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In Partnership with:

CITY OF NEW ORLEANS
Mitchell J. Landrieu, Mayor

100 RESILIENT CITIES

ARCADIS

New Orleans Stormwater Strategic Pathways

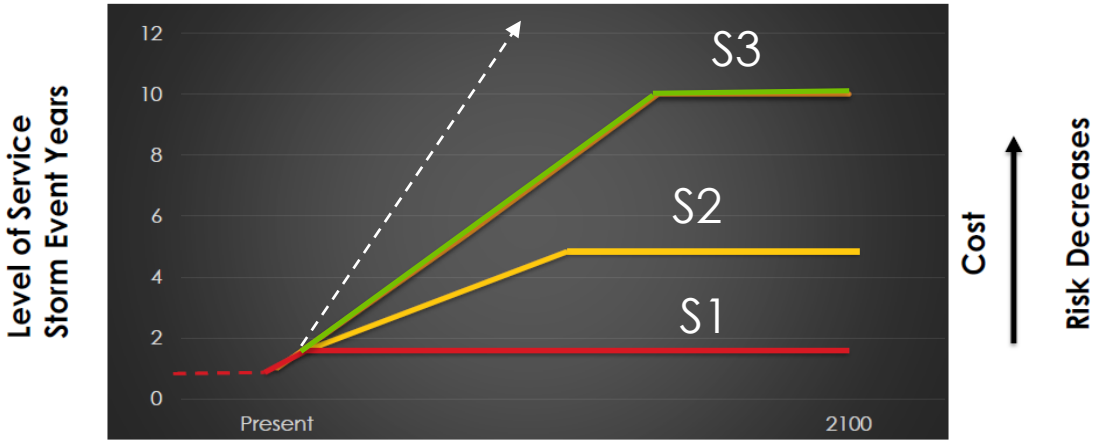
Workshop 1 - Follow-up

Level of Service (% Chance of Occurrence /Year)

- 1.5 – year storm (67%)
- 5 – year storm (20%)
- 10 – year storm (10%)

Other LOS

- 25 year Storm (4%)
- 50-year (2%)
- 100 year storm (1%)
- 500 year storm (0.2%)



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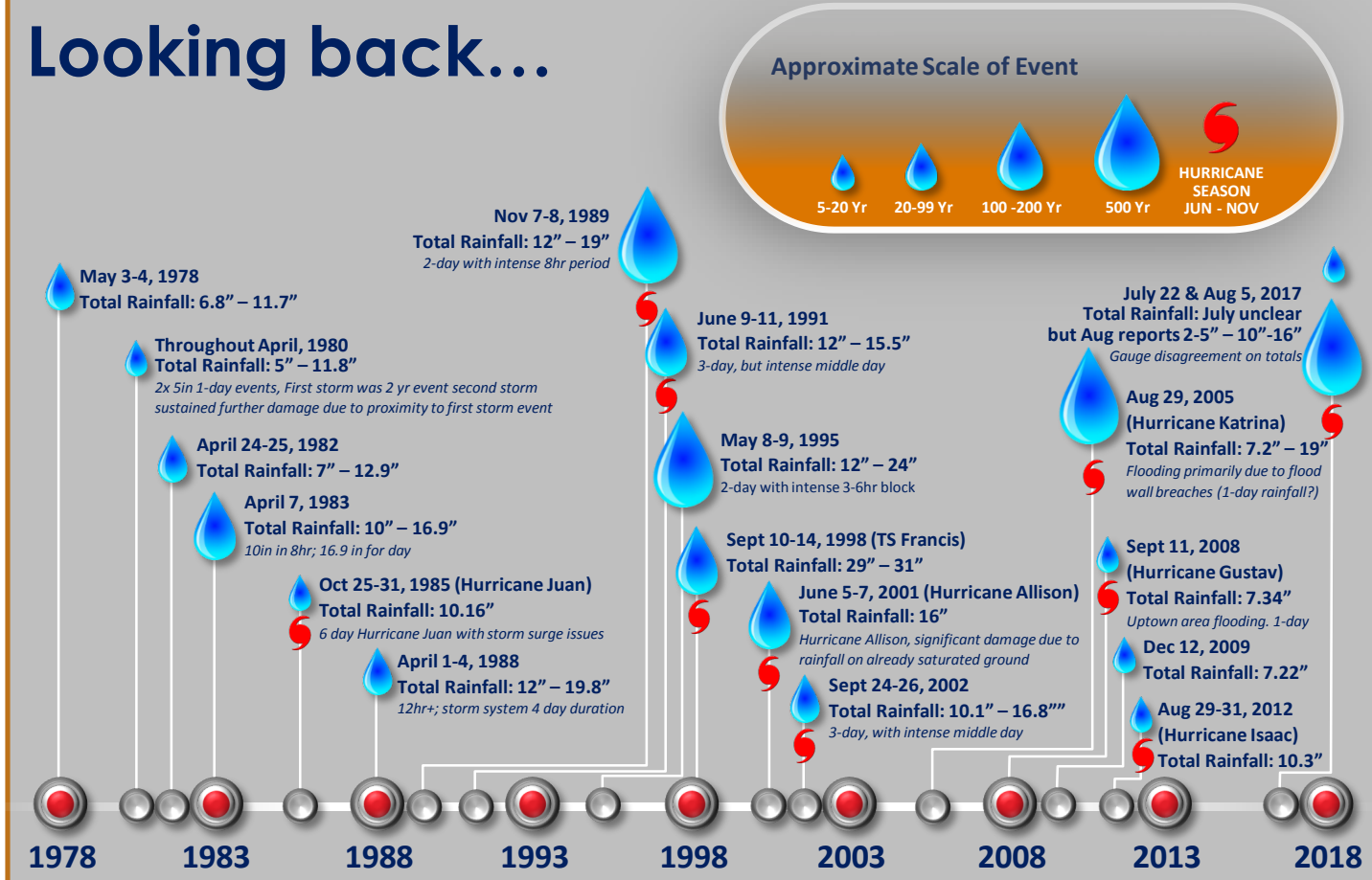
Looking back…



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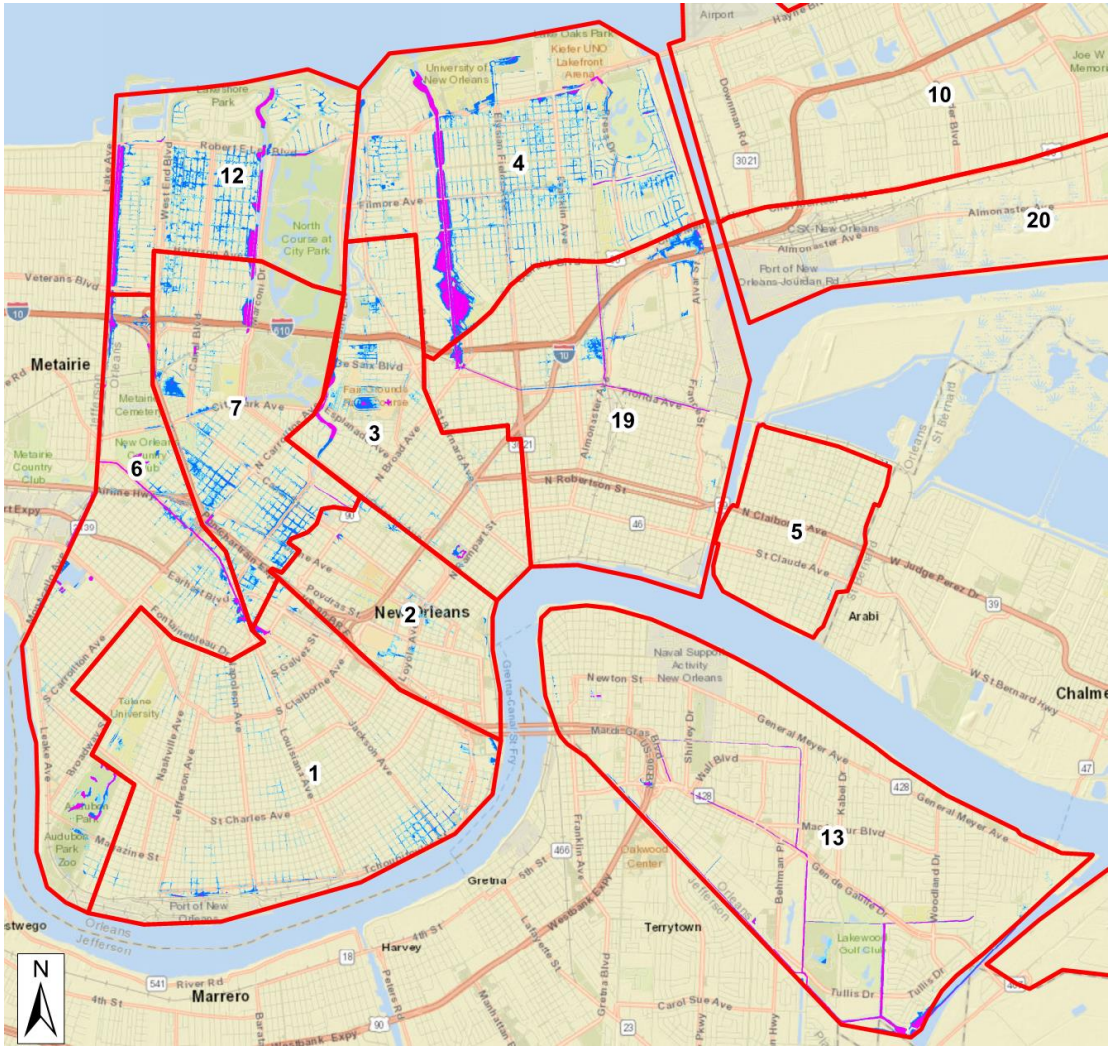

1.5-Year Rainfall Event (67%)

Est. Structures Impacted
780

Est. Monetary Damages
$23 million

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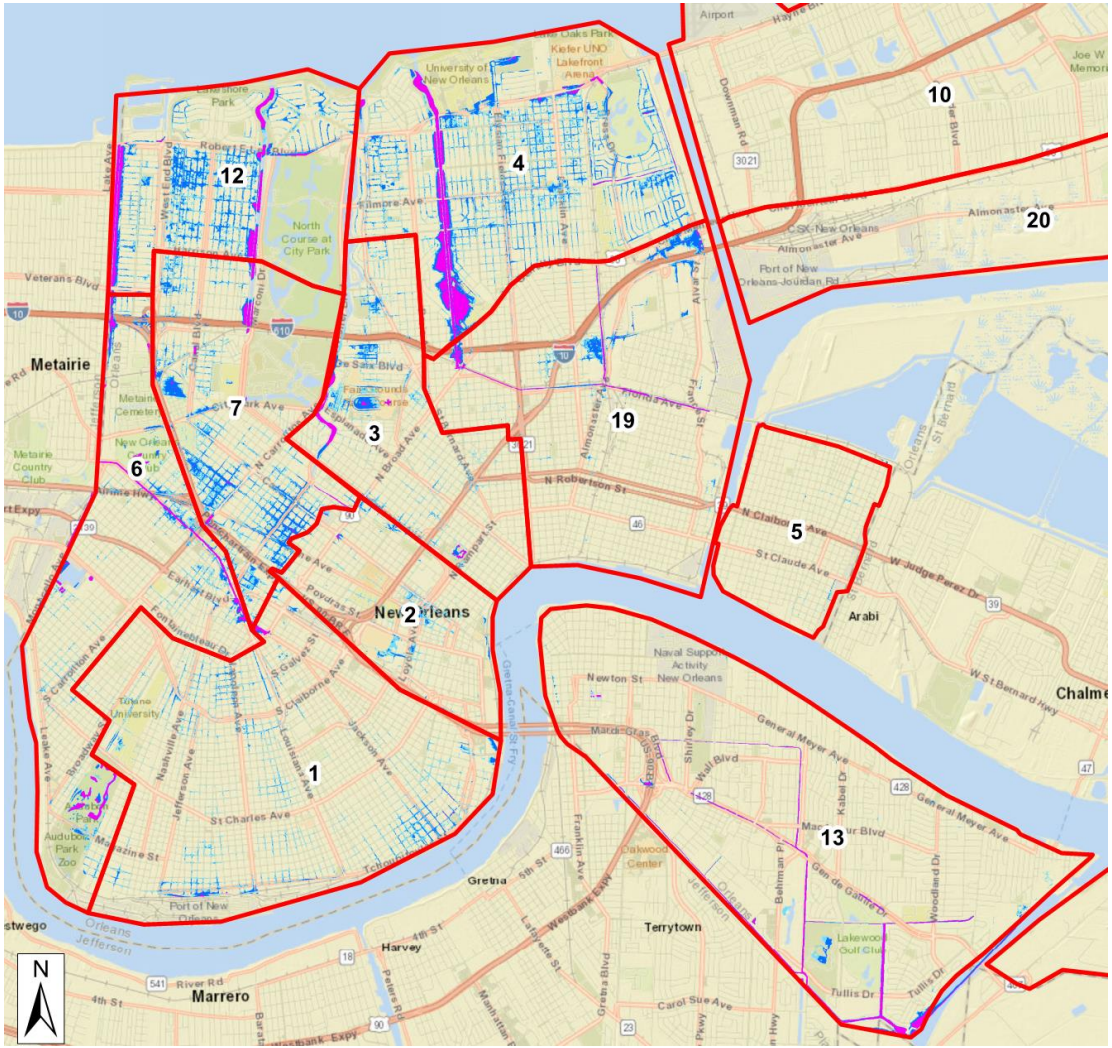

2-Year Rainfall Event (50%)

Est. City-wide Structures Impacted

1,200

Est. City-wide Monetary Damages

$28 million

24-Hour Modeled Flood Depth
Feet

- 0 - 0.5
- 0.5 - 2
- > 2

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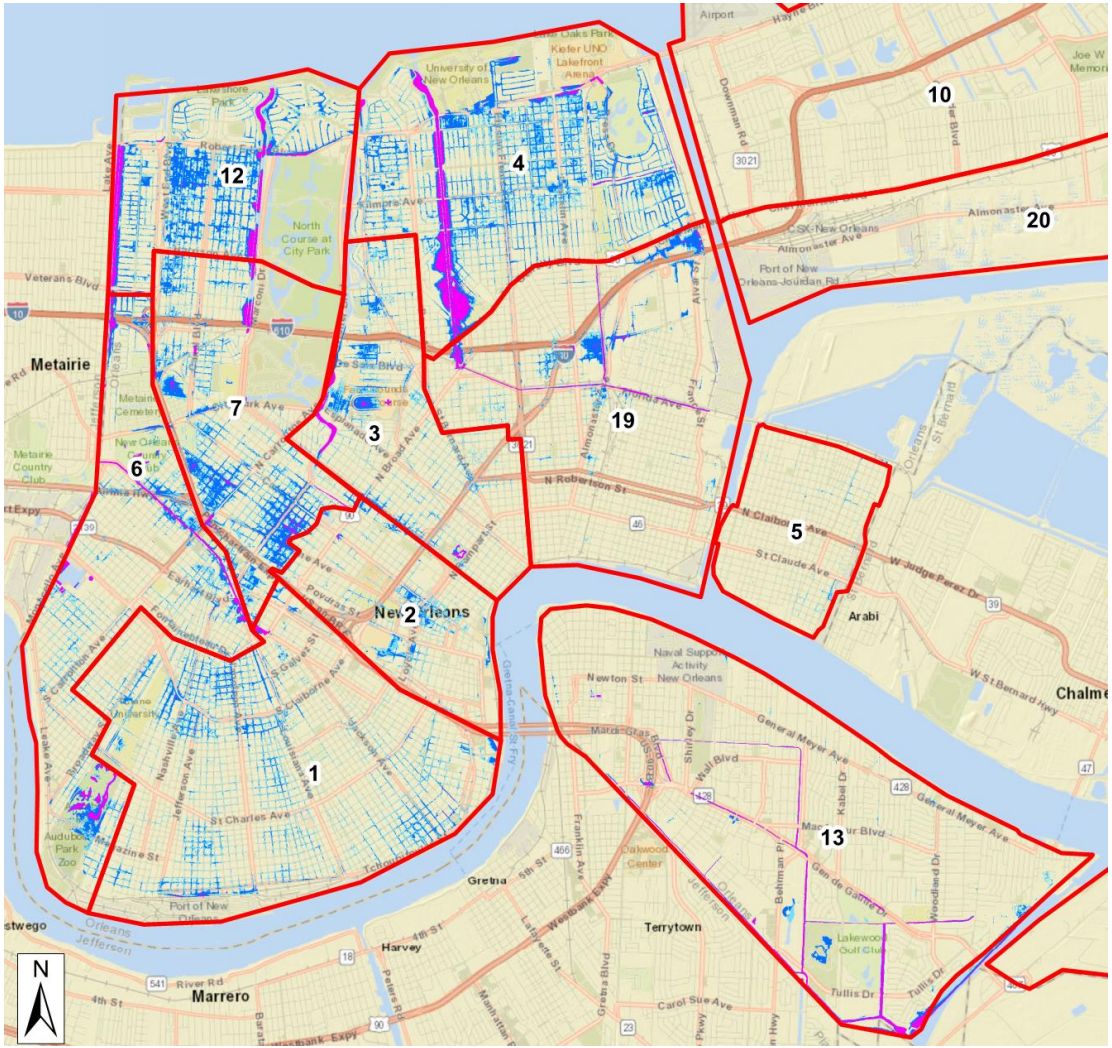

5-Year Rainfall Event (20%)

Est. City-wide Structures Impacted

2,600

Est. City-wide Monetary Damages

$51 million

24-Hour Modeled Flood Depth
Feet

- 0 - 0.5
- 0.5 - 2
- > 2

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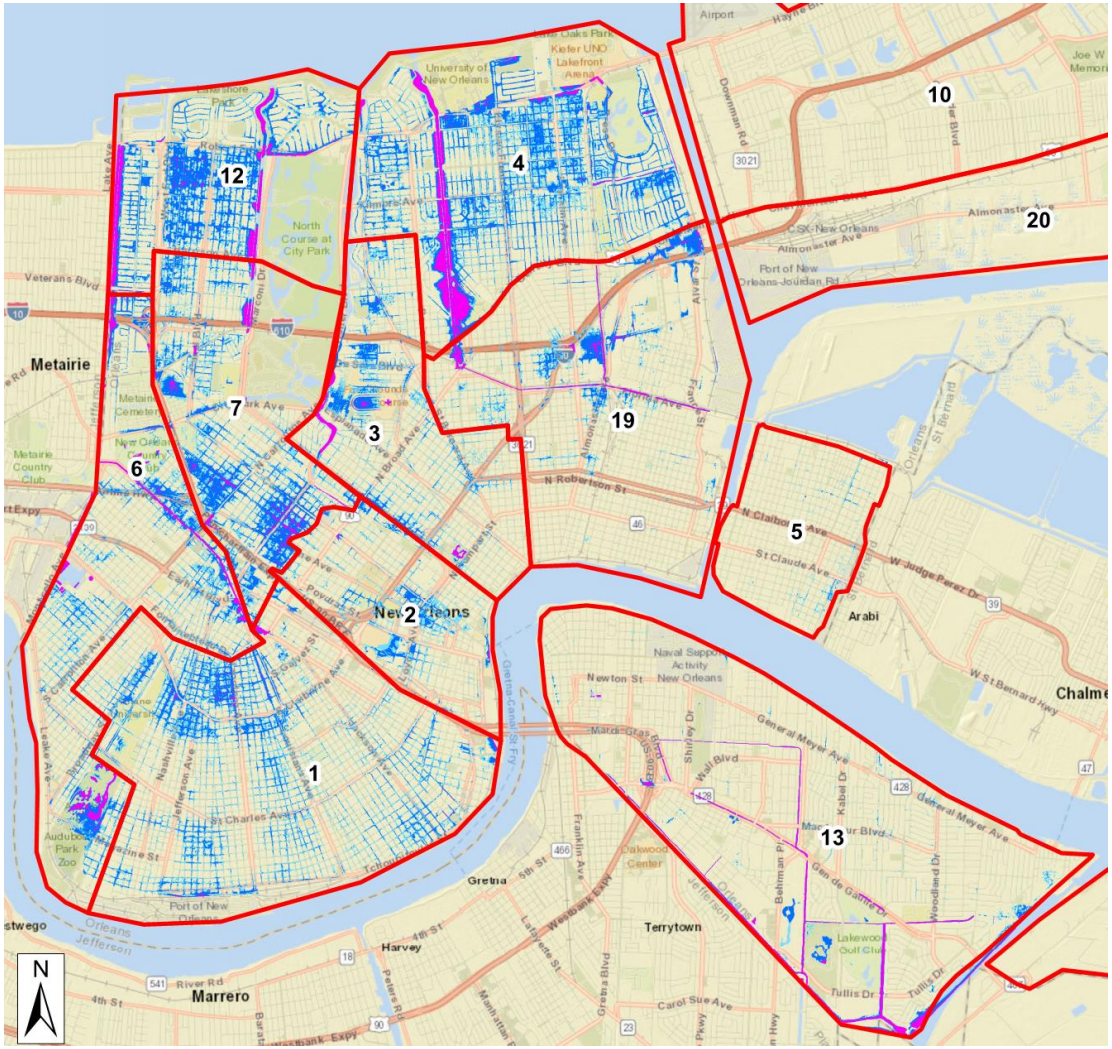

10-Year Rainfall Event (10%)

Est. City-wide Structures Impacted

4,800

Est. City-wide Monetary Damages

$90 million

24-Hour Modeled Flood Depth
Feet

- 0 - 0.5
- 0.5 - 2
- > 2

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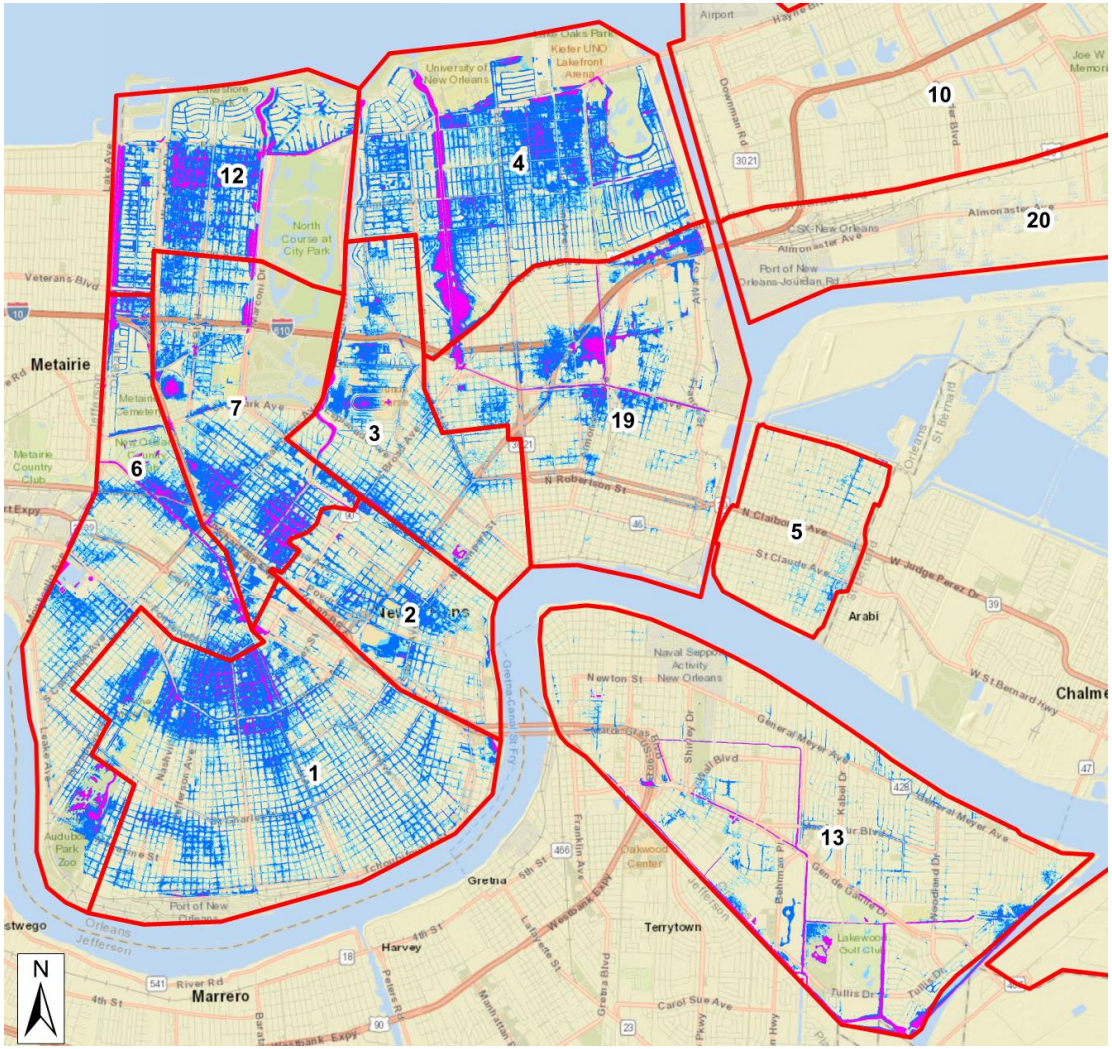

100-Year Rainfall Event (1%)

Est. City-wide Structures Impacted

15,000

Est. City-wide Monetary Damages

$380 million

24-Hour Modeled Flood Depth
Feet

- 0 - 0.5
- 0.5 - 2
- > 2

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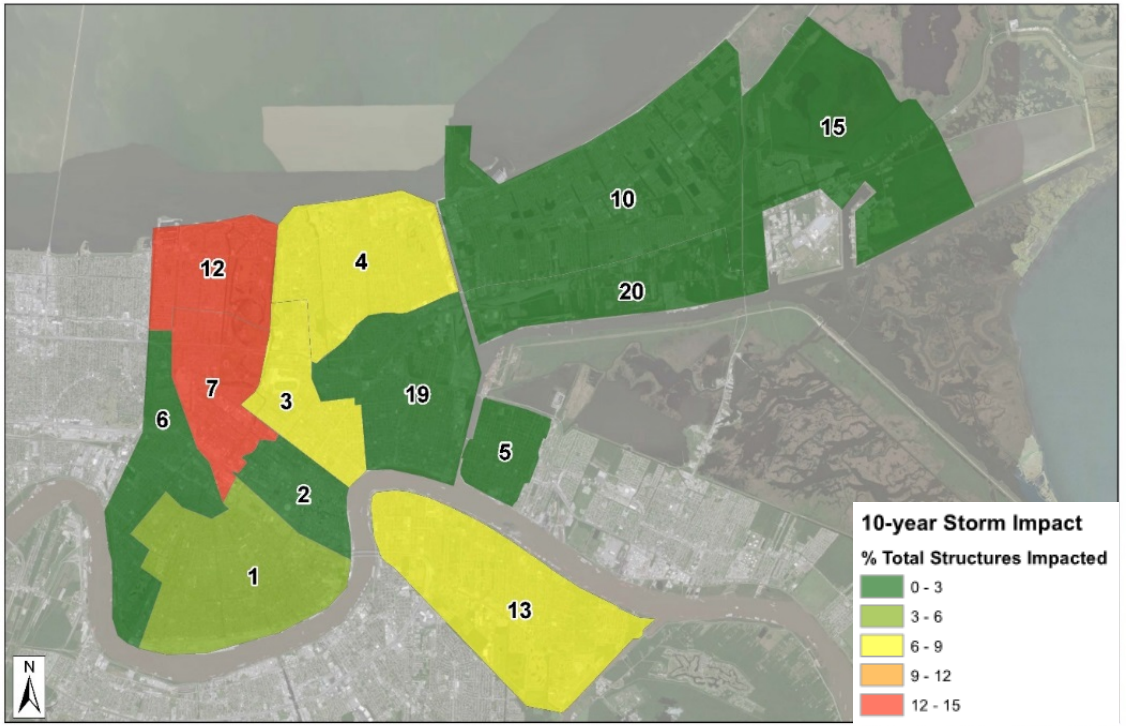
Define Strategic Pathways Priorities

Flood Risk Reduction

- Restore / Reliability
- Upgrade / Redundancy
- Optimize / Expand



Risk ~ % of Residences Impacted

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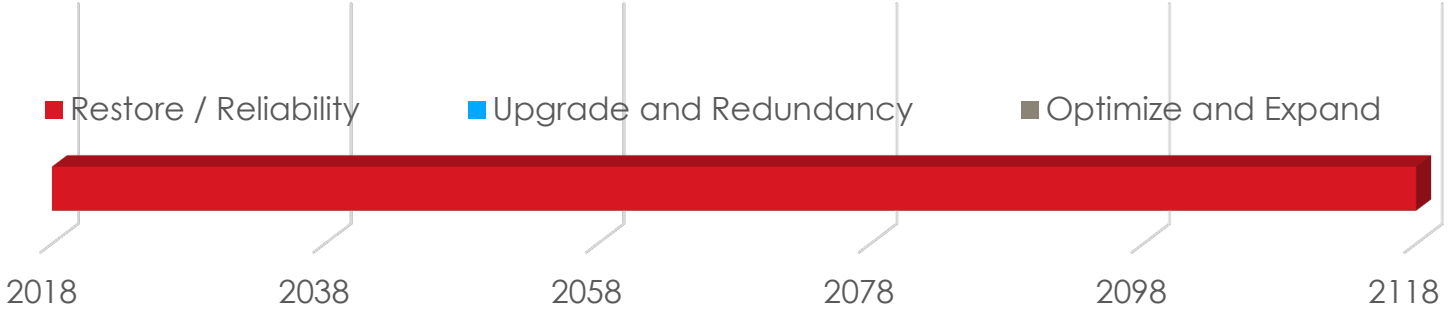
Define Strategic Pathways Priorities

1. Restore / Reliability / Maintain
   - Achieve Nameplate Capacity
   - Achieve power grid reliability
   - Achieve Pumping system reliability
   - Gain limited capacity
     Ongoing funded GI projects



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Strategic Pathways

Restore / Reliability – **Immediate Risk**

Scenario 1 – **Revised** Estimated Capital Costs

- Collection / Transmission $ 160 M
- Green Infrastructure / Storage $ 100 M
- PS Upgrades and retrofits $ 450 M
- Power Upgrades* $ 250 M

Total All Basin Cost - $ 960 M

* Total costs for power upgrades for stormwater (1/3 of total Cost)

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Restore / Reliability

Ongoing Funded Programs HMGP and NDRC $300Million+

Stantec Vision of Gentilly District

Benefits:

- Flood Mitigation
- Social
- Environmental
- Public Health
- Quality of Life

Maximize community benefits

- **Agreed / Strongly Agreed ~ 70%**

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Hagan-Lafitte Drainage and Green Infrastructure

Ongoing Funded Green / Grey Solutions

Project Area

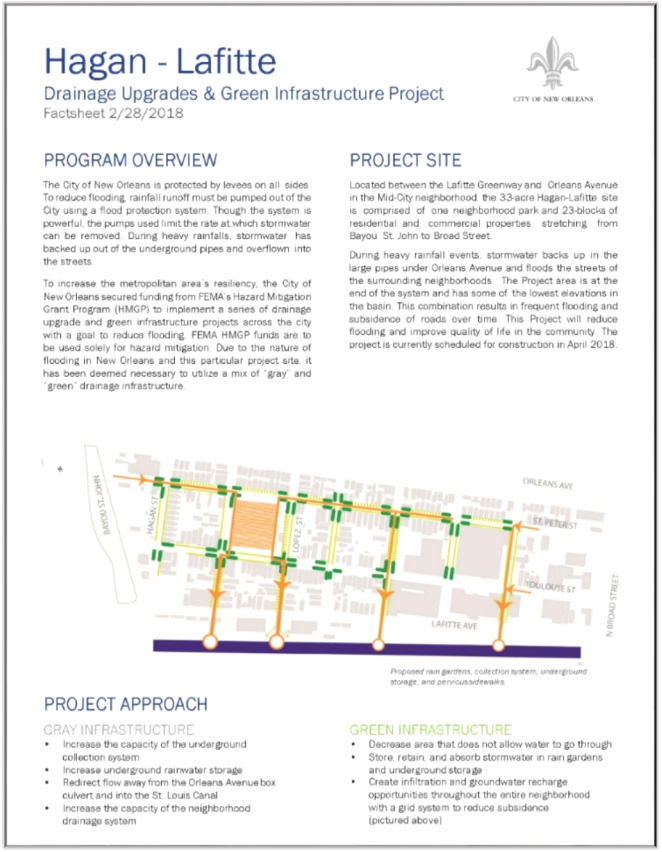
Location:
Bayou St. John Neighborhood

Project Overview

Total Budget $7 Million
HMGP funded $5.35 Million for Construction

Purpose – reduce flooding in Hagan-Lafitte neighborhood

Benefit / Cost Ratio – 1.67



Hagan - Lafitte

Drainage Upgrades & Green Infrastructure Project

Factsheet 2/28/2018

CITY OF NEW ORLEANS

PROGRAM OVERVIEW

The City of New Orleans is protected by levees on all sides. To reduce flooding, rainfall runoff must be pumped out of the City using a flood protection system. Though the system is powerful, the pumps used limit the rate at which stormwater can be removed. During heavy rainfalls, stormwater has backed up out of the underground pipes and overflown into the streets.

To increase the metropolitan area's resiliency, the City of New Orleans secured funding from FEMA's Hazard Mitigation Grant Program (HMGP) to implement a series of drainage upgrade and green infrastructure projects across the city with a goal to reduce flooding. FEMA HMGP funds are to be used solely for hazard mitigation. Due to the nature of flooding in New Orleans and this particular project site, it has been deemed necessary to utilize a mix of "gray" and "green" drainage infrastructure.

PROJECT SITE

Located between the Lafitte Greenway and Orleans Avenue in the Mid-City neighborhood, the 33-acre Hagan-Lafitte site is comprised of one neighborhood park and 23-blocks of residential and commercial properties stretching from Bayou St. John to Broad Street.

During heavy rainfall events, stormwater backs up in the large pipes under Orleans Avenue and floods the streets of the surrounding neighborhoods. The Project area is at the end of the system and has some of the lowest elevations in the basin. This combination results in frequent flooding and subsidence of roads over time. This Project will reduce flooding and improve quality of life in the community. The project is currently scheduled for construction in April 2018.

Proposed rain gardens, collection system, underground storage, and pervious sidewalks.

PROJECT APPROACH

GRAY INFRASTRUCTURE

- Increase the capacity of the underground collection system
- Increase underground rainwater storage
- Redirect flow away from the Orleans Avenue box culvert and into the St. Louis Canal
- Increase the capacity of the neighborhood drainage system

GREEN INFRASTRUCTURE

- Decrease area that does not allow water to go through
- Store, retain, and absorb stormwater in rain gardens and underground storage
- Create infiltration and groundwater recharge opportunities throughout the entire neighborhood with a grid system to reduce subsidence (pictured above)

Project Goal
Neighborhood Resiliency

- Utilize Green Infrastructure to slow, retain, and absorb storm water
- Improved Water Quality
- Recharge Aquifer
- Reduce subsidence

- Mix of green and gray infrastructure
- Strategic Peak Storage

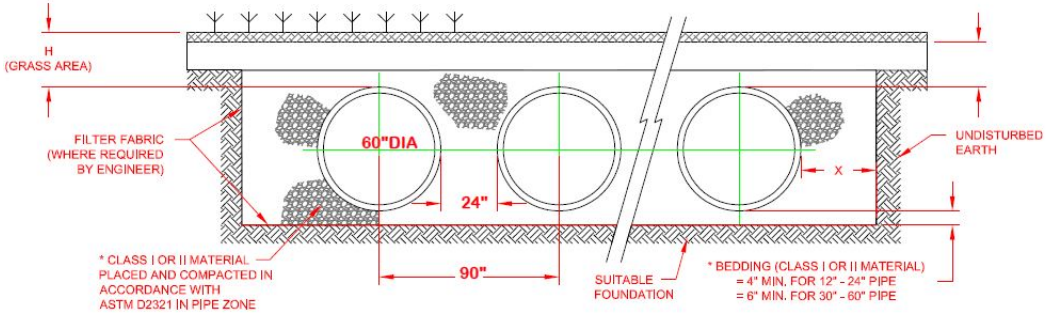
Drainage Solutions

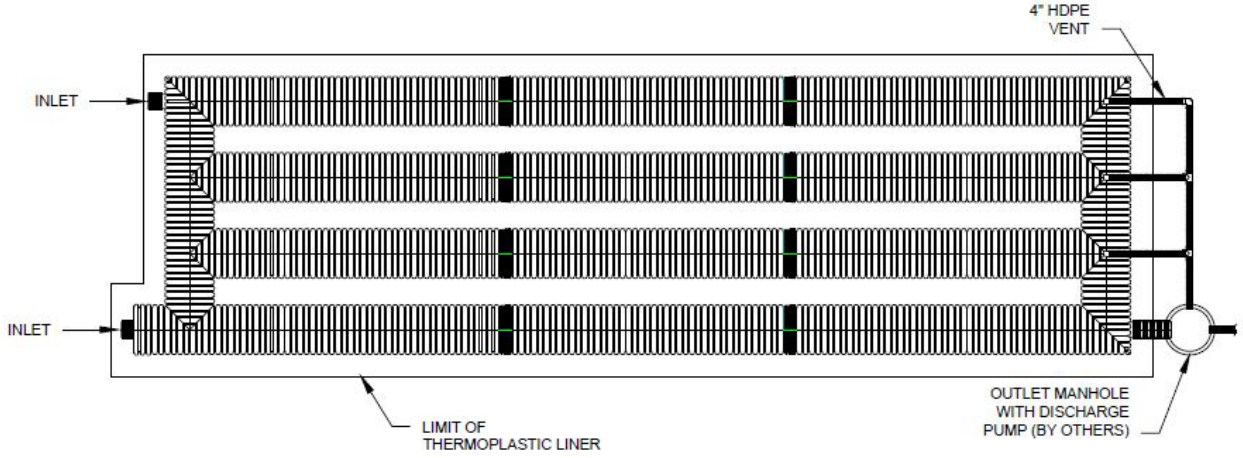
Easton Park

- Strategic underground storage – reserved for peak of storm with weir system
- Retains functionality of park
- Improves fields with drainage

Drainage Solutions

Easton Park Underground Storage System



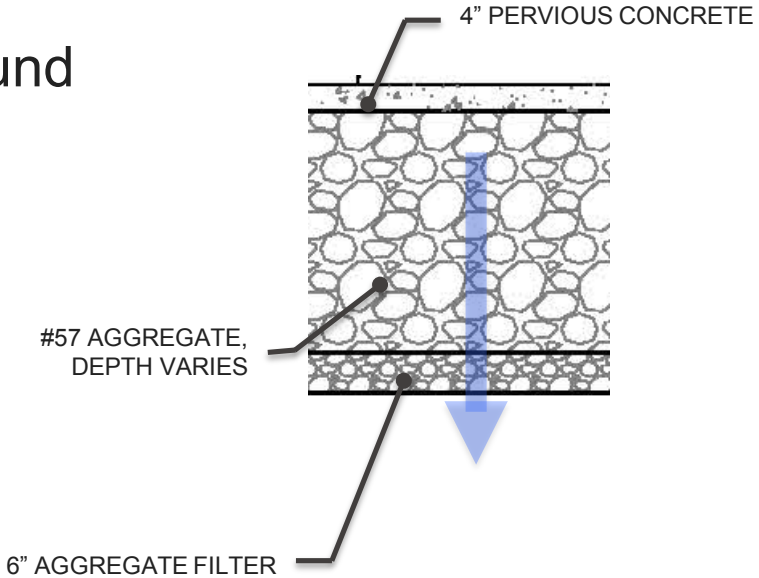


Drainage Solutions

Pervious Sidewalks

Replace sidewalks in project area with pervious concrete

- Potential to retain/return flow to ground instead of converting it to runoff
- Intercept flows from roof leaders, driveways
- Create a recharge grid to address subsidence

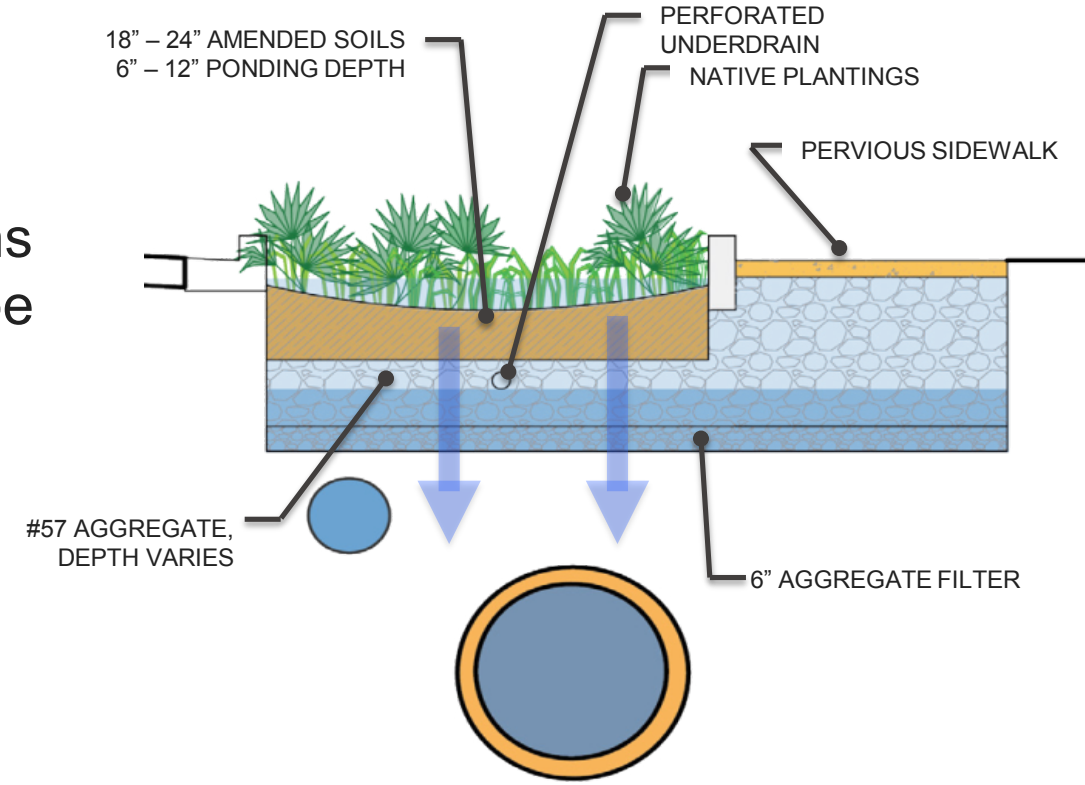


Drainage Solutions

Green Infrastructure

Rain gardens at key locations

- Around existing catch basins
- As a street corner landscape improvement / parking deterrent
- Connected to pervious sidewalk grid to form an integrated system



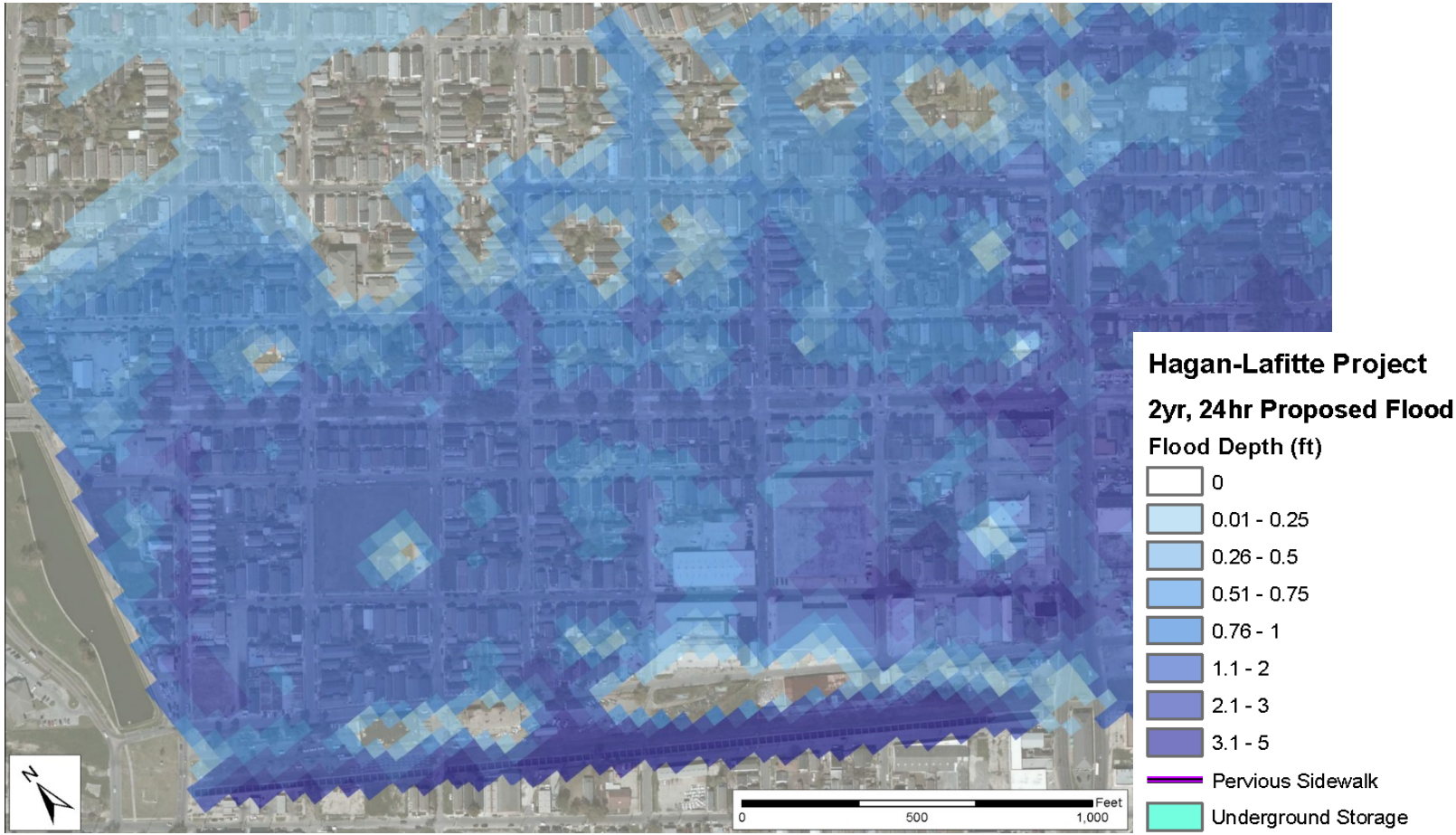
Drainage Solutions

Green Infrastructure – Rain Gardens

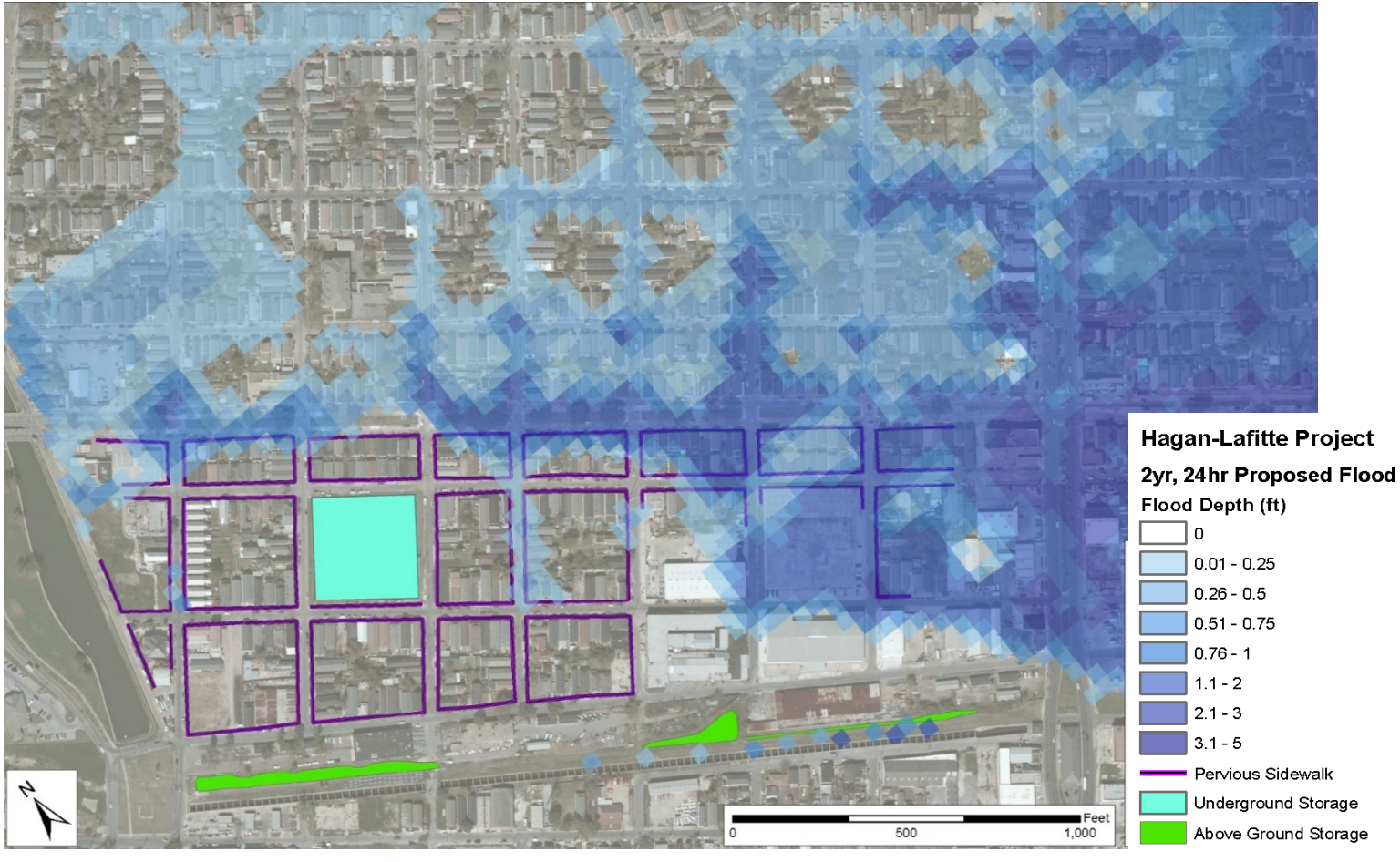
Drainage Solutions

Green Infrastructure – Rain Gardens

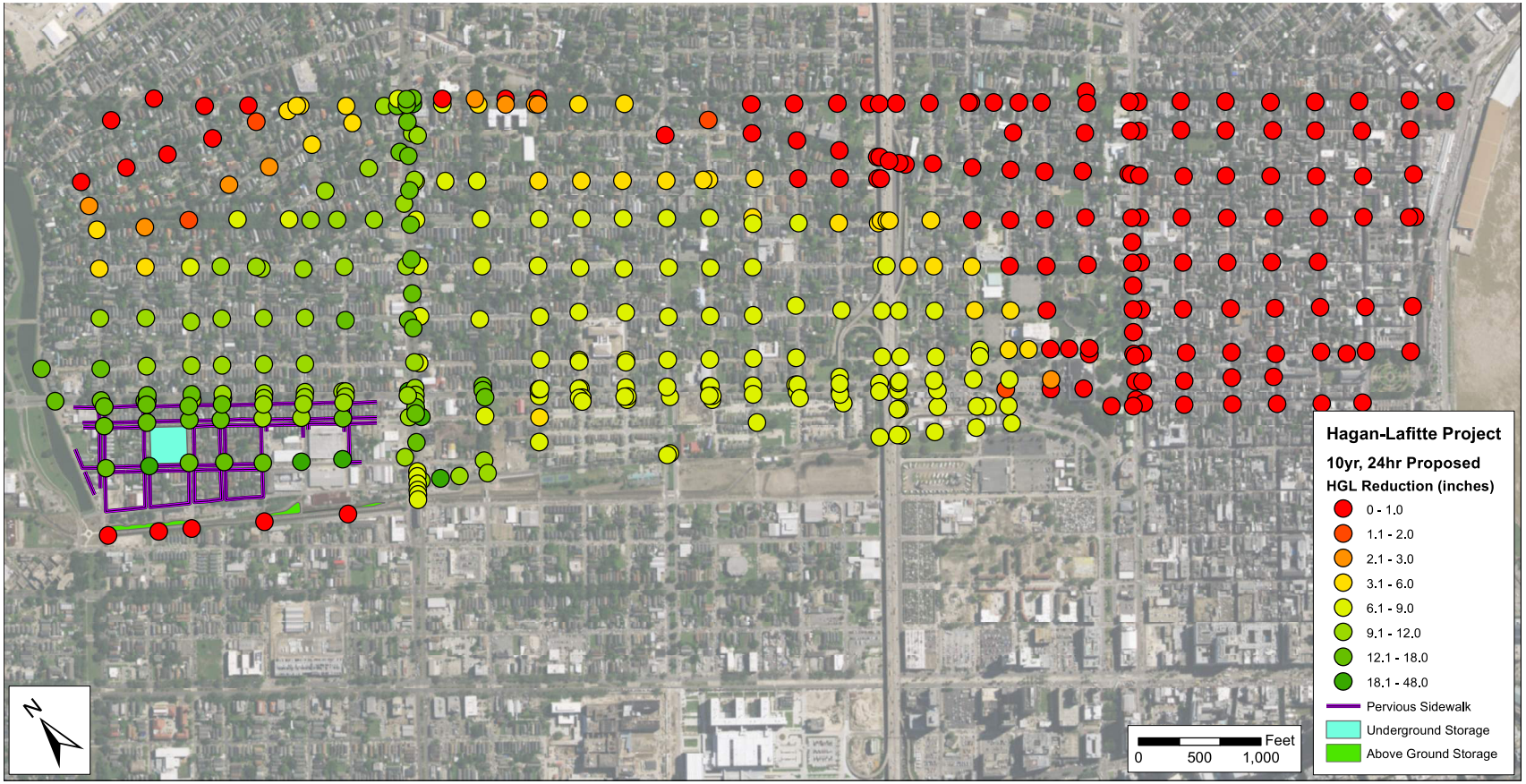
Results –2 Year – 24 Hour Storm - Before



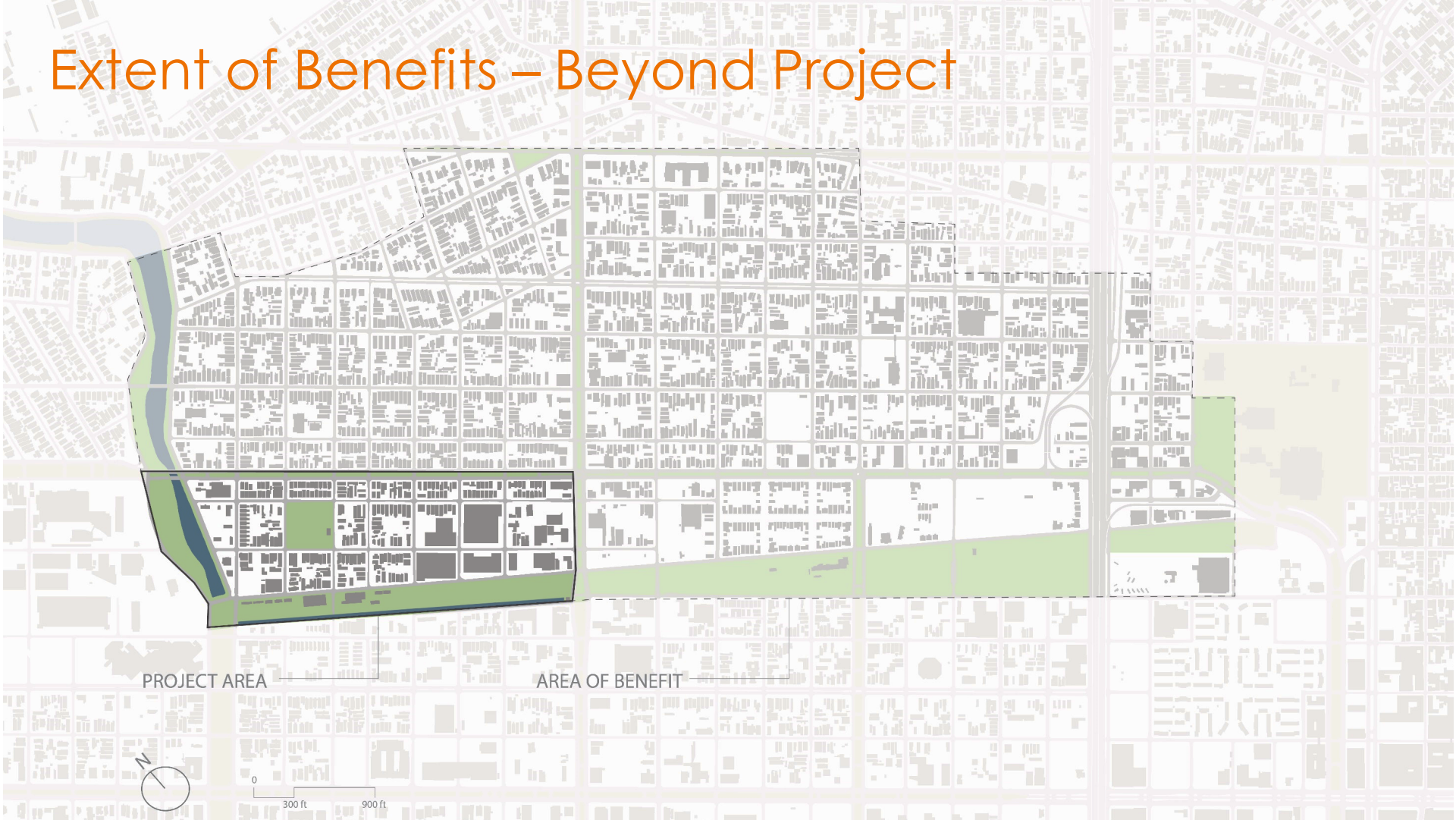
Results –2 Year – 24 Hour Storm - After



Results –10 Year – 24 Hour Storm – Extent of Benefit



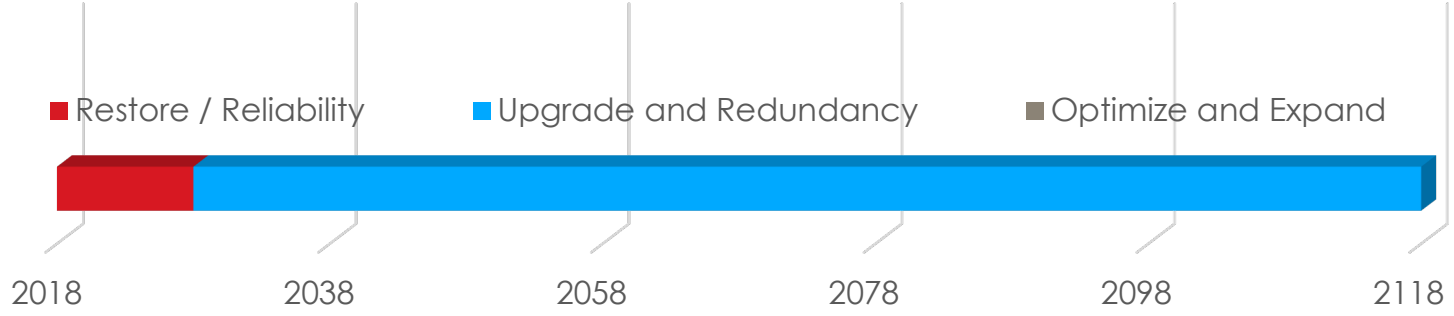
Extent of Benefits – Beyond Project



Define Strategic Pathways Priorities

1. Restore / Reliability

2. Upgrade / Redundancy / Maintain
   - Upgrade LOS
   - New green /blue infrastructure
   - New Regional Storage solutions
   - New grey infrastructure



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Strategic Pathways

Upgrade and Redundancy – **High Risk**

Scenario 2 - Estimated Capital Costs

• Collection / Transmission	$ 1,200 M
• Green Infrastructure / Storage	$ 700 M
• PS Upgrades and retrofits	$ 850 M
• Power Upgrades*	$ 250 M

Total All Basin Cost - $ 3,000 M

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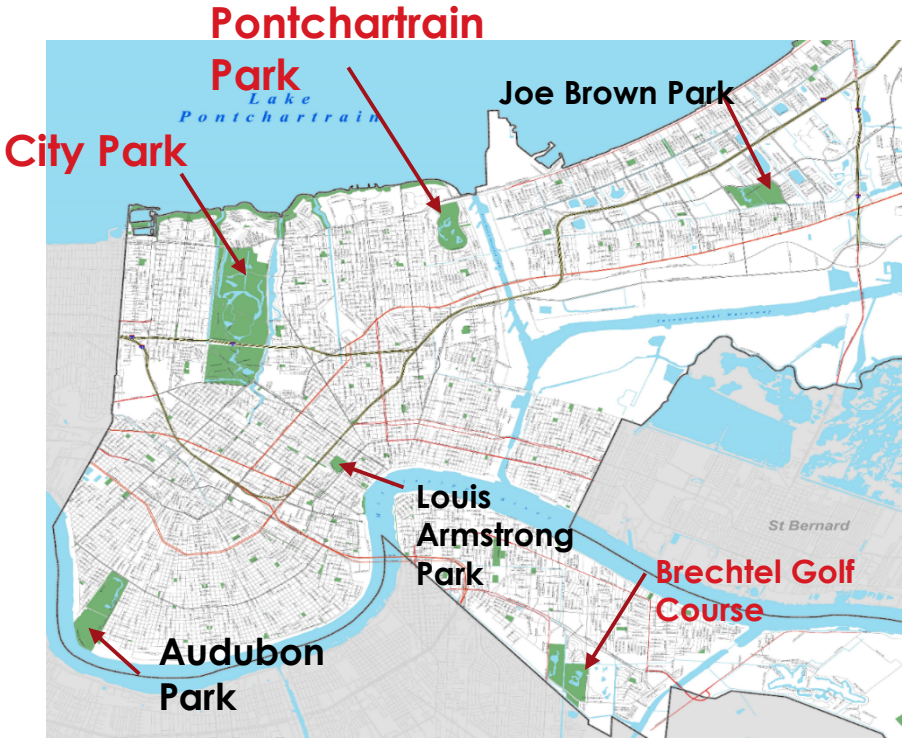
Strategic Pathways

Upgrade and Redundancy – **High Risk**



- Strategic Surface Storage

  Blueways and Greenways

  - Large areas designed to store / equalize peak storm flows
  - **Cost effective**

Maximize Green Infrastructure
- **Agreed / Strongly Agreed ~ 70%**

Maximize community benefits
- **Agreed / Strongly Agreed ~ 70%**

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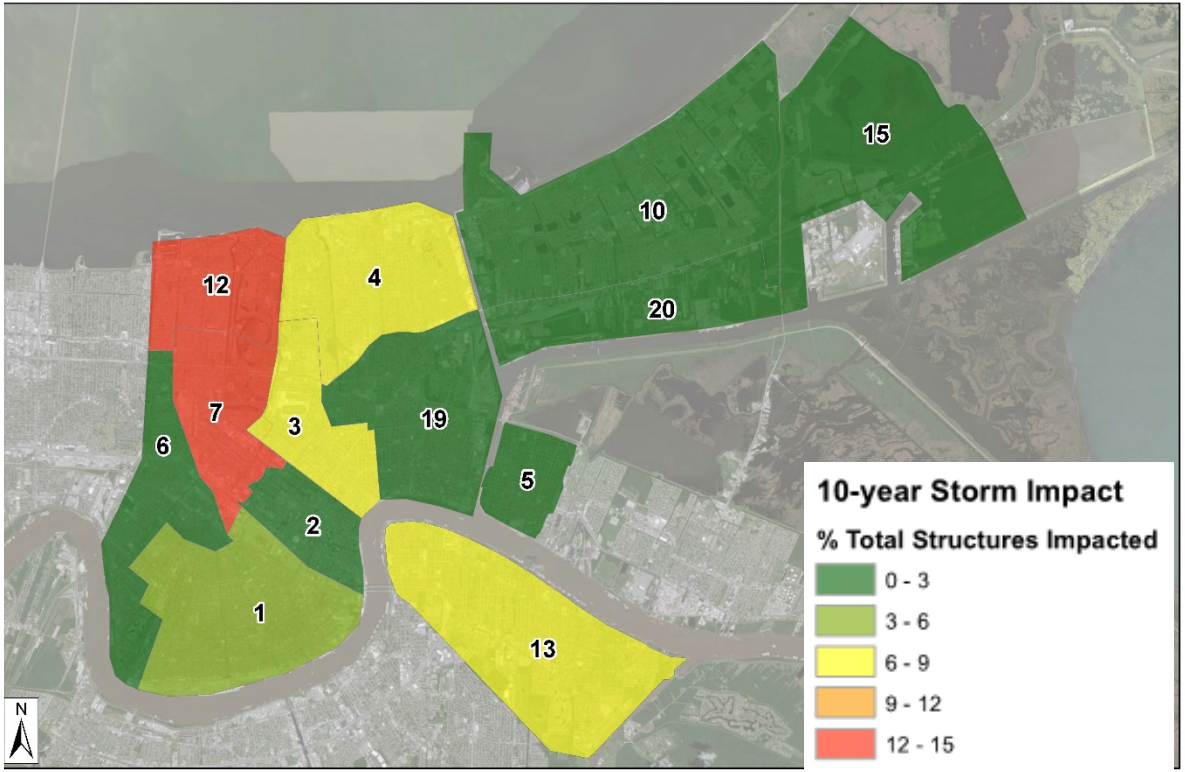
Strategic Pathways

Upgrade and Redundancy – **High Risk**

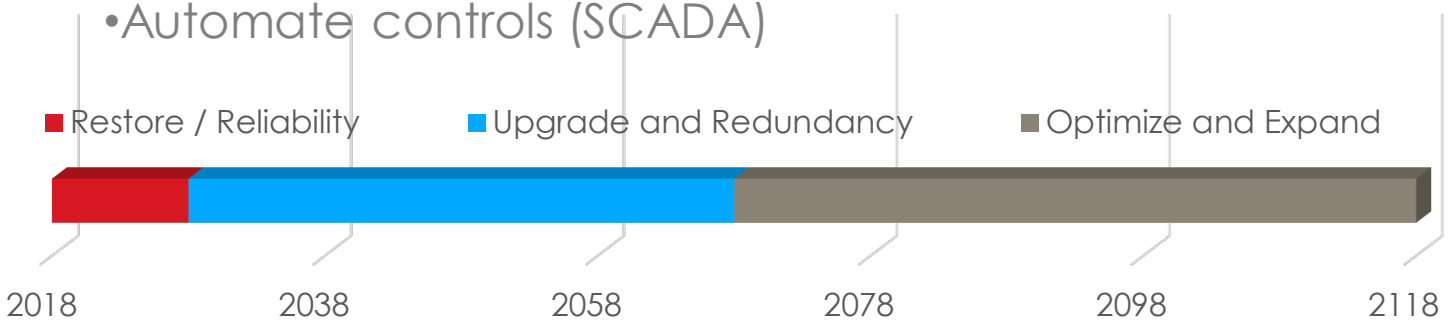
Basin Risk

- Immediate: 7, 12
- High: 3,4,13 and 1



Define Strategic Pathways Priorities

1. Restore / Reliability
2. Upgrade / Redundancy
3. Optimize / Expand / Maintain
   - Further upgrade LOS
   - Add further pumping redundancy
   - Add Inter-connectivity
   - Hydraulically off-load – redefine basins
   - Add new off-line (green basin) storage
   - Automate controls (SCADA)



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Strategic Pathways

Optimize and Expand – **Medium Risk**

Scenario 3 – Estimated Capital Costs

• Collection / Transmission	$ 1,500 M
• Green Infrastructure / Storage	$ 1,350 M
• Capacity Increases and PS Upgrades	$ 1,700 M
• Power Upgrades	$ 250 M

Total All Basin Cost - $ 4,800 M

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Regional Solutions - Opportunities

Basin Reconfiguration

- Re-direct flow to Mississippi River or canals
- Off-load from existing canals and pump stations to free up capacity

Examples:

- Monticello Pump to River
- DPS 4 West
- Bayou St. John Pumps
- DPS 3 to Florida Canal

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Permanent Canal Closures and Pumps Project

Assets for the Future Plan

17th Street Outfall Canal

- 12,600 cfs capacity
- 39 MW power generation

Orleans Ave. Outfall Canal

- 2,700 cfs capacity
- 10 MW power generation

London Ave. Outfall Canal

- 9,000 cfs capacity
- 29 MW power generation

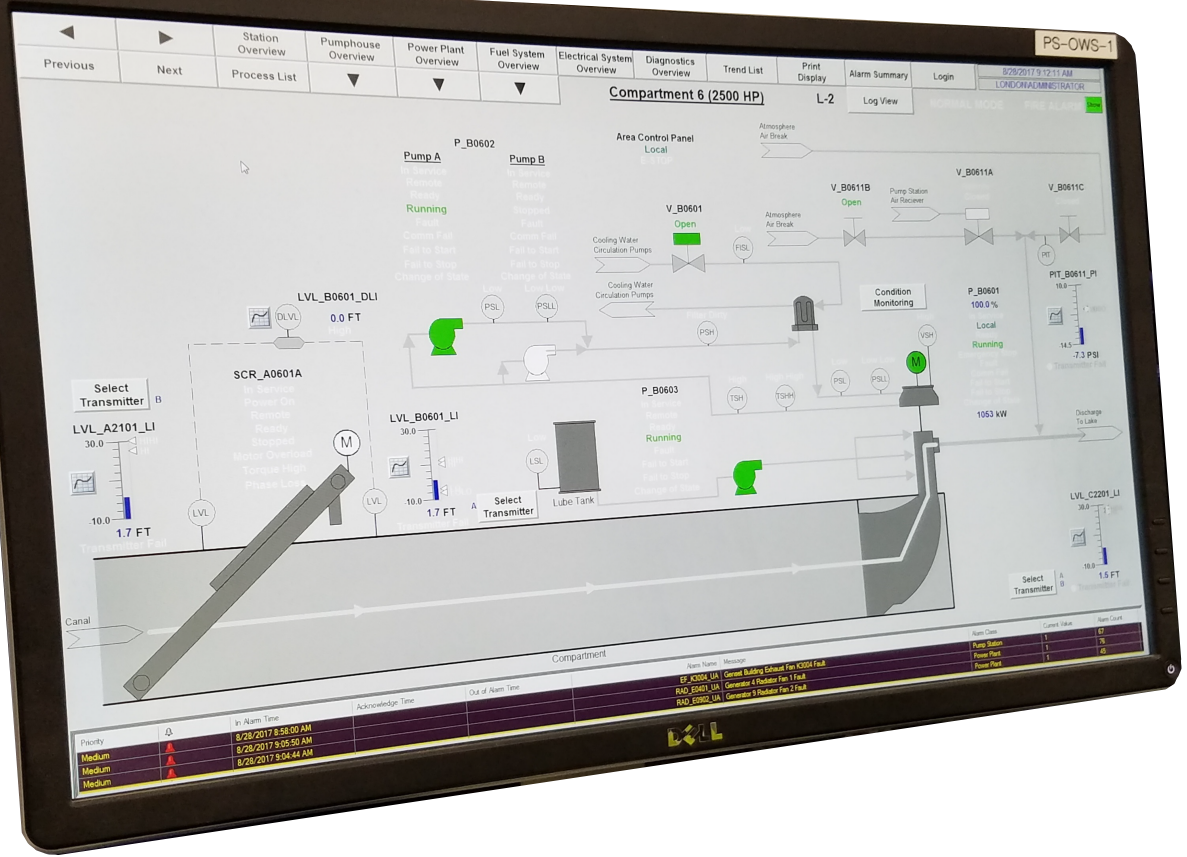
Pump Station Interior

Generator Building Interior

Generator Capacities

Site	Power Output (Installed)	Number of Generators	Fuel Storage
17th Street	44.2 MVA	17	300,000 Gallons
Orleans Avenue	10.4 MVA	4	80,000 Gallons
London Avenue	28.6 MVA	11	250,000 Gallons
	83.2 MVA	**32**	**630,000 Gallons**

- Grid independence – operates on diesel power in a hurricane
- N+1 redundancy through a swing bus
- 15 kV rated equipment for future 13.2 kV pump motors
- Two permanently VFD driven pumps at each station
- Remainder are VFD start only with bypass
- Two MVA of HVAC and miscellaneous load



- Compartmentalization
  - Each storm pump and generator designed as a compartment for independent control and coordination
- Redundancy
  - Redundant PLCs, networks, and instrumentation clusters

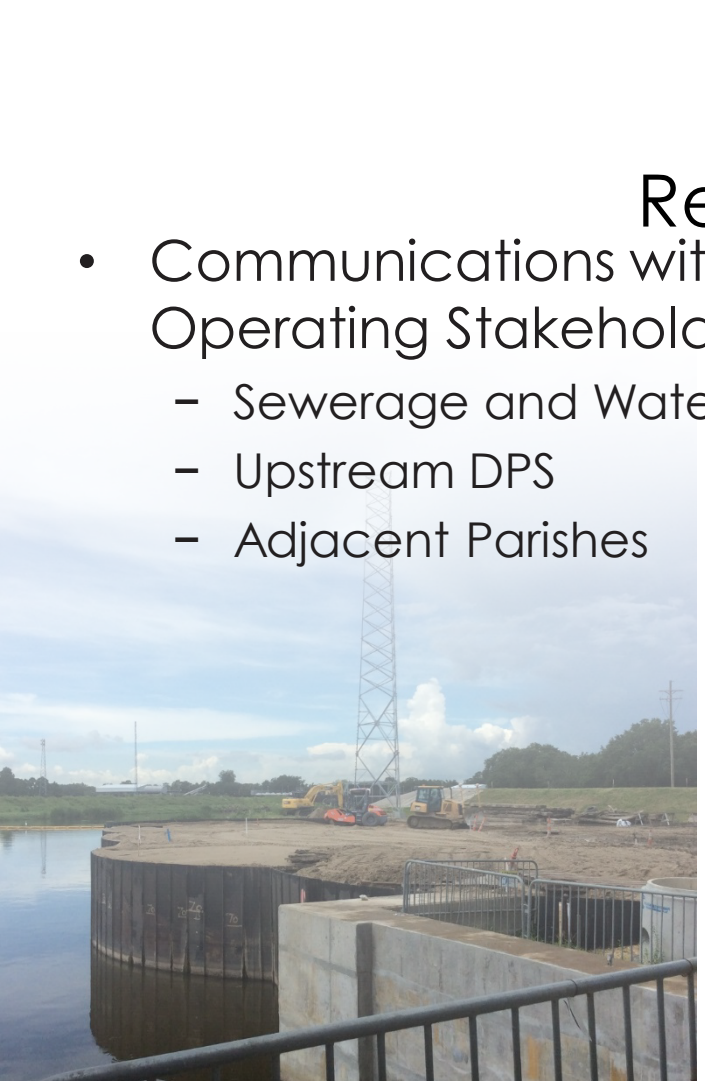
Designed for Automation

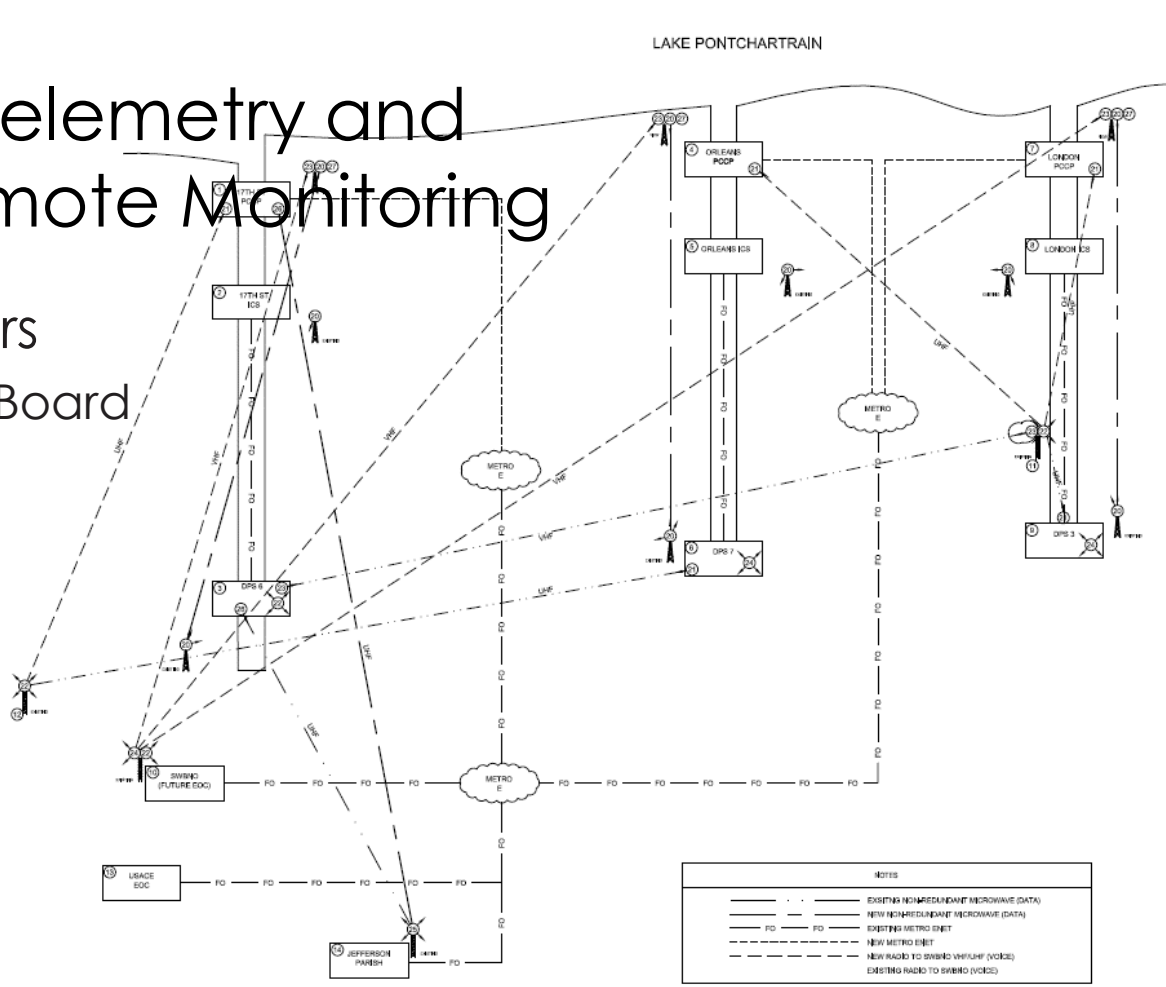
Control Systen

- PLC based SCADA system with redundant master PLCs and compartment PLCs
- Ethernet based communications
- PLC based paralleling switchgear
- Coordination between generation – paralleling switchgear – and pumping through storm pump PLCs

Telemetry and Remote Monitoring

- Communications with Operating Stakeholders
  - Sewerage and Water Board
  - Upstream DPS
  - Adjacent Parishes





Strategic Pathway

What are the next steps?

1. Continue the Dialogue
2. Comprehensive Stormwater Plan – Projects, costs and priorities
    - Continue ongoing projects and system improvements
    - Identify Priority Projects
    - Define Desired Level of Service
    - Capital Improvement Plan – Power / Green / Grey
3. Stormwater Rate Study
4. Secure Dedicated Funding
5. Apply for matching Grant Funding
6. Implement the Vision

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