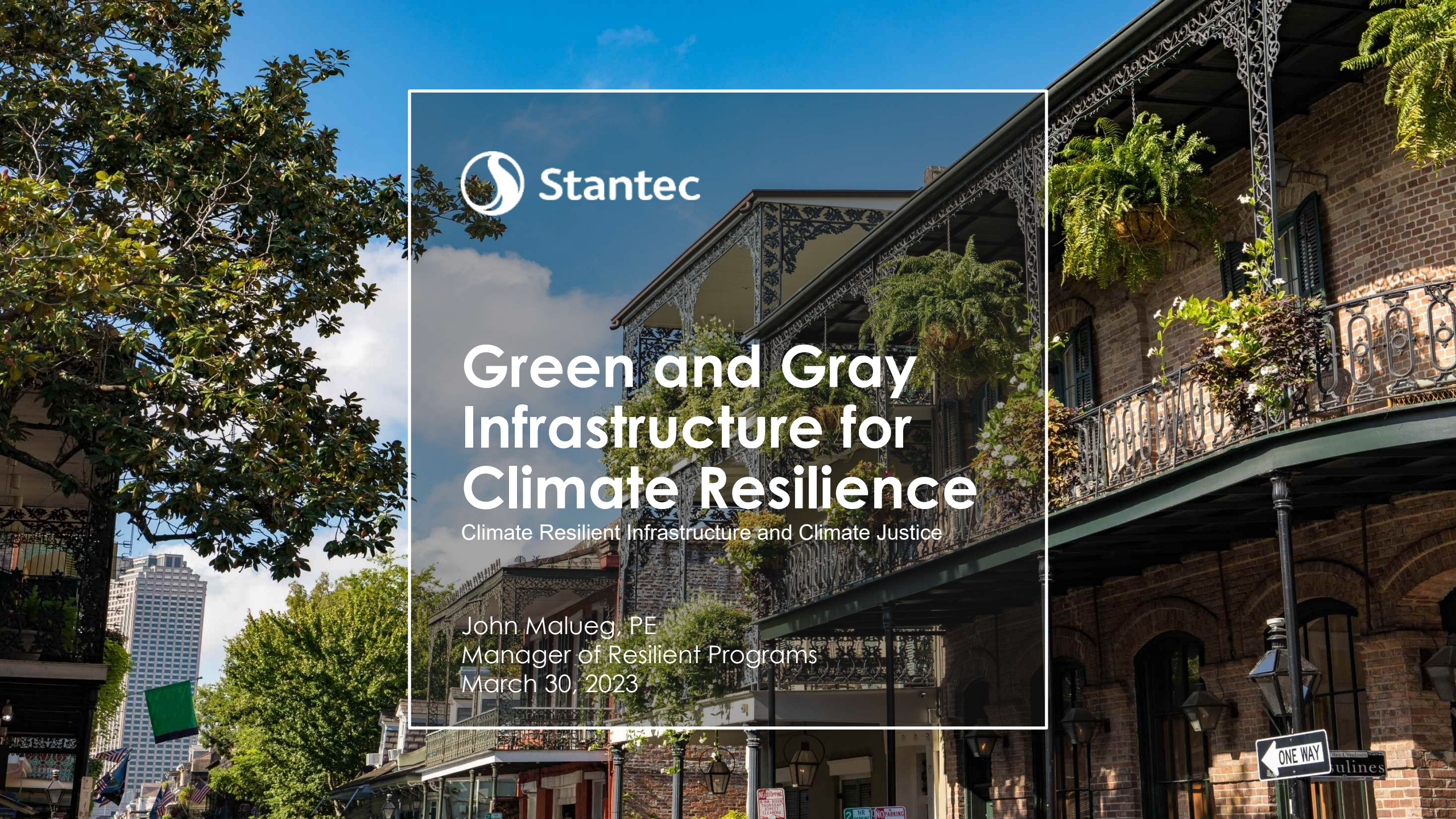




Green and Gray Infrastructure for Climate Resilience

Climate Resilient Infrastructure and Climate Justice

John Malueg, PE
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March 30, 2023





City of New Orleans Challenges

Natural Stressors

- Coastal flooding / sea-level rise
- Urban flooding / micro-bursts
- Extreme heat
- High-wind power outages

Subsidence - Sinking Delta Soils

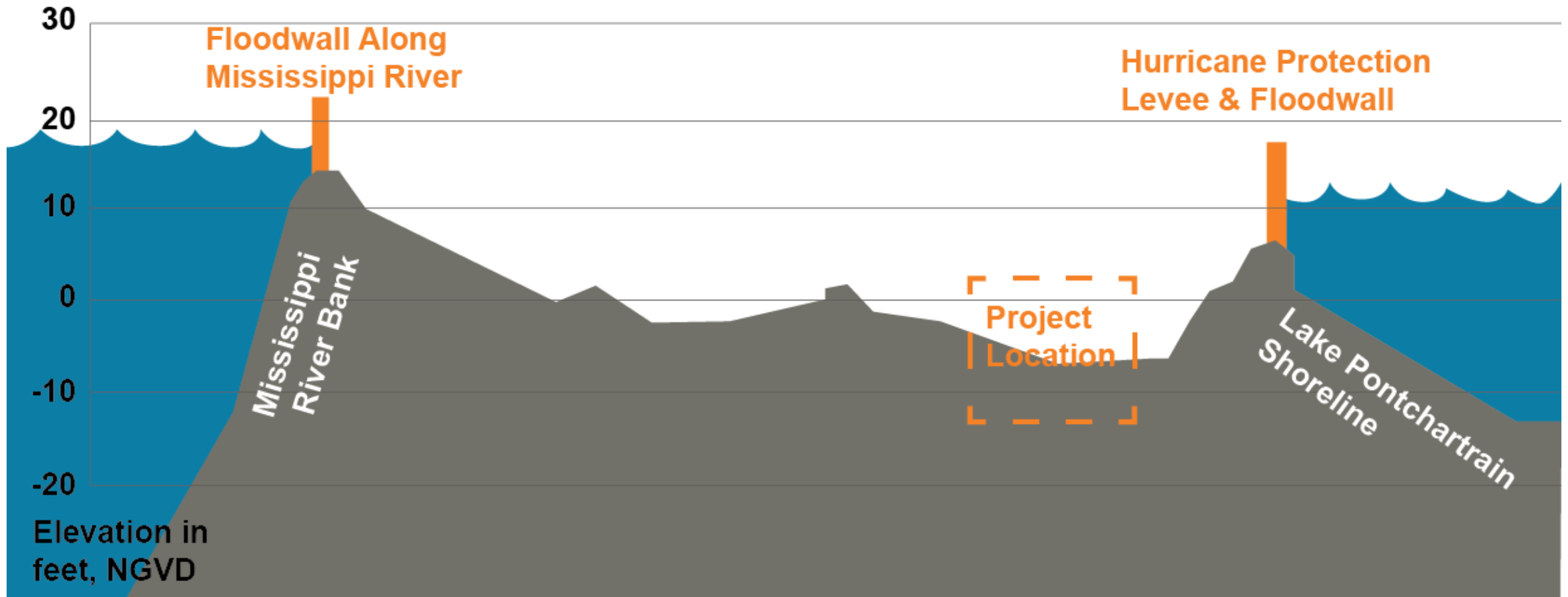
Social Stressors

- Poverty and high unemployment
- Income inequality
- Disparities in public health outcomes





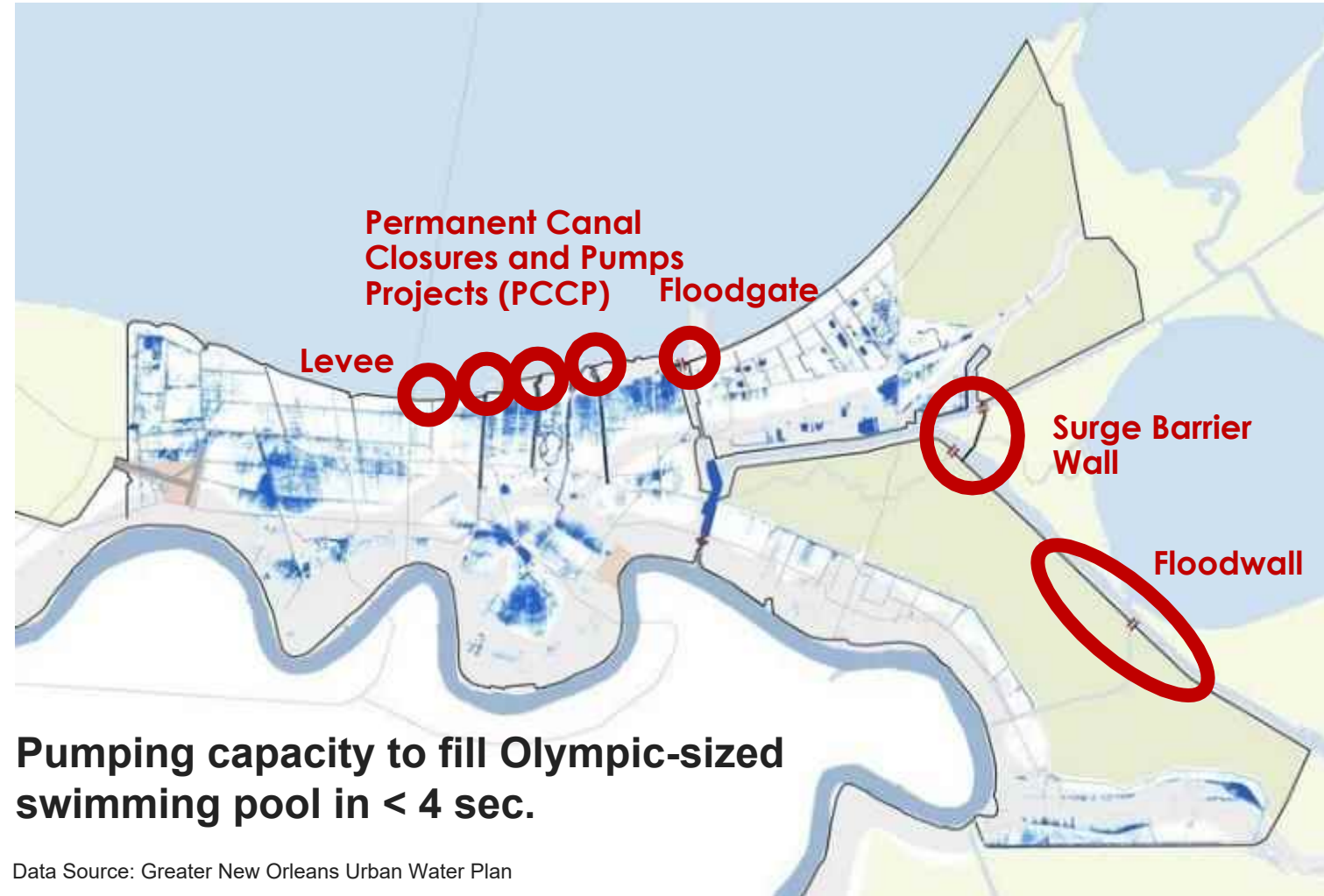
City of New Orleans: Critical Elevations





City of New Orleans: Gray Infrastructure

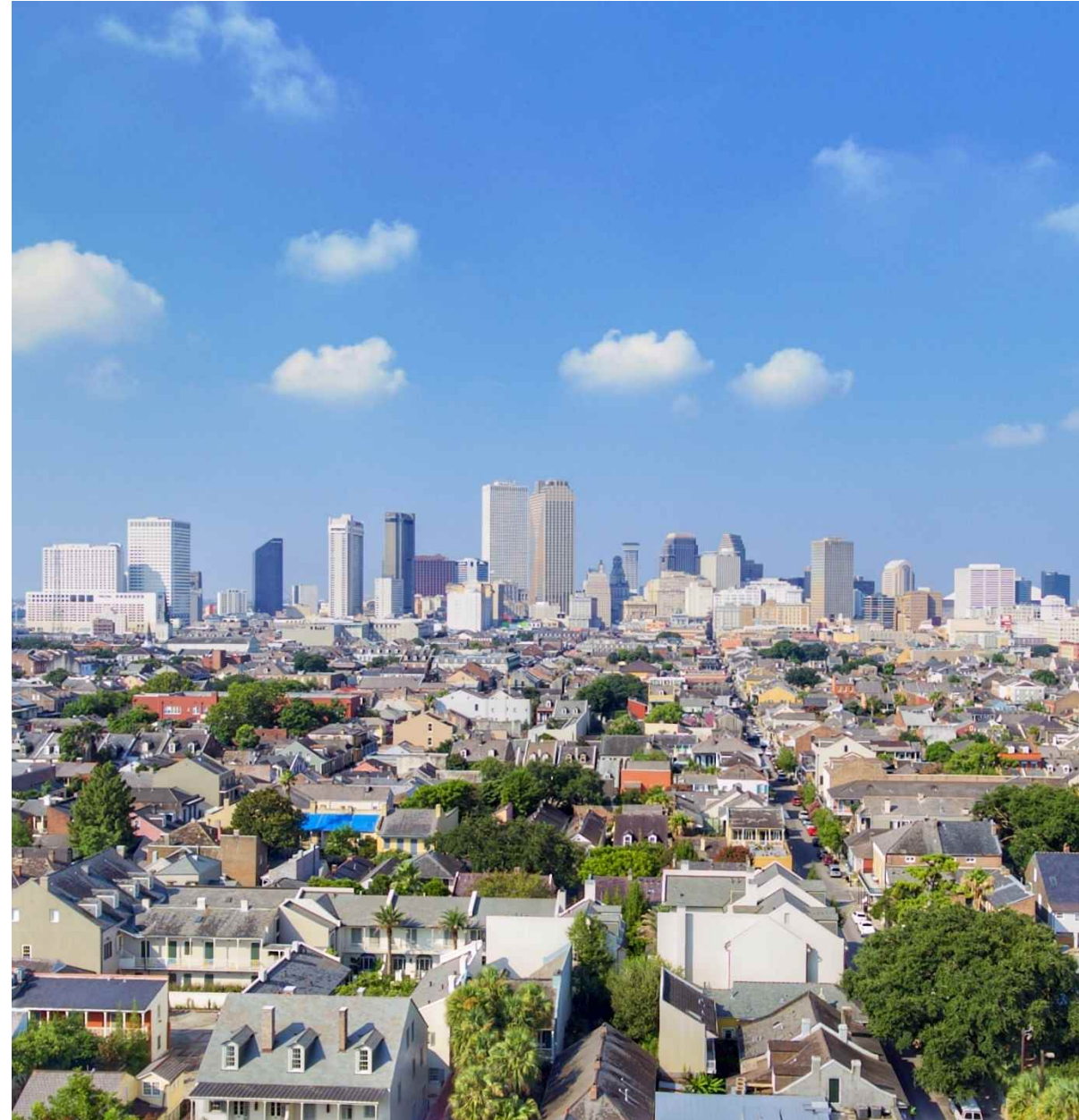
- \$14.6 Billion Federal Investment (US ACE)
- 350 miles of levee/floodwall
- Canal closure and pump stations (100-Year Level Risk Reduction)
- Pumping capacity ~ 24,300 cfs





Public Engagement: What We Heard

1. Improve Drainage
2. Improve Neighborhood Landscaping
3. Provide Walkable and Bike Friendly Area
4. Provide Park Amenities





Outlining Resilient Project Goals

Water Goals

- Address flooding
- Promote infiltration and groundwater recharge

Public Health Goals

- Provide access to parks
- Provide recreation

Economic Goals

- Meet financial goals for funding
- Drive economic growth through reinvestment
- Reduce flood management and subsidence risk

Cultural Goals

- Create community destinations for neighborhood gatherings
- Provide interactive educational opportunities

Urban Heat Goals

- Create shade
- Reduce heat island effect



Visioning a Resilient Future: The “Blue-Green Corridor” Project is Born



Living with Water



Visioning a Resilient Future: The “Blue-Green Corridor” Project is Born



Living with Water



Blue-Green Corridor Key Design Elements



- Neutral grounds designed to reduce flooding and mitigate subsidence

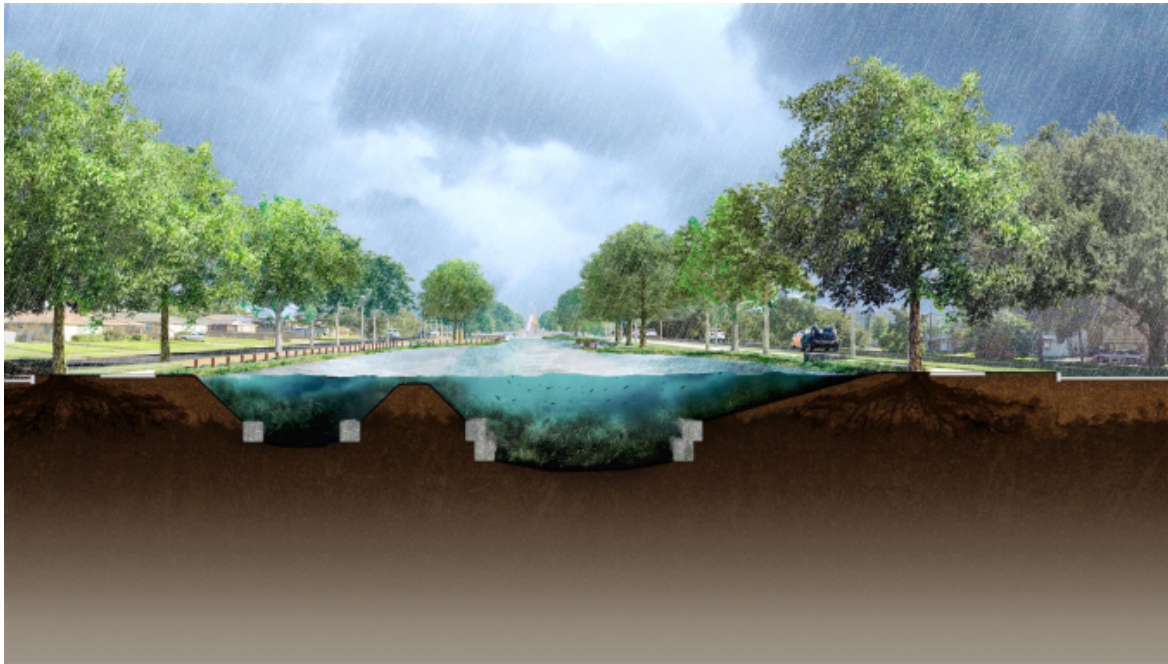


Key Design Element: Stormwater Storage



- Neutral grounds designed as extension of flood control pump station wet wells

Key Design Element: Stormwater Storage



- Neutral grounds designed to recharge aquifer, mitigate the rate of subsidence

Key Design Element: Complete Streets

Bump-outs:

- Enhance safety, reduce crossing distance for pedestrians
- Enhance the streetscape
- Enhance water quality
- Mitigate maintenance via trapping floatables / filtering runoff





Key Design Element:
**Multi-Purpose
Recreational
Amenities**

- Green space
- Community destinations
- Playgrounds
- Walkways / Trails

AND

- Stormwater storage



The Business Case: Benefit Cost Analysis

BCA = present value of benefits = **1.67**
present value of costs

Greatest benefits

- Flood damage reduction
- Subsidence reduction
- Improved quality of life

Greatest costs

- Capital costs
- Operations and maintenance
- Replacement costs

Benefit/Cost Type	Benefit/Cost	Lifetime Net Present Value
Financial	Residual Value of Assets	\$387,500.00
Financial	Replacement Costs	-\$2,163,000.00
Financial	Operations and Maintenance Costs	-\$3,751,000.00
Financial	Upfront Capital Costs	-\$34,531,950.40
Social	Avoided Subsidence (Property)	\$31,571,000.00
Social	Avoided Flood Damage	\$27,833,000.00
Social	Avoided Subsidence (Road)	\$13,097,000.00
Social	Property Value Uplift	\$9,408,000.00
Social	Community Recreation	\$6,167,000.00
Social	Education	\$3,585,000.00
Social	Public Health (Exercise)	\$455,000.00
Social	Health – Heat Island	\$411,900.00
Social	Public Health (Reduced Stress)	\$89,000.00
Environmental	Improved Water Quality	\$1,431,000.00
Environmental	Carbon Sequestration	\$694,000.00
Environmental	Reduced Air Pollution Emissions	\$14,300.00
Financial	Social	Environmental
-\$40,058,450.40	\$64,783,900.00	\$2,139,300.00



Monitoring / Adaptation: Goals Metrics

Water Metrics

- Reduced frequency of flooding
- Increase in groundwater table elevations

Public Health Metrics

- Improved public school attendance
- Units of playground equipment

Economic Metrics

- Change in home tax evaluation values
- Home / Business new construction / restoration permits issued
- Reduce flood insurance claims

Cultural Metrics

- Number of neighborhood events permits issued
- Number of educational events held

Urban Heat Metrics

- Number of shade tree planted



Gray and Green Infrastructure for Climate Resilience

- Living with Water
- Your Resilient Solution is likely a mix of gray and green infrastructure
- Each community challenge presents unique opportunities
- Strive to maximize benefits
 - Damages avoided
 - Social / Equity / Quality of Life
 - Environmental
 - Economic

Design with Community in Mind



Questions?

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