



City of New Orleans Stormwater Management

City of New Orleans

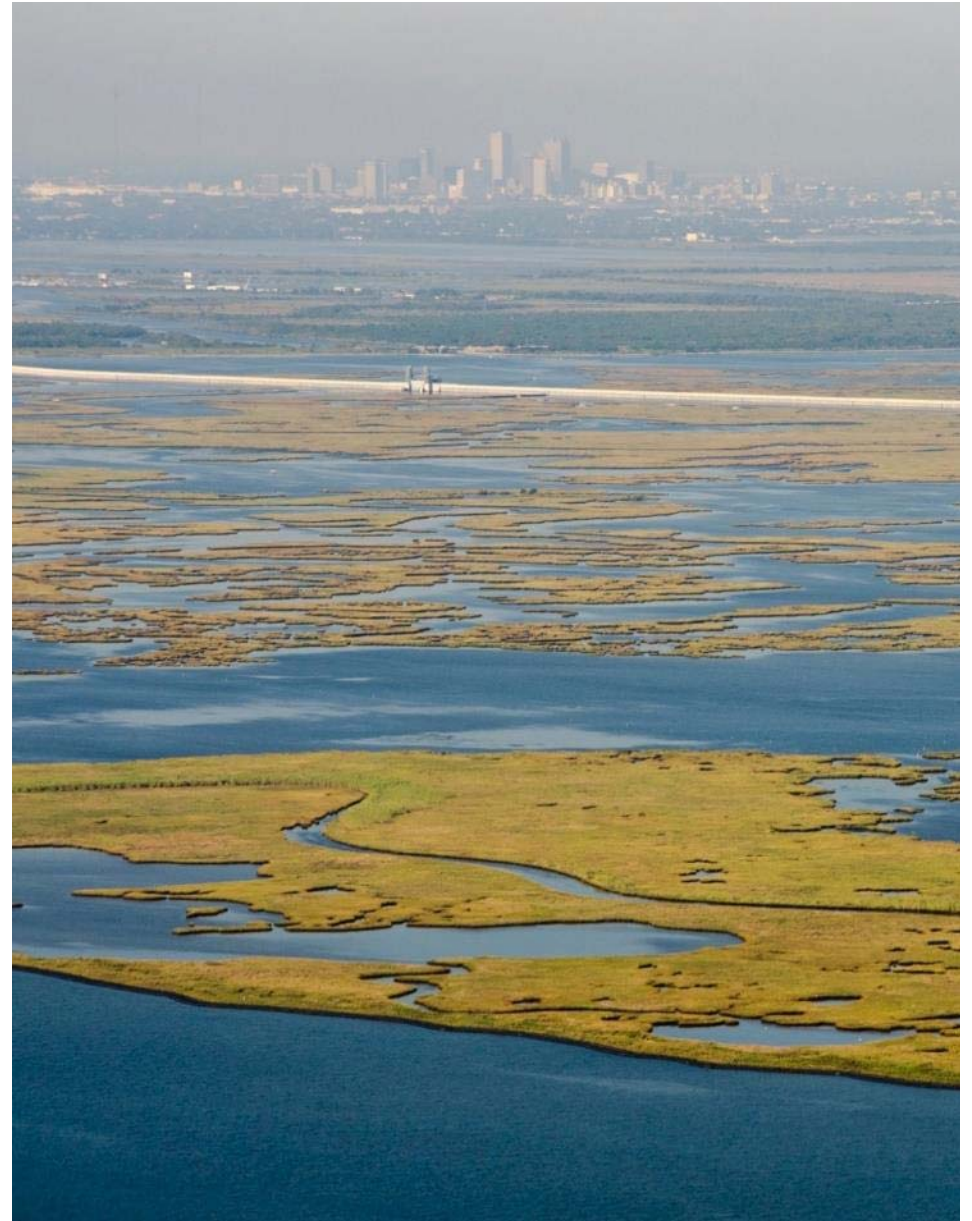
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Stormwater Management

Surrounded by water and protected by levees, New Orleans collects stormwater in an underground drainage system and then pumps water out. As a 300-year old city, most of the land is developed. Short of replacing all the City's pumps, how New Orleans manage our stormwater and flooding in the face of increasingly intense storms?

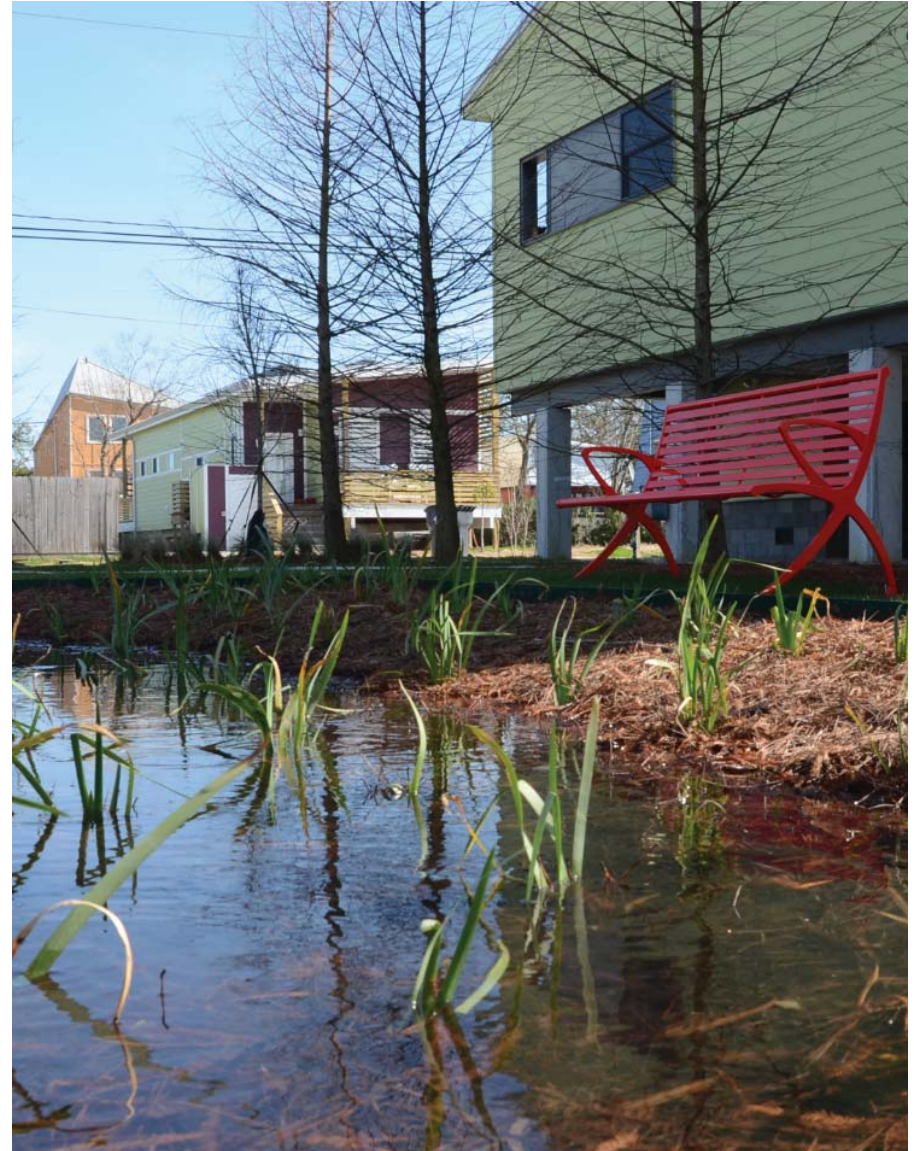
The answer lies in how we live with water – incorporating stormwater storage into our green spaces, streets, and in our homes and yards. Through both the Hazard Mitigation and Disaster Resilience programs, the City is using green infrastructure to manage flooding and support public health.



FEMA Hazard Mitigation

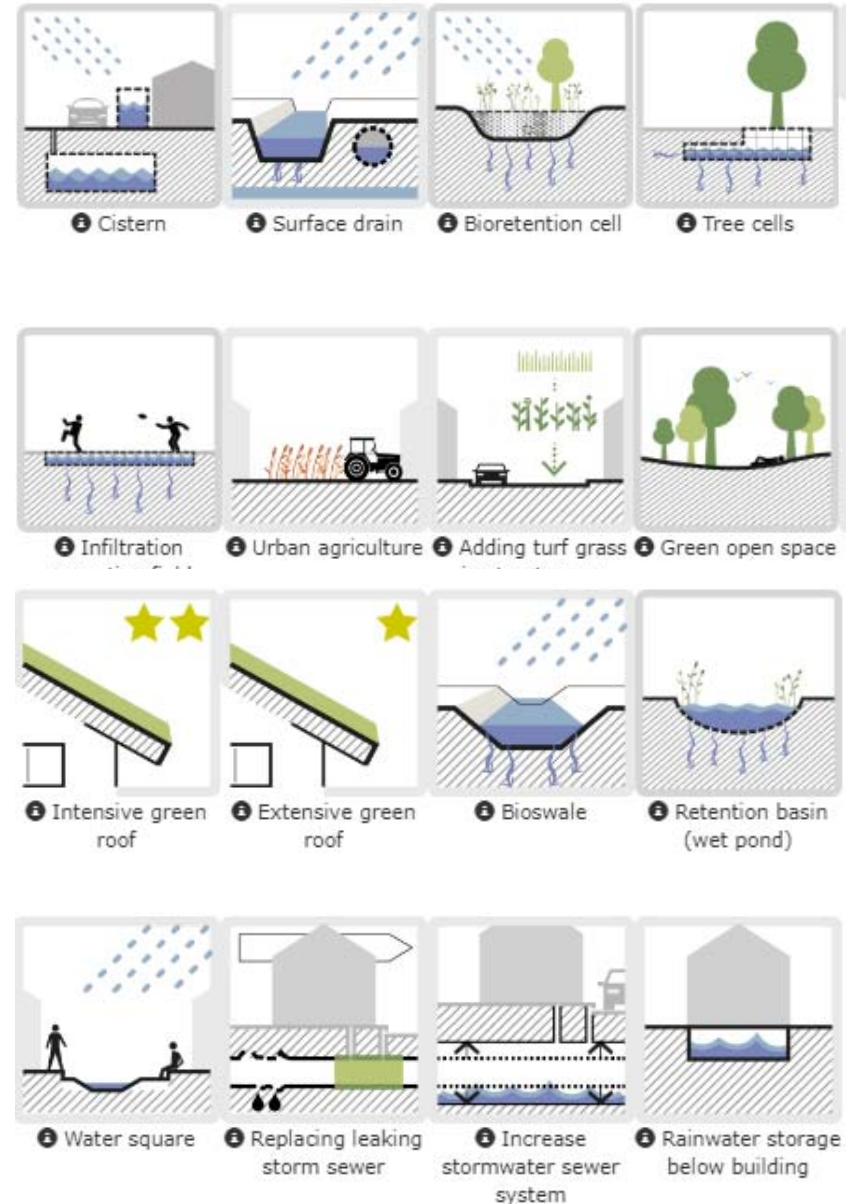
Proportional to a City's total award after a disaster, FEMA makes funding available for Hazard Mitigation – funding to prevent damage from future disasters. These projects must also show a 1:1 benefit to cost ratio. All costs to design and build project must be less than the predicted cost of future damage if the project was not built. These awards address different types of risk:

- Stormwater Management
- Home Elevation
- Wind Retrofits for structure hardening.



Solutions for Streets, Parks and Homes

- Stormwater Lots and Parks
 - Pontilly Stormwater Network
 - St. Anthony Green Streets
- Pervious Pavement
 - Mirabeau Water Garden
- Bioswales
 - St. Anthony Green Streets
 - St. Bernard Neighborhood
- Rain Gardens
 - Community Adaptation Program
- Retention Basin
 - Mirabeau Water Garden
 - Blue and Green Corridors
- Underground Storage
 - St. Bernard Neighborhood Storage



Oak Park

This project transforms five vacant NORA-owned parcels on Perlita Street, and nearby planting strips along the street, into a stormwater management feature that reduces flood risk. Underground stormwater retention tanks in the parcels slowly release stormwater through a weir.



- **Project Goals**

- Reduces flooding depth and duration benefitting 209 homes
- Bioswales adjacent to the roadway store and filter stormwater, providing habitat for pollinators and improving water quality
- Avoids \$420k in future damage to automobiles from street flooding

- **Budget: \$1.6M HMGP**

- **Construction bid: QTR 1 2020**



Types of Green Infrastructure



Hagan Lafitte

This project combines underground stormwater storage tanks, pervious sidewalks, and pipe upgrades to reduce peak stormwater flow to DPS 03 and reduce flooding.

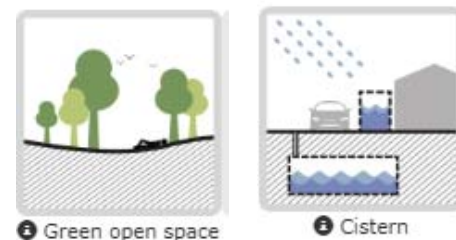


- **Project Goals**

- Reduces peak flooding depth by 14" and duration by 3 hours in 10-year storm
- Combination of grey and green infrastructure can be replicated in other neighborhoods

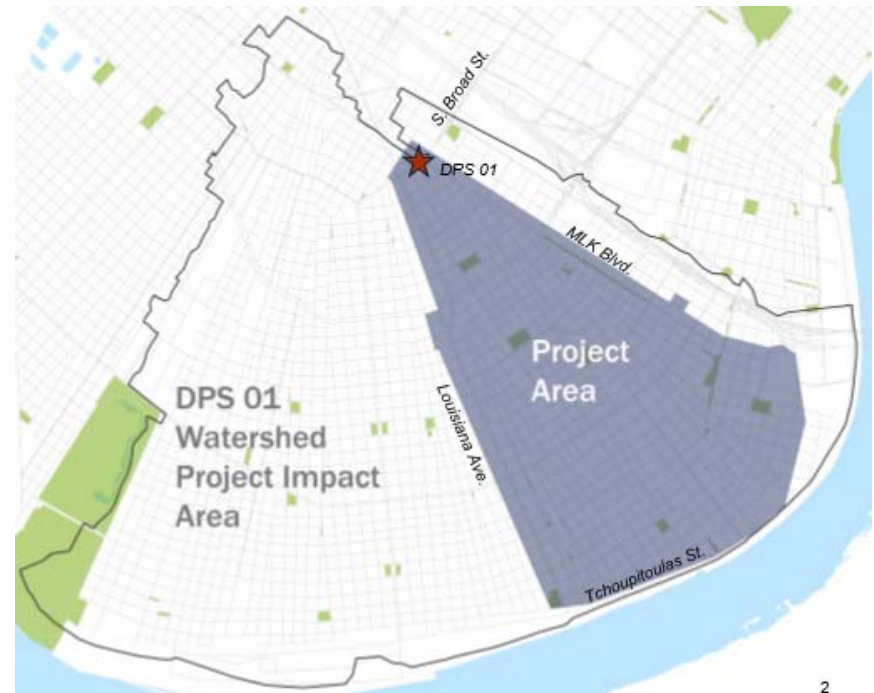
- **Budget: \$6.5M HMGP**

- **Currently in construction**



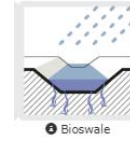
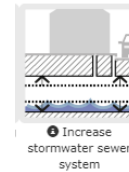
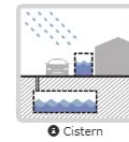
Drainage Pump Station 01 Broadmoor

- Green infrastructure will temporarily capture stormwater runoff at higher ground near the River
- Pipe upgrades will increase the amount of stormwater that can get to the pump station & outfall canals
- Phase I:
 - 4 Stormwater Parks
 - 2 Stormwater Lots
 - 3 Green Intersections
 - Associated Pipe Upgrades
- Phase II:
 - 2 Stormwater Parks
 - 2 Green Intersections
 - 6 Complete Streets
 - Improvements with Associated Pipe Upgrades

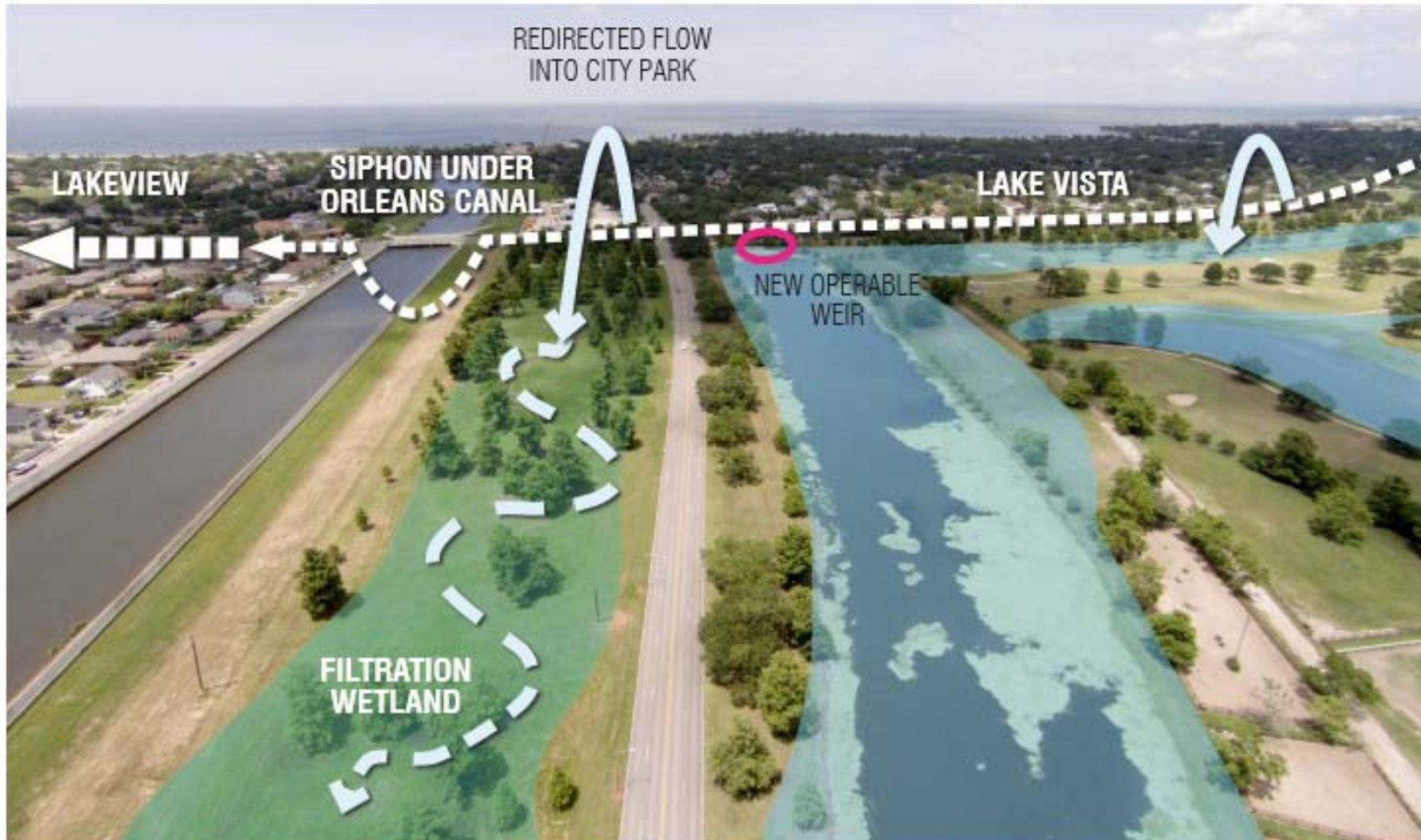


Drainage Pump Station 01 Broadmoor

- Stormwater storage in Saratoga and Van McMurray Parks with plantings to improve stormwater infiltration
- Intersection upgrades with pervious gutters, rain gardens, and pervious crosswalks
- Streets upgraded with stormwater storage, pervious pavement, pervious asphalt bike lane, bioswales, and upgraded drainage pipes
- Stores 12.9M gallons of stormwater
- **Budget: \$45.2M HMGP**
- **Construction bid: 3 QTR 2019**

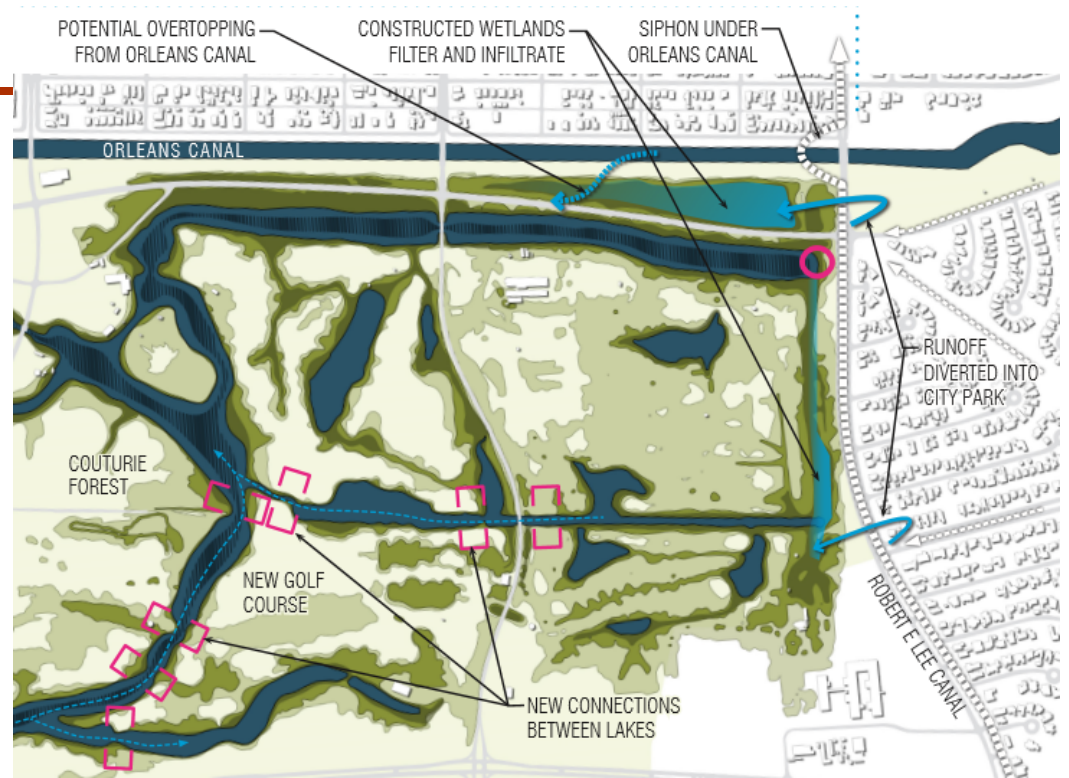


Lakeview – City Park



Lakeview – City Park

This project combines alleyway stormwater storage with lagoon improvements in City Park to increase stormwater storage, improve water quality and enhance green space in City Park. Improved wetlands in City Park accept drainage from Lake Vista.



- **Project Goals**

- Operable weirs allow lowering of water levels in lakes in advance of storm events
- Dredged lake beds provide up to 320M gallons of storage capacity diverted from the drainage system
- Modified lake edges stabilize banks and increase storage capacity

- **Budget: \$22.2M HMGP; Design start: QTR 1 2019**

National Disaster Resilience Competition

New Orleans was awarded \$141M to establish the first-ever Resilience District with several integrated initiatives that will turn Gentilly into a national model for retrofitting post-war suburban neighborhoods into resilient, safe, and equitable communities of opportunity.

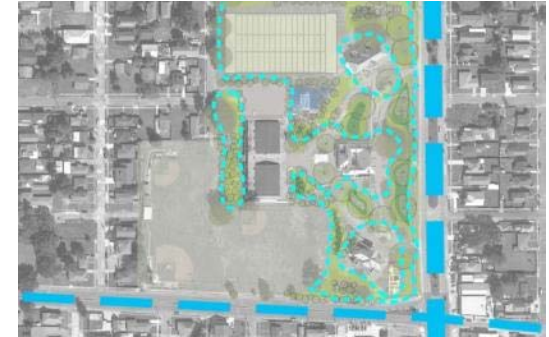
Initiatives include planning, community engagement, government policies, and construction projects

- Transforming water from a threat into an asset in the public realm,
- Adapting private property for stormwater management,
- Enhancing energy grid reliability, and
- Training residents in water infrastructure.

Performance of the District is measured in the acres of green space constructed, numbers of households within 0.5 miles of improved public spaces, number of jobs created, number of people trained, and number of permits for new construction.



Gentilly Resilience District: Urban Water & Community Adaptation Activities



Parks & Playgrounds



Vacant Lots



Streets & Corridors



Open Spaces

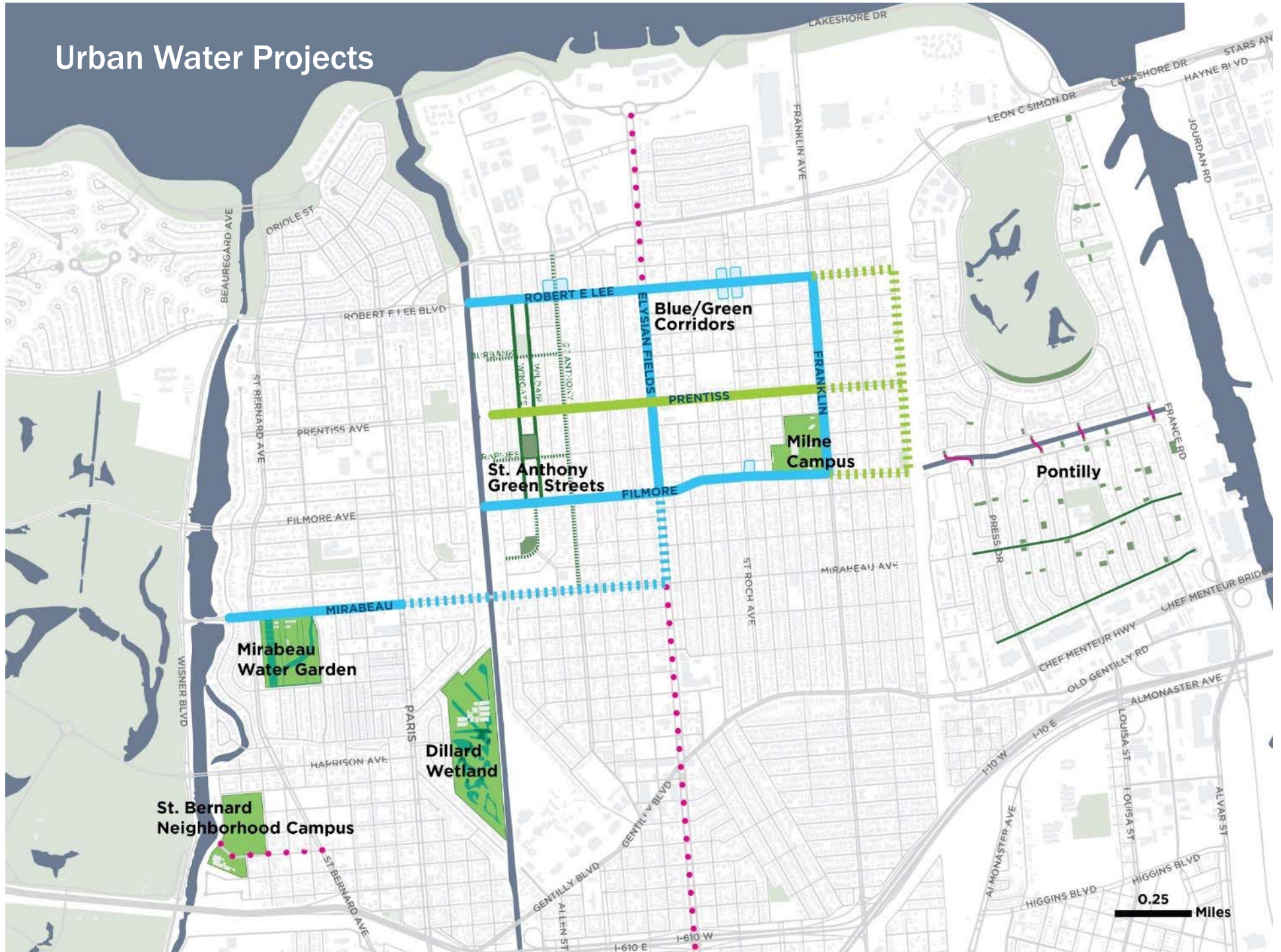


Home & Property Improvements

Design for Multiple Benefits and Equitable Outcomes



Urban Water Projects



Mirabeau Water Garden

The Mirabeau Water Garden is a public works project that will transform a 25-acre open site into a recreational and educational amenity that reduces flood risk. The land was donated to the City of New Orleans by the Congregation of St. Joseph for the enhancement of the neighborhood.



- **Project Goals**

- Divert and temporarily store up to 10 million gallons of water from street drainage pipes into a site detention pond to mitigate flooding
- Infiltrate water into the site's sand layer to allow organic soils to stabilize and limit subsidence
- Clean water of pollutants through a series of constructed filtration wetlands to improve water quality and allow visitor interaction
- Educational and recreational facilities and programming on sustainable water management and local ecology
- **Budget: \$16.6M HMGP; \$11.5M NDR**
- **Construction bid: QTR 1 2020**

Milne Campus: History of Serving Youth



Milne Campus

Enhances an existing historic site with green infrastructure features and recreational facilities that reduce the risk of flooding and subsidence in the surrounding neighborhood and further the site's existing mission of youth development.



- Project Goals
 - Improve stormwater management and reduce flood risk and subsidence
 - Enhance and add value to existing and future programs of the site, including NORDC, NOLA FOR LIFE, and water-focus education and economic opportunity activities, with a focus on youth programming.
 - Engage the city's youth, especially teens, in important topics for the city's future, including: water management, environmental stewardship, community development, and economic opportunity.
- Estimated Construction Budget: \$6.04M
- Construction Bid: July 2020

Pontilly Project History

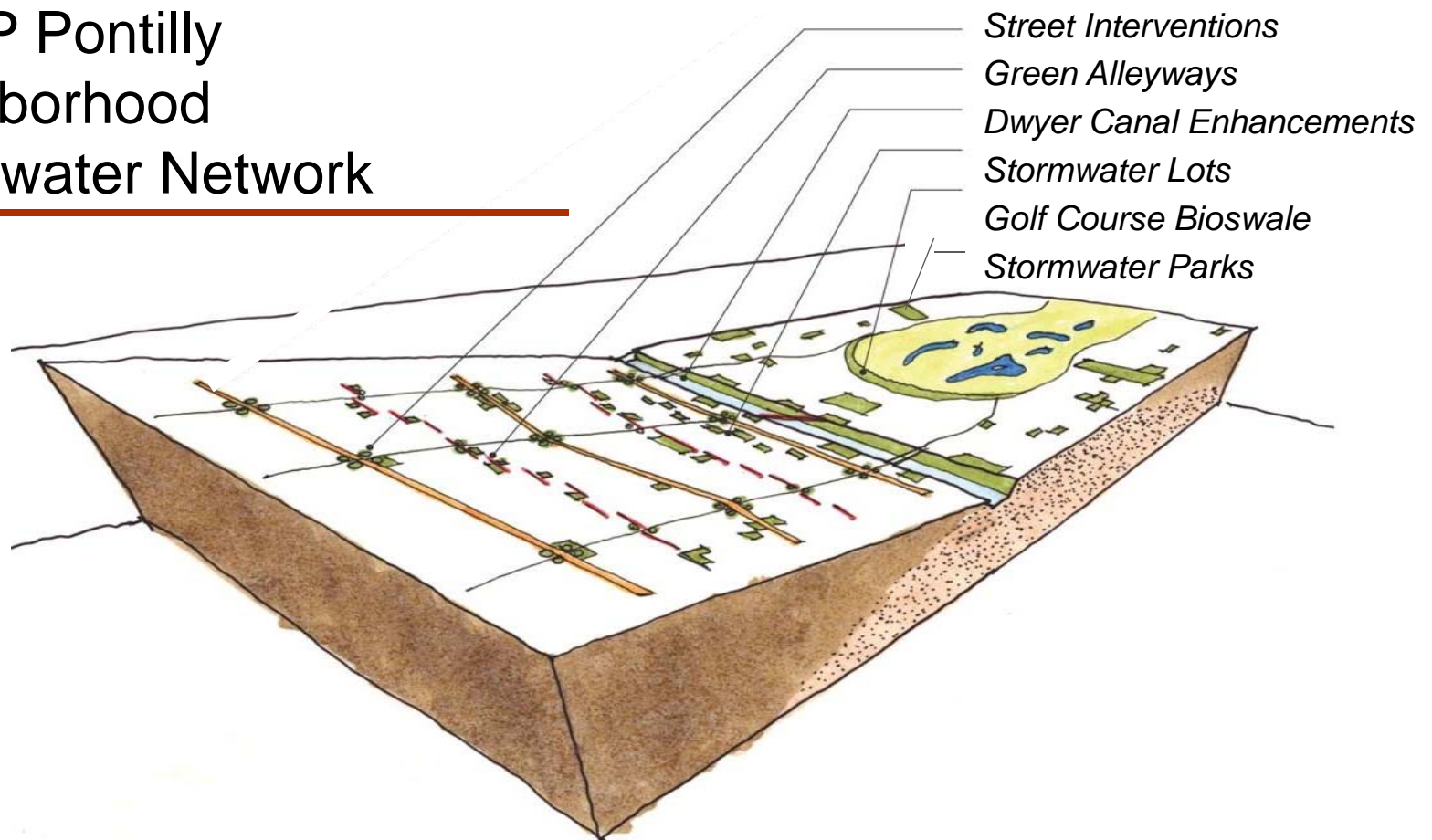
Dwyer Canal acts as barrier between two historically segregated neighborhoods developed in the 1950s: Pontchartrain Park to the north and Gentilly Woods to the south



Pontchartrain Park and Gentilly Woods residents approached NORA in 2008 with a vision for a redesign of the Dwyer Canal and other spaces in the neighborhood to reduce flooding and to make the community more beautiful and walkable.



HMGP Pontilly Neighborhood Stormwater Network



Drainage improvements to the Dwyer Canal combined with green infrastructure features at vacant lots, streets, and alleyways designed to capture stormwater and beautify the Pontchartrain Park and Gentilly Woods neighborhoods

- Budget: \$13.5M FEMA HMGP Leverage Activity
- HMGP Construction start: March 2019

HUD NDR Dwyer Canal Public Space Improvements

Public space and placemaking amenities along and near the Dwyer Canal that connect the Gentilly Woods and Pontchartrain Park neighborhoods and enhance the 100% designed FEMA-funded green infrastructure and drainage improvements



- Project Goals
 - Improve walkability, connectivity, and recreational opportunities within and across the Pontchartrain Park and Gentilly Woods neighborhoods
 - Provide spaces for social cohesion and expressions of neighborhood identity and history
 - Promote environmental learning and education of green infrastructure
 - Beautify the Dwyer Canal and adjacent neighborhoods
- Estimated Construction Budget: \$2.1M NDR
- Construction Bid: June 2020

Blue-Green Corridors

Transforms major boulevards in Gentilly into a series of blue and green corridors that reduce flood risk and subsidence while facilitating safe and comfortable spaces to travel and recreate. This project serves as the framework that connects other Gentilly Resilience District projects, setting an innovative model for urban adaptation practices in delta communities.



- Project Goals
 - Increase stormwater storage and available green space
 - Increase high quality multimodal facilities in and across neighborhoods
 - Create new and enhanced civic spaces
 - Enrich social cohesion through community engagement, awareness, and participation
 - Catalyze neighborhood investment and economic vitality
 - Forge a distinct identity for Gentilly
- Budget: \$45.2 M NDR

St. Anthony Green Streets

Seeks to establish a new standard for neighborhood streets and neighborhood parks that incorporates stormwater management as a key component. With this project, the City will improve upon existing strategies implemented across New Orleans and test new strategies for block-level environmental adaptation across the city.



- Project Goals
 - Improve stormwater management and reduce flood risk and subsidence
 - Empower residents to participate in adapting their block and neighborhood parks to manage water and build resilience.
 - Enhance social cohesion and community well-being
 - Develop a replicable model for block-by-block strategies for stormwater management and community resilience across the city.
- Budget: \$21.1M NDR, \$10M FEMA PA Leverage
- Construction bid: January 2020

St. Bernard Campus

Enhances an existing academic site with green infrastructure features and recreational facilities that reduce the risk of flooding and subsidence in the surrounding neighborhood. Improves the connectivity between social service facilities with green infrastructure and stormwater management features.



- Project Goals
 - Improve stormwater management and reduce flood risk
 - Create new and enhanced recreational space – examples may include plazas, seating areas, multi-purpose places, and play areas
 - Improve access and neighborhood connections to Bayou St. John and City
 - Promote environmental and health education opportunities
- Budget: \$11.3 NDR
- Construction bid: May 2020

Dillard Wetlands

Enhance a 27-acre urban forest by removing invasive species and routing stormwater through wetland to enhance water quality. This second growth forest, cut in the 1940s, contains some live oaks 100 years in age but has been compromised by invasive species such as Chinese tallow, reducing its ability to support native species.



Photo: Richard Campanella

- Project Goals
 - Detain and filter stormwater from surrounding neighborhood
 - Create outdoor classroom and recreational asset
 - Protect urban forest and reduce invasive and vector species
- Budget: \$5.9M NDR
- Construction bid: August 2020

Community Adaptation Program

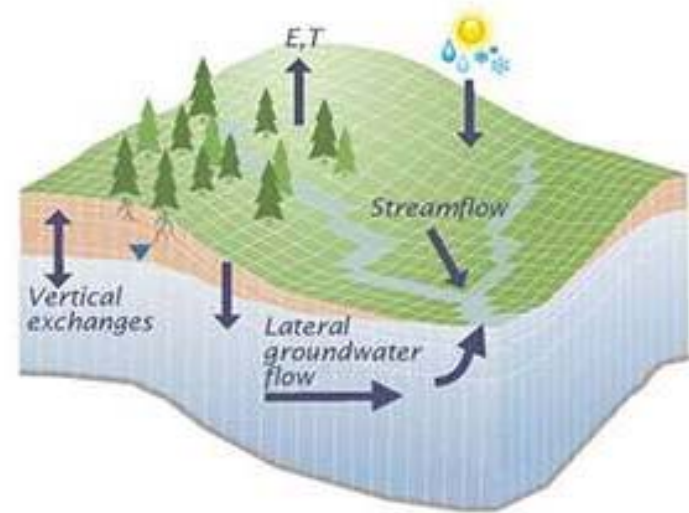
Adds stormwater management features to private residences through grants managed by the New Orleans Redevelopment Agency (NORA). Residents choose the feature (rain gardens, permeable surfacing, rain barrels, to be installed and the contractor to perform the work. NORA qualifies the contractors and submits invoices for reimbursement.



- Project Goals
 - Divert and detain stormwater runoff on over 200 properties with an average grant award between \$10,000 and \$25,000
 - Involve residents in stormwater management
 - Protect and beautify the home of low- to moderate-income individuals
- Budget: \$5.9M NDR
- In Construction

Planning and Project Delivery

- New Orleans is a former barrier island with sand layer running SW to NE
- Soil is layers of clay and sand
- Clay in Gulf Coast can expand with high water storage and shrink when dry
- Groundwater Monitoring and Modelling – Deltares
 - Reduce soil subsidence
 - Reduce soil salinity
 - Improve soil health
 - Reduce urban heat



Integrated Hydrologic Models

Planning and Project Delivery

Repetitive Loss Area Analysis – University of New Orleans

- In-depth look at areas that have experienced multiple losses from flooding
- Detailed building information is collected develop an understanding of the causes of repetitive flood damage at those sites
- Generate specific guidance on mitigation solutions for individual buildings or areas, rather than community wide hazard mitigation plan
- UNO is using desktop analysis and student site visits

GENTILLY WOODS



Landscaping and a vivid color scheme. Elevation about 3 ft.



Brick veneer with traditional New Orleans circular vents. Elevation about 3 ft.

<http://floodhelp.uno.edu>

<http://new.uno.edu/chart/cep>

Next Steps – Collaboration on Campuses

Universities, schools, churches – any entity with a large campus or large parking areas can collaborate with the City to assess potential for stormwater management. The City can apply for FEMA or CBBG-DR hazard mitigation grants to store stormwater on agency or private property once a CEA is in place.

- St. Bernard - OPSB CEA with City to install stormwater storage under athletic fields
- Parking lots – Convert impervious areas to pervious surfaces and install stormwater storage
- Overflow lots – install underground stormwater storage and reinforce grass surface, reducing landscape maintenance



Next Steps – Turf Management

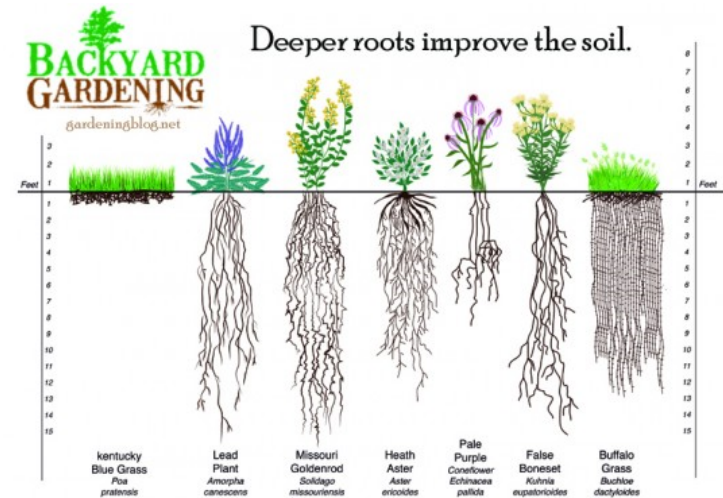
Stormwater storage, soil health, and plant health are linked. Healthy turf and plants with longer roots lead to more water being stored in existing soil.

- Healthy topsoil is replenished with decaying plant and animal matter, circulated by bacterial and insect activity
- Compacted urban soils are mostly inert and shed stormwater
- Shorter turf grass supports shorter roots – less stormwater infiltration and bacterial zone
- Achieving 5% organic content in soils can reduce runoff and improve stormwater quality



Next Steps – Turf Management

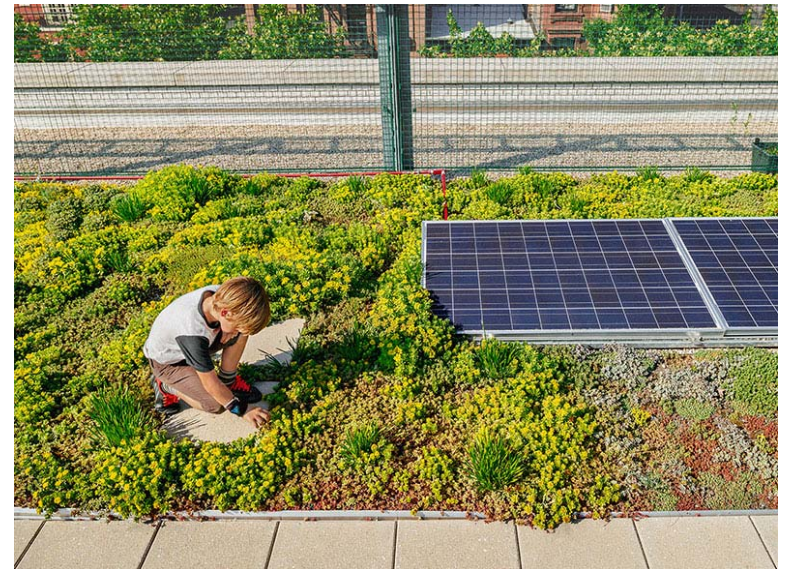
- Blow in or spread compost to large turf areas to increase organic matter
- Set mower height to encourage root development and reuse clippings in mulched beds
- Overseed with longer rooting grasses and nitrogen fixers to reduce invasive weeds
- Coastal prairie grasses – Little bluestem, big bluestem, broomsedges – and “wildflowers” – blazing stars, Rudbeckia, coreopsis, and goldenrod – can be ornamental and effective in increasing stormwater storage through root development
- Discontinue pesticides to encourage diverse soil biome



Next Steps – Roofs and Walls

“Cooling” days comprise the majority of year. “Blue” and green stormwater storage roofs insulate buildings from heat exchange as well as reduce stormwater peaks.

- Blue roofs temporarily store stormwater in media trays or membranes. Stormwater is released through a drain restrictor or check dam. Stormwater quality is not improved.
- Green roofs store stormwater in vegetation and growing media over a waterproof membrane. Stormwater runoff is reduced through plant uptake and evaporation, and stormwater quality is improved.
- Cost effective
 - Green media trays around solar panels improve energy output by reducing heat spikes
 - Roof membranes last twice as long
 - Lower HVAC costs



Next Steps – New definitions for infrastructure

“The High Line has a been a resounding success as an engine for tourism”



Paris Wants to Grow ‘Urban Forests’ at Famous Landmarks





Questions?

City of New Orleans

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