORKS : PLANNED OVERFLOW



PROJECTS – CHERRY AVENUE PARK



Stormwater harvesting basin constructed in collaboration with Pima County Regional Flood Control District in an underutilized corner of the park eliminates turf, mitigates flooding in the surrounding neighborhood, and creates habitat and shade.



PROJECTS – GENE C. REID PARK



PROJECTS – GENE C. REID PARK

1 ALEPPO PINE
transitions to
2 VELVET MESQUITES

23,500 gal/yr



40' canopy

Present

1 AFRICAN SUMAC
transitions to
3 LITTLELEAF ASH

12,500 gal/yr



40' canopy

Present

Improperly installed sediment trap



Properly installed sediment trap



LESSONS LEARNED

- **Early involvement in project planning saves time and resources**
- **Project costs**
 - Significantly higher than anticipated
 - Vary greatly by project type: in-street, behind the curb, in parks, on parcels
- **Contractor Challenges**
 - Timelines
 - Experience & expertise
 - Drawings/details – construction disconnect
- Plant pallet
- Irrigation systems vs. hand watering



GSI MAINTENANCE PROGRAM

- No prior Mx program; neighborhood agreements
- GSI assets are "owned" across various City departments
- Departments use different asset management systems that don't communicate w/one another
- Competing interests & protocols
 - TW well sites
 - Police, unsheltered population
- Mx Contractors & COT Mx staff





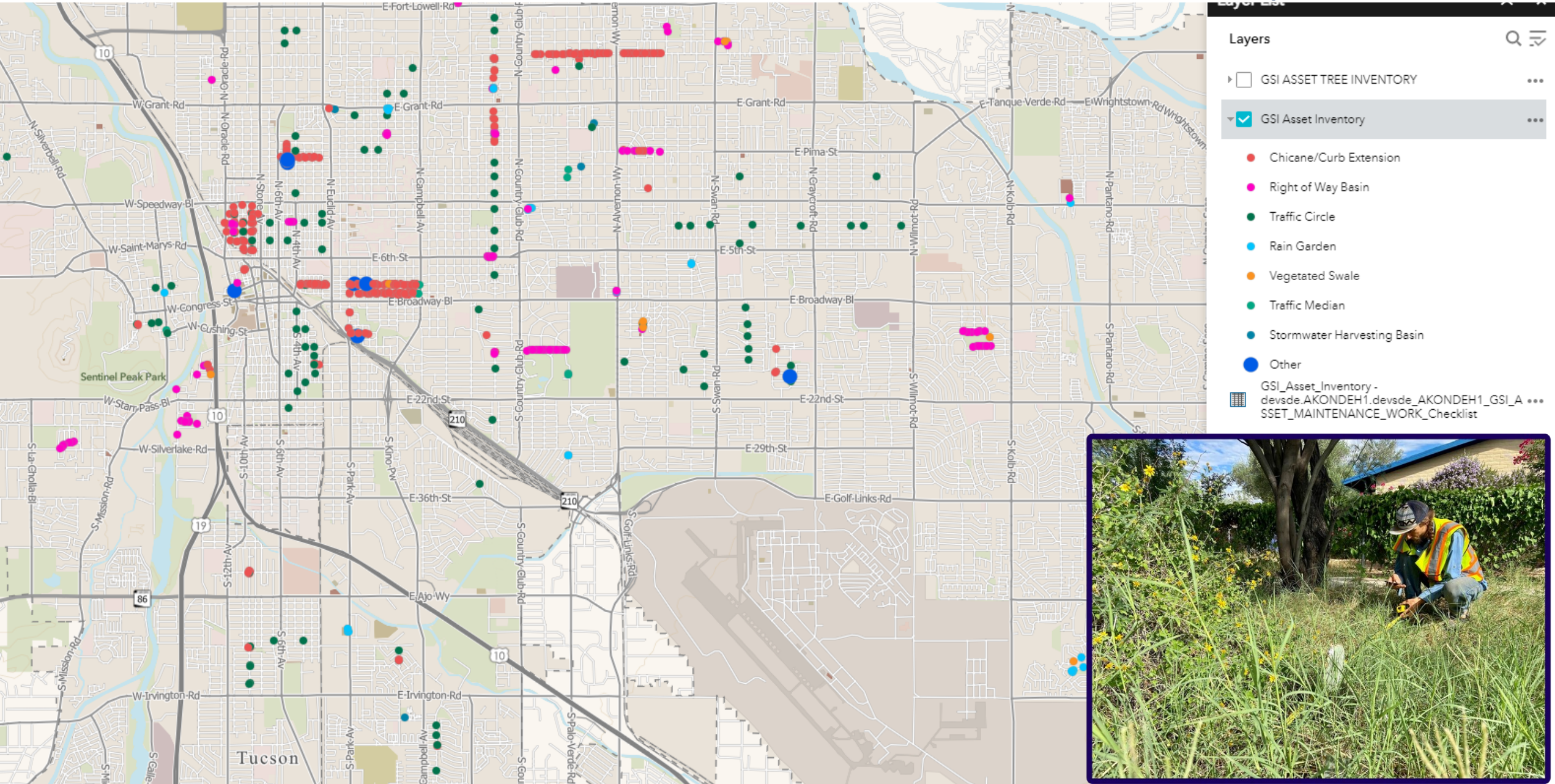
RESOLVING Mx CHALLENGES

- Building Resilience, University-Community Partnership (52 GSI stakeholders)
Establish, implement and disseminate a GSI maintenance protocol for the City of Tucson
- GSI Mx training modules (on-line & in field)
- GSI Mx Manual for internal/external use
- GSI Mx Agreements w/City depts
- Enterprise Asset Management System

GSI Asset Inventory

~600 city-built assets

Tree Inventory = ~850



PARTNERSHIPS

- Parks and Recreation Department
- Transportation Department
- Flood Control District/Stormwater
- Water Department
- Planning and Development Department
- Businesses
- Neighborhood Associations
- University of Arizona





Questions or comments?

** UA Soil Scientist Vanessa Buzzard and AZ Project WET's Josh Ruddick lead Sunnyside High Bioscience students in a tea bag decomposition experiment in the Campbell Ave. basin at Gunny Park*



BECOME A MEMBER:
cityparksalliance.org/join

Thanks for joining us!

NATURE-BASED SOLUTIONS TO CLIMATE THREATS: FLOODING, BIODIVERSITY LOSS, AND HEAT

MODERATOR



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Principal
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Sasaki
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City of Tucson
Greg.Jackson@tucsonaz.gov

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General CEUs

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June 21 - 25, 2024
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CITY
PARKS
ALLIANCE