

WAGGONNER  
& BALL



18 FEBRUARY 2020

## Sewerage and Water Board of New Orleans Integrated Master Planning RFI

WAGGONNER & BALL  
ARCHITECTURE/ENVIRONMENT

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18 February 2020

**Patti Wallace**

Purchasing Director, Sewerage and Water Board of New Orleans  
625 St. Joseph Street, Room 131  
New Orleans, LA 70165  
504-585-2428  
pwallace@swbno.org

RE: Sewerage and Water Board of New Orleans Integrated Master Plan RFI

Dear Ms. Wallace,

The Sewerage & Water Board of New Orleans has a rich history: the invention of the Wood Screw Pump propelled a century of growth and development, and the work of the Board underpins our city’s safety and prosperity. Now, this call presents an opportunity for the organization to write its next chapter, to envision a future beyond the capacity of current practice. We welcome the opportunity to contribute to this effort.

We envision the work ahead as a 50-year renovation project, beginning with existing assets and building toward a more flexible, adaptable, nature-based water system. We further envision an expanded public, collaborative leadership role for the SWBNO — a greater role in the life and identity of the city that builds public trust over time. A proactive approach will be required to create and implement organizational transformation. Successful change will be guided by aspiration, responsive to environment, and, crucially, supported by technical expertise.

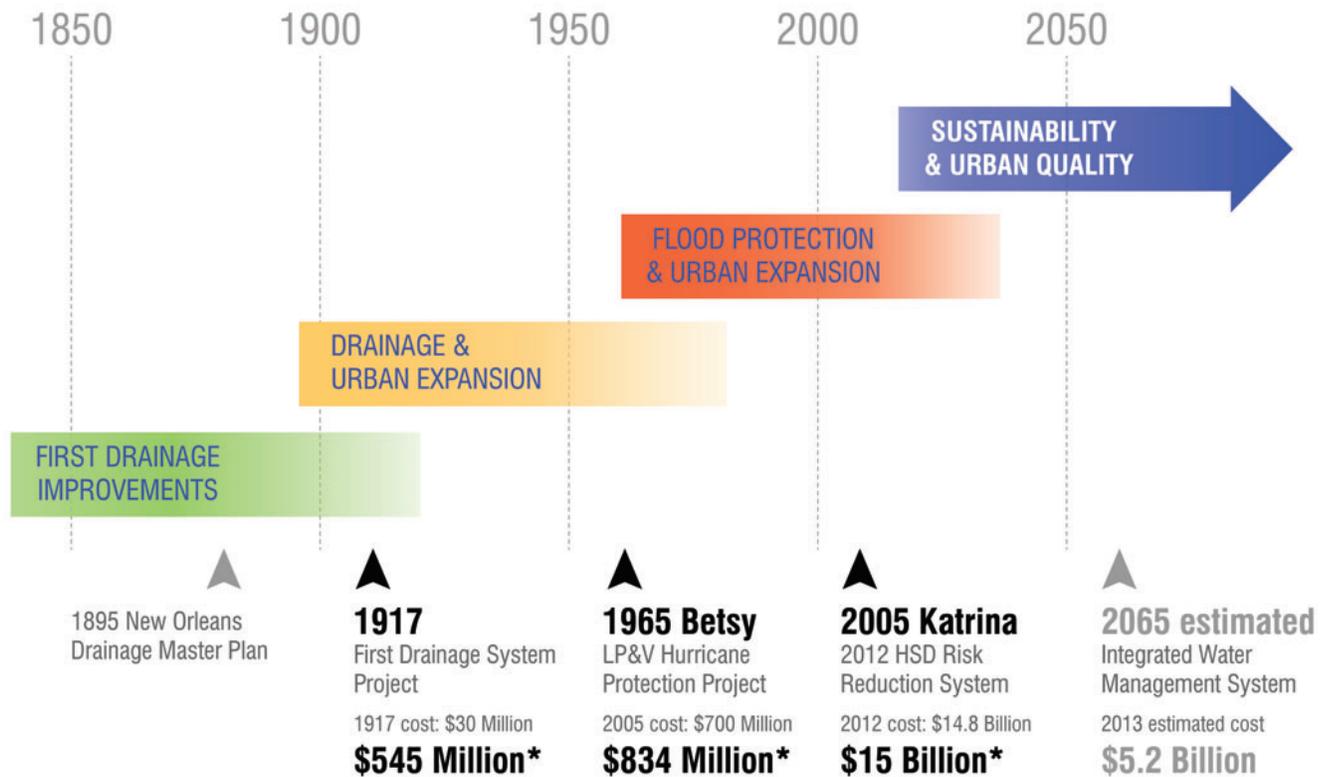
**Summary of Challenges**

Opportunities are matched in scale by challenges across lines of business:

- Climate change amplifies the demands on an aging system.
- The operational paradigm remains focused on pumps, without feedback from people and land.
- Groundwater is unaccounted for, resulting in subsidence, damaged infrastructure, and never-ending maintenance.
- A generational shift in workforce threatens continuity of institutional knowledge.
- Lack of coordination between SWBNO & other entities results in duplication and wasted resources.
- The SWBNO must adapt to cross-jurisdictional challenges, city, inter-parish, state and federal, and must respond to environmental and policy changes from the gutter to the gulf.
- Poor public perception compromises financial security and future funding imperatives.

Solutions to these challenges, while often technical in nature, will require new methods of design and planning within the SWBNO to address the integrated nature of systems management. Driven by design and grounded in science, our collaborative approach grew out of the demanding New Orleans delta context and has demonstrated success in water management transformation across the Gulf and East Coasts.

**“Successful change will be guided by aspiration, responsive to environment, and, crucially, supported by technical expertise.”**



\* In 2013 dollars, per US Bureau of Labor Statistics' CPI (Consumer Price Index) inflation calculator

**Sewerage & Water Board Eras**

The SWBNO is at an inflection point in its history. A new era promises integrated solutions to 21st century challenges.  
Greater New Orleans Urban Water Plan, 2013.

**Waggonner & Ball Capability & Contributions**

Our firm is committed to the landscape, people, and water of our home, the foundation of our practice. Beginning with the Dutch Dialogues™, we have organized workshops here and in various forums around the country, involving many firms and organizations, both public and private, who we expect to submit to this request for information. Waggonner & Ball is deeply familiar with the likely players and knows the SWBNO's home court. Our expertise derives from the design process and spatial observation. As architects we are fundamentally generalists: we know how, with our clients, to create visionary plans, and we know when and how to utilize technical experts to accomplish those plans. As project lead for the Urban Water Plan, we assembled a team of 22 professional firms from around the world and leveraged their aptitudes in service of a holistic response. In addition to our significant in-house expertise in urban water planning specific to the SWBNO's drainage business line, we offer an ability to bring stakeholders together, and can, if requested, assist the Board in the organization and implementation of the proposed workshop process.

This innovative RFI and workshop model provides a strong basis for integrated planning. WBAE is prepared to partner with any and all firms, and we are willing to assist SWBNO in coordination and structuring of master planning effort, if requested. While focused to date primarily on stormwater, we believe our capabilities are well-suited to the Board's request for an integrated approach across all lines of business. Our firm is well-known for water work in the local community, and our reputation can benefit the Board throughout this master planning process. We are already engaged in issues critical to SWBNO with local institutions who want to act now, including the Downtown Development District, Business Council

**“We offer an ability to bring stakeholders together, and can, if requested, assist the Board in the organization and implementation of the proposed workshop process.”**

of New Orleans, and Tulane University. We maintain strong relationships with local community groups and non-profits. In addition, we understand how to work with state and federal organizations such as the CPRA and US Army Corps of Engineers.

Over the course of its history, the SWBNO has enabled tremendous growth through health and safety improvements that ushered New Orleans into the modern era. While the inertia of the 20th century water management approach and its consequences are formidable, the opportunity to transform this city's relationship to water is now real and profound. I am pleased to submit Waggonner & Ball's qualifications and perspective in service of the Board's request for information. We value this opportunity to apply our knowledge and process, working with and for the Board and this community, to sustain our city for future generations.

Sincerely,



**J. David Waggonner III, FAIA**

Principal/Owner

Waggonner & Ball Architecture/Environment  
2200 Prytania Street  
New Orleans, LA 70130  
504.524.5308  
david@wbae.com

# Firm Profile

**Our team is internationally recognized for excellence and leadership in water management and resilience.**

Waggonner & Ball is a New Orleans-based firm with global experience and reputation in the urban water management and resilient design spheres. Our firm launched the water resilience movement in Greater New Orleans by convening the post-Katrina Dutch Dialogues™ and leading the subsequent Greater New Orleans Urban Water Plan, now integrated into the City's Resilient New Orleans strategy and Master Plan. Here and across the country, we lead and leverage a wide-ranging network of expert collaborators from around the world who help us advance resilience planning and visioning for states, cities, institutions, and private clients.

The Dutch Dialogues™ collaborative workshop model was a leading influence on the post-Superstorm Sandy Rebuild by Design program and the Dutch government-sponsored Water As Leverage program in Asia, in both of which Waggonner & Ball participated. We have successfully used the Dutch Dialogues™ model in Houston in collaboration with the Rockefeller Foundation's 100 Resilient Cities program, in coastal Virginia, and in Charleston, South Carolina.

Our design approach is based on Living with Water™ and Building with Nature. Like water itself, these concepts cross borders, disciplines, and scales. Our methodology begins with a regional awareness and continues with layering strategies at increasingly higher resolutions in order to integrate systemic and structural measures.

## Adaptable Data-Based Design Process

Our approach to complex projects begins with framing the challenge and understanding fundamental underlying issues through rigorous analysis of maps and data. Among our strengths is identifying key questions and ensuring the right people are working on them. Our past work on the Urban Water Plan and our current work on both Mirabeau Water Garden and the Gentilly Resilience District has given us a head start on data gathering, a deep familiarity with the SWBNO system, and a keen awareness of what questions will help frame the challenges faced by the SWBNO. Our design process, honed over years of practice, is adaptable. We have tailored our approach for regional planning efforts in multiple cities for multiple types of public clients.

## Vision & Strategy Capabilities

Developing shared visions for large and complex projects is our expertise. From Charleston to Chennai, from Bridgeport to Beijing, our work begins with collaborative convenings and workshops. We are adept at gathering stakeholder feedback and building coalitions among citizens, design professionals, technical experts, and public agencies into compelling shared visions for successful projects and planning efforts.

## All-Scales System Planning Approach

Our greatest challenges of the next 50 years are not purely technical. As we experience unprecedented changes to our climate and environment, we believe that what is needed most urgently is collaborative leadership to unlock the potential of existing technical expertise to envision a future beyond the capacity of current practice. Therefore, we approach new challenges with an *all-scales system approach*. We recognize the value of holistically framing issues, recognizing and closing data gaps, and synthesizing current and ongoing planning efforts to establish a basis for vision-setting.

**Location:** New Orleans, LA

**Staff:** 22

**Year Founded:** 1970

### Expertise and Services:

Water Management Design & Strategy

Resilience Planning

Coastal Adaptation Planning

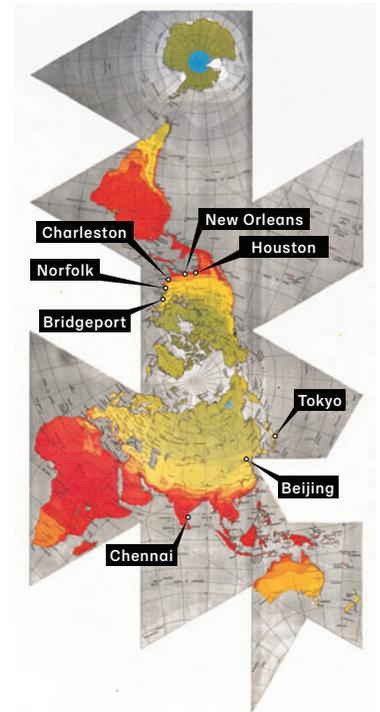
Master Planning

Institutional Programming & Visioning

Urban Design

Architecture

Landscape Design



**Waggonner & Ball is a New Orleans-based firm with global reach. Our current and recent work spans cultures and continents.**

# Dutch Dialogues

LOCATION	COMPLETION DATE
NEW ORLEANS, LA	2010
HAMPTON ROADS, VA	2015
CHARLESTON, SC	2019
HOUSTON, TX	2019

**TYPE**  
RESILIENCE PLANNING

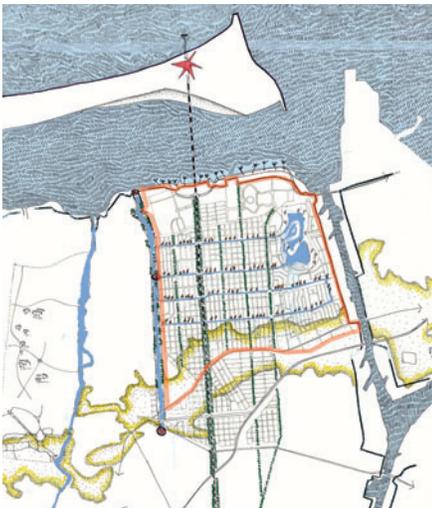
## Learning from the Netherlands: challenges equal design opportunities in New Orleans, Virginia, Charleston, and Houston

Facilitated by the Royal Netherlands Embassy, Waggonner & Ball established cooperation with the Dutch National Ministries responsible for infrastructure, water management and spatial planning. This collaboration grew to include provincial and municipal governments, universities, Water Board officials, and private engineering and design firms.

Co-sponsored by the Embassy and the American Planning Association, three workshops were held in New Orleans from 2008 to 2010 to frame and address water challenges through a collaborative and holistic approach that aimed to increase value as well as safety at multiple scales.

Proposals from these workshops led directly to the Greater New Orleans Urban Water Plan and the City of New Orleans' successful application to the National Disaster Resilience Competition, which funded the Gentilly Resilience District.

We have led successful Dutch Dialogues™ workshops across the country, from Houston in collaboration with the Rockefeller Foundation's 100 Resilient Cities program, to coastal Virginia and Charleston, South Carolina. This model has resulted in study cities changing their processes, including adopting policies, implementing pilot projects, and creating long term support for Living With Water™ efforts.



1



2



3



4

- 1 Vision for Gentilly neighborhood in New Orleans
- 2 Resilient redevelopment along a creek in Hampton, Virginia
- 3 A circulating canal network in New Orleans provides improved drainage during wet weather and circulating water during dry periods
- 4 Workshop in Norfolk, Virginia

# Greater New Orleans Urban Water Plan

A new approach to risk reduction that redefines New Orleans’s environment into a safer, greener, and more equitable future

**CLIENT**  
GREATER NEW ORLEANS, INC.

**TYPE**  
RESILIENCE PLANNING

**FUNDING SOURCE**  
STATE OF LOUISIANA OFFICE OF COMMUNITY DEVELOPMENT

**COMPLETION DATE**  
2013

**LOCATION**  
ST. BERNARD PARISH AND THE EAST BANKS OF ORLEANS AND JEFFERSON PARISHES, LA



- 1 Regional water system
- 2 Paradigm shift: from piping & pumping to slowing, storing & reusing

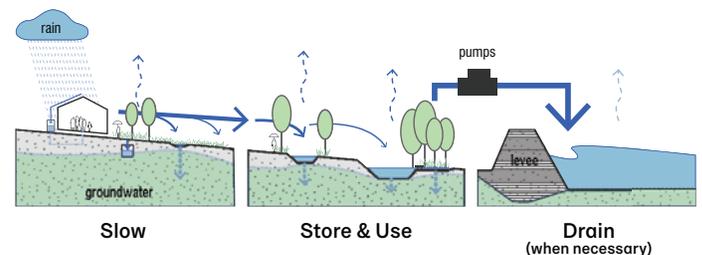
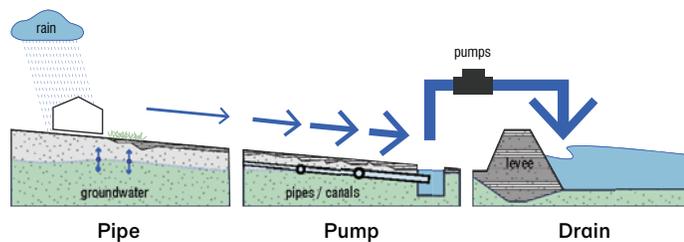
1

The New Orleans region has been surrounded and defined by water since its colonial founding over 300 years ago. Now partially below sea level on the Mississippi River delta, the area is fortified by a perimeter levee protection system designed to reduce risk from a 100-year storm event. However, flooding from frequent rainfall and land subsidence from current drainage practices remain critical challenges.

approach that is science-based, place-based, and adaptable. We convened and coordinated a large, international multidisciplinary team to develop the multi-scaled, actionable strategy, which spans four volumes and over twenty district and demonstration reports. Documents are available for public download at [livingwithwater.com](http://livingwithwater.com).

Waggonner & Ball led the Greater New Orleans Urban Water Plan, a water-based landscape and urban design proposal that illustrates how the region can live with water rather than fight against it. The Plan employs a multi-layered, ground-up

Waggonner & Ball's leadership in the approach of the preceding Dutch Dialogues led to the development of the Urban Water Plan, which has created a shift in public policy and project implementation, and increased support for best practices of urban water management in the city and region.



2

# National Disaster Resilience Projects

## Developing and implementing resilience strategies for the states of Connecticut, Louisiana, and Virginia, and New Orleans

### CLIENT

CITY OF NEW ORLEANS  
COMMONWEALTH OF VIRGINIA  
STATE OF CONNECTICUT  
STATE OF LOUISIANA

### AWARD

\$141 M  
\$120 M  
\$54 M  
\$92 M

### TYPE

RESILIENCE PLANNING

Waggonner & Ball's water-sensitive, urban design approach influenced four of the 14 successful HUD National Disaster Resilience Competition applications, all of which are now being implemented with our leadership.

We led a team of local, national, and international experts to develop the City of New Orleans proposal for the Gentilly Resilience District, a green and blue network of infrastructure and public spaces that manage stormwater and subsidence while reconnecting neighborhoods.

Building upon the foundation of the Dutch Dialogues Virginia, we worked with Arcadis and RTKL to develop proposals for the Ohio and Newton's Creek Watersheds in Norfolk. We are the urban design and architecture lead for this effort.

In Connecticut, we assisted WSP in developing a Coastal Resilience Plan, with demonstration projects in Bridgeport and New Haven. Resilient Bridgeport includes coastal protection of a historic neighborhood that creates multiple benefits.

We worked closely with officials to conceptualize and craft the State of Louisiana application, and led the design during the subsequent LA SAFE regional planning effort. Pilot projects we developed in LA SAFE are being implemented, including Gretna City Park. We are leading the urban and architectural design for the Isle de Jean Charles Resettlement, a pioneering approach to relocating vulnerable coastal residents.



Vision for pilot projects in the Gentilly Resilience District in New Orleans

## New Orleans, Louisiana Gentilly Resilience District

An interconnected grid of pilot projects define a neighborhood's identity and create multiple benefits that can be replicated throughout the city and region.



Blue-Green Corridors turn water storage into an asset while connecting projects within the Gentilly Resilience District



Mirabeau Water Garden, the showcase project of the Gentilly Resilience District, can be used as a park when dry

**Norfolk, Virginia  
Ohio Creek Watershed**

Opportunities to limit vulnerabilities and reinforce assets in a historic coastal neighborhood with public housing.



Proposed projects

Rendering of green infrastructure improvements and new pump station

**Bridgeport, Connecticut  
Resilient Bridgeport**

A long-term vision for urban coastal adaptation that leverages public housing and a park in a historic neighborhood.



A discontinued street is replaced with a naturalized channel that daylights water conveyed from behind a raised road

A historic park is re-imagined as a multi-benefit component of a broader stormwater management system

- Louisiana:**
- LA SAFE
- Isle de Jean Charles Resettlement
- Gretna City Park

The LA SAFE regional planning effort reinforces the resettlement of vulnerable coastal residents to higher ground, and includes a pilot project to retrofit Gretna City Park to store more water as the showcase of a new resilience district.



Community members informed site and building design decisions during workshops for the Isle de Jean Charles Resettlement



Design water storage targets for Gretna City Park



LA SAFE 50 year vision plan for Lafourche Parish

# Stormwater & Drainage Challenges & Approach

**The greatest challenge of the next 50 years is structural and functional adaptation to the physical environment.**

The Greater New Orleans Urban Water Plan identifies three primary water-related challenges: 1) a drainage system overwhelmed by rainfall volume, 2) subsidence driven by the water system, and 3) the lack of public space around water and, more broadly, water undervalued as an asset. While seemingly focused on drainage, these challenges apply to the water system as a whole: they bridge and transcend the Board's three lines of business. This is the greatest challenge of the next 50 years: to adapt the organization to receive new input from people and the land, and to adapt services provided to respond to legacy and future challenges our community confronts in the physical environment.

Stormwater challenges are linked to all other forms of water in New Orleans, from wastewater to drinking water to recreational and industrial water, and even to the lack of water. Failure to acknowledge these interdependencies compounds drainage-specific challenges over time.

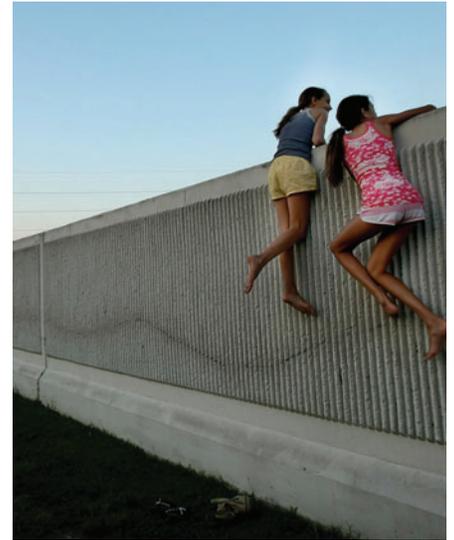
## Water System Challenges



**1** Drainage systems are regularly overwhelmed by too much runoff, causing flooding.



**2** Excessive pumping causes the land to sink by lowering groundwater levels.



**3** Critical water assets are wasted, hidden behind walls, buried underground, or pumped out of sight.

## Long Term Challenges & Approaches

**Transitioning to a nature-based mindset.** Pumping alone cannot keep pace with heavy downpours today or with the scale of change on the horizon. A transition from a “pump first” to a “pump only when necessary” approach is needed, with a fundamentally shift in the Board’s focus at all levels to prioritize passive, nature-based solutions, including green infrastructure and beyond.

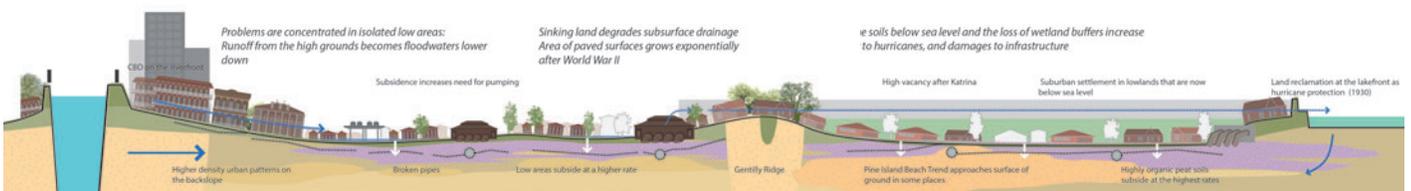


**Adapting the drainage system for climate change impacts.** More intense rainfall is anticipated within the drainage basin, and higher boundary conditions due to sea level rise are projected at discharge locations outside. The Green Infrastructure Plan sets a precedent to build on, in partnership with other agencies, to address runoff and the excess of paved surfaces. In addition, large in-line storage projects are needed to add storage volume in the system. While drought would seem like a drainage engineer’s relief, extended dry periods shrink soils and destabilize infrastructure, worsening level of service impacts.

**Measuring and balancing groundwater.** Subsidence is a long-term existential threat for New Orleans and the Sewerage & Water Board, one that compounds the challenges of climate change and sea level rise. Lack of understanding of groundwater strains maintenance budgets for all city infrastructure and, through subsidence, will eventually render pile-supported drainage canals obsolete. Long term, saltwater intrusion driven by external water levels needs to be mitigated through fresh groundwater management to protect vegetation and subsurface infrastructure.

**SWBNO is the only entity poised to address resulting subsidence and bring groundwater levels into balance.**

In practice, SWBNO systems manipulate groundwater levels, however inadvertently, and SWBNO is the only entity poised to address resulting subsidence and bring groundwater levels into balance. Robust and ongoing data collection and analysis are needed. An operational and legal framework will need to be created—perhaps as a dedicated line of business—to address this challenge.



### Impacts of Subsidence

The section diagram shows the general effects that subsidence has across the city. *Source: Greater New Orleans Urban Water Plan, 2013*



**Coordinating between lines of business.** Responding to the groundwater management mandate can be the foundation for a new integrated systems approach. Where possible, align system retrofits to minimize street and sidewalk repairs. Drainage, water, and sewer systems interact, sometimes exacerbating weak points. Integrated water management requires coordination across departments, with feedback loops from conditions in the field including real-time monitoring and platforms for data sharing.

**Leading external stakeholders.** The SWBNO is positioned to become our region's greatest water champion. An expanded purview and mandate for the Board is among the most important shifts the organization can make to support New Orleans' long-term viability. A sense of this ambition and mission within the organization, empowered by the city and the public, can improve water-related outcomes for all lines of business and for all stakeholders, from employees to residents to the Corps of Engineers. Coordinated operation of water levels across parish lines, beginning with inter-agency workshops to set targets and identify problems, may provide one approach.



The Board can demonstrate leadership through transparent science and through best-practice examples. Revisions to the well-known systems limits—1" the first hour, ½" each hour after that—must more explicitly acknowledge the physical limits of the flat landscape, and the role that other city departments and individual home and business owners must play in response to the changing environment. Finer-grained coordination, and potentially updates to infrastructure ownership between SWBNO and the Department of Public Works will be especially crucial. Adaptations to streets, parks, and properties of all types should be part of a holistic approach, whether explicitly within the Board's charge or through new partnerships.

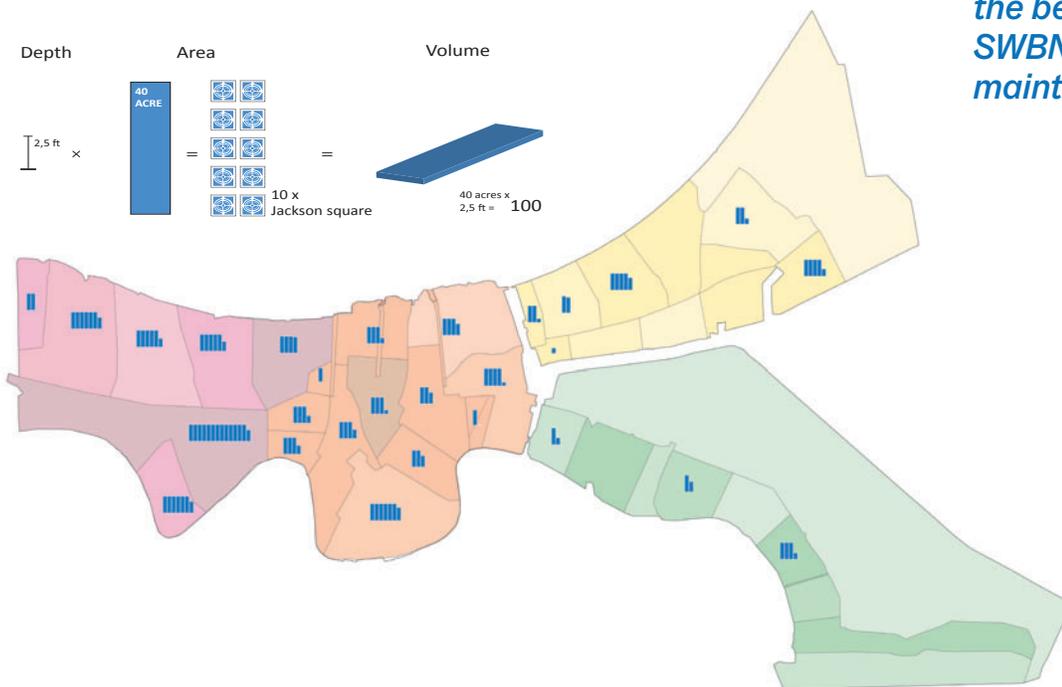
**Finding the right people.** As an organization, the Board is preparing to undergo a generational shift in workforce, and risks losing the institutional knowledge required to maintain its complex systems. On a project basis, staff and consultant roles may need to expand beyond what has traditionally been a technical focus. For example, designers added to water project teams can help identify and realize multiple benefits for infrastructure, and market analysis of real estate value capture opportunities can help demonstrate project payoffs.

**“A generational shift in workforce is an opportunity to strengthen the water economy sector.”**



**Cultivating civic pride in water.** We must build trust in the institution. More than other business lines, the stormwater system has a physical presence in New Orleanians’ day-to-day routines and the life of the city, from catch basins to manhole covers to floodwalls to open canals. SWBNO should not be perceived solely as a technical organization, but one that values and sustains the experience of living in New Orleans in both dry and wet times. We can realize opportunities to renovate the drainage system into beautiful, functional public spaces that use water to improve quality of life and create mechanisms to capture value from the resulting economic development. The water system can directly support New Orleans’ characteristic trees and plants, its urban forest, and help sustain its ecology. A design-based approach to water management can complement engineered solutions, layering on ideas such as nature-based, integrated strategies for mosquito control and urban cooling effects from water and vegetation. We shall look for more demonstration projects and opportunities for community partnerships, such as expanding the Green Infrastructure Grant Program. The more the public values water in all forms, the better positioned the SWBNO will be to fund and maintain its operations.

**“The more the public values water in all forms, the better positioned the SWBNO will be to fund and maintain its operations.”**



**The Water Assignment**

Measuring the water assignment--and sharing responsibility for it with citizens--makes the runoff problem more visible, and therefore more solvable.

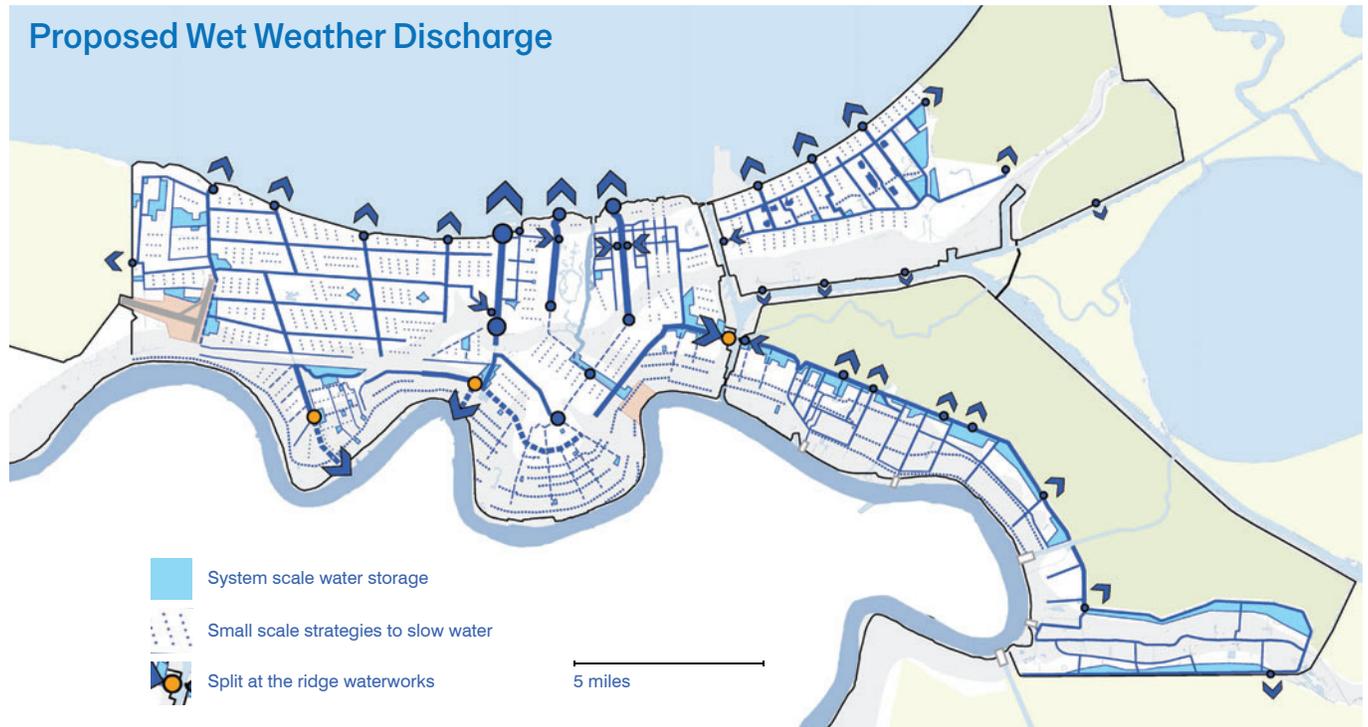
Source: Greater New Orleans Urban Water Plan, 2013.

## An Integrated Approach

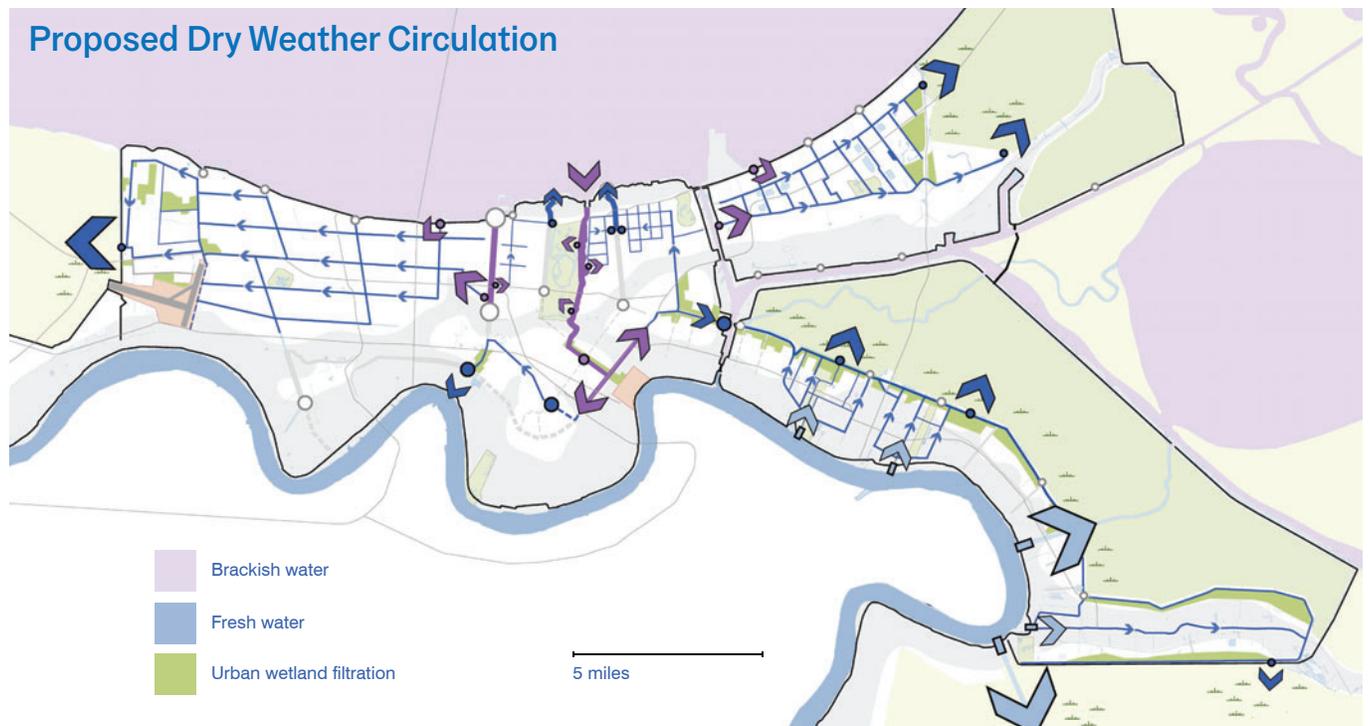
# A Living Water System

A "living water system" that sustains the urban landscape in all weather conditions is needed to improve quality of life and function of our city. The SWBNO's stormwater existing drainage network is the baseline for this future system, and its components can be retrofitted and repurposed for new and improved functions.

### Proposed Wet Weather Discharge



### Proposed Dry Weather Circulation



Source: Greater New Orleans Urban Water Plan, 2013

# Wastewater & Sewerage Challenges & Approach

Treated water and solid waste are assets that can add value over time.

Wastewater challenges should be defined in relation to other lines of business and in relation to impacts on the surrounding environment. In addition to conveyance considerations, wastewater planning must take a wider view of downstream impacts and opportunities to “close the loop” on the urban water cycle and find ways to capture the value of its products. In addition to those listed, we look forward to integrating and addressing additional challenges identified by the Board and its specialist consultants.

## Long Term Challenges & Approaches

**Maintaining the system.** Like all lines of business, sewer maintenance is an ongoing challenge. Subsurface infrastructure impacts surrounding buried lines, and inter-agency maintenance coordination may help with both service disruption and surface inconvenience. Technical solutions such as pipe liners and flexible connections may help limit future subsidence impacts.

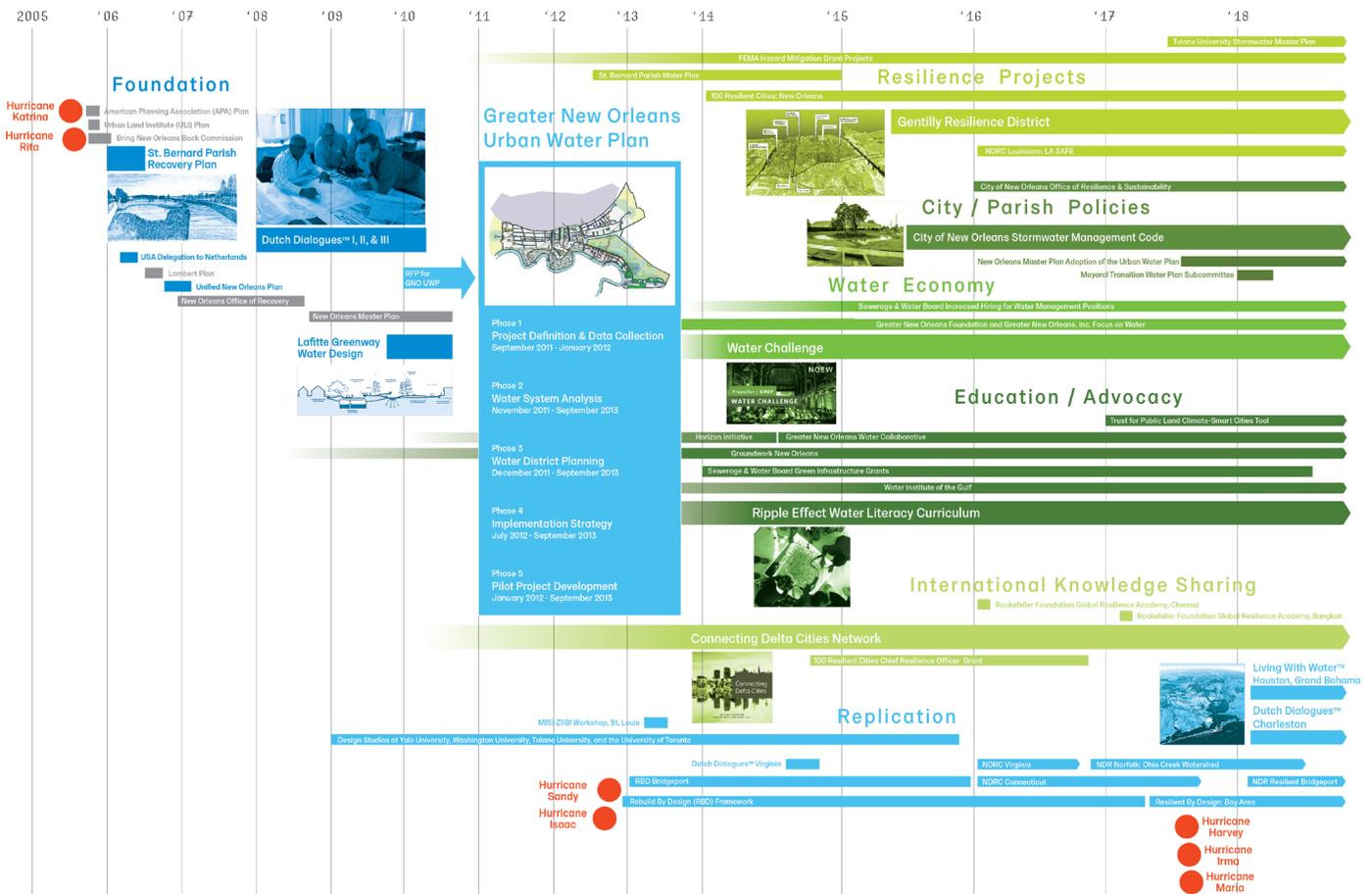


**Measuring and balancing groundwater.** The sewer system is thought to contribute to groundwater imbalance. Sewers are typically the lowest pipes in the street cross section, and thus the farthest below the water table. Unsealed gravity lines may significantly lower groundwater levels, affecting all layers above and the pipes themselves. Cracked sewer lines may be a cause of localized sink holes due to soil removal through pipes. More data and monitoring is needed to determine sewer system impacts on groundwater, and collaborations with research organizations already studying these interactions, such as Deltares in the Netherlands and the Water Institute of the Gulf, may be mutually beneficial.



**Creating downstream benefits.** Wastewater suffers from a public perception problem; however, treated water and solids are potentially valuable assets, especially in delta landscapes. Water reclamation and reuse has precedent in cities such as Los Angeles. Here, reclaimed fresh water is useful to maintain salinity balances in urban wetlands, can be used for system circulation and groundwater recharge in dry periods, and may be useful as drinking water in emergency situations. Treated solids have been tested locally for use in Bayou Bienvenue restoration and may be useful for restoration or land elevation elsewhere in the region.

## Living With Water™ Momentum



Waggonner & Ball's water planning efforts since Katrina have catalyzed a Living with Water™ movement in New Orleans and in other cities. The SWBNO's ambition to transform its operations over the next 50 years can build on, leverage and amplify this local energy.

## Subsidence Management

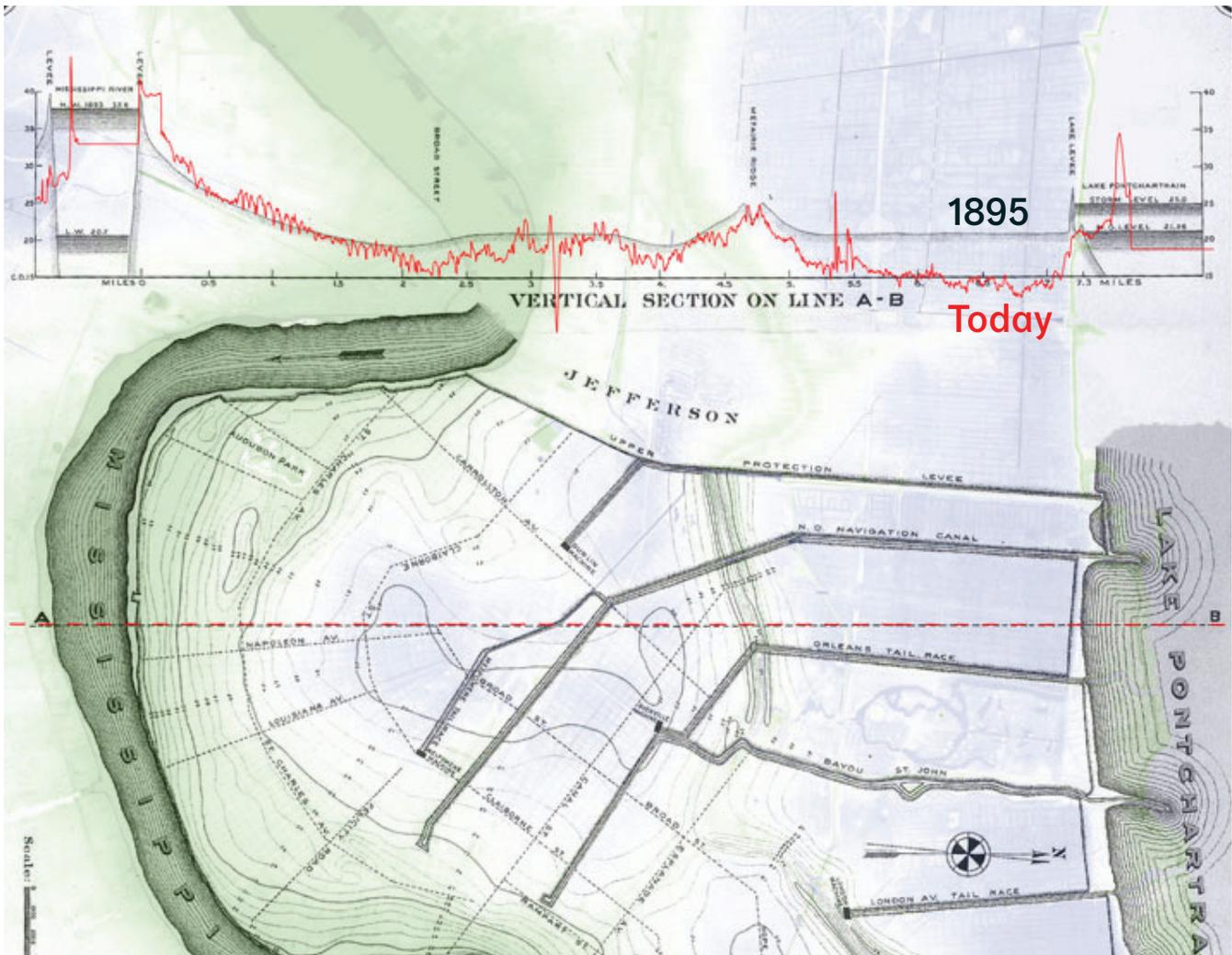
# The Groundwater Imperative

Today, life below sea level is possible only with the operation of powerful pumps, but a new management paradigm is needed to stop the sinking. Deep organic soil layers indicate the potential for continued subsidence if new approaches to managing groundwater are not adopted.

Systems for drainage, sewerage, and drinking water all depend on a stable subsurface to properly function. Soil type and groundwater levels shape design decisions—where detention is viable, where infiltration naturally occurs, what ecologies can flourish—yet groundwater levels and flow are largely unknown.

Waggonner & Ball advised Deltares and the City of New Orleans on the installation of a city-wide network of groundwater monitoring wells, and the creation of the first groundwater map of the city. This data must be continually collected and refined, and working knowledge continually deepened.

For the long term viability of its own systems and our region as a whole, the SWBNO must become the champion of all things subsurface, as a new line of business or as a fully-integrated aspect of all areas of service. The ground—and what is below, out of sight—sustains all that happens above.



### Over a Century of Subsidence

The black line labeled "1895" indicates the height of land in that year; the red line shows the lower elevations of those same areas today. Some areas have subsided almost ten feet, with the potential to subside further. *Base map: 1895 Drainage Master Plan, SWBNO.*

# Drinking Water Challenges & Approach

**Increasing reliability and adaptability over time will mitigate supply shocks and internal stresses.**

Like other aspects of the water system, challenges for drinking water affect and are affected by other forms of water, with impacts on groundwater a major knowledge gap. The drinking water supply, unlike other lines of business, critically depends on factors outside city boundaries, and must consider the quality and reliability of upstream sources. Failure of the distribution network is a major risk to public safety—and public trust.

## Long Term Challenges & Approaches

**Safeguarding the water supply.** Advocate for water quality improvements in the Mississippi River. Explore opportunities for regional collaborations, including interconnections of East Bank water supplies for emergency backup. Conservation measures can free up capacity and add redundancy to the water supply. Given the importance of water supply, risk management scenario planning should include disruptions to the Mississippi River flow, however remote, including Gulf salinity impacts and changes in river course.

**Maintaining the distribution system.** Distribution losses are well known, however repairs often create new pressures elsewhere. Opportunities for decentralization can be explored to improve reliability. Water line repairs are a nuisance for neighborhoods and are potentially hazardous for drivers. Future maintenance approach can be better coordinated with Department of Public Works to improve the customer, resident, and visitor experience in the city. Maintenance is a highly visible point of interaction with customers, and successful interactions can contribute to positive user experiences.

**Measuring and balancing groundwater.** Leaky drinking water pipes are an expensive way to maintain groundwater levels, and the affects of leakage, both positive and negative, on subsurface water are largely unknown. Scouring effect of leaking pressurized lines should be studied, especially below roads and buildings.

**Leaky drinking water pipes are an expensive way to maintain groundwater levels.**



**Resilience through Collaboration**

# Waggonner & Ball Collaborators

We routinely convene leading designers, engineers, governments and institutional partners to create ambitious plans and detailed, actionable projects. A broad international network of partners enriches and informs our practice on a daily basis, including many firms that may express interest in this RFI. We are eager to participate in the SWBNO Master Plan workshops with partners new and old, and, if desired, offer our experience in workshop facilitation to help the Board set and realize its planning goals. Successful collaborations depend on relationships—the knowledge of individual and firm-wide strengths and how to deploy them for best results—and we are well-positioned to share this knowledge for the Board's benefit.



1 Infrastructure Workshop in Norfolk, VA, during the Ohio Creek Watershed Project

2 The All Scales Workshop in Bridgeport, CT, during the Rebuild by Design project

**Engineering + Stormwater Modeling**

- |                    |                               |
|--------------------|-------------------------------|
| Arcadis            | Sherwood Design Engineers     |
| Batture            | Waldemar S. Nelson & Co., Inc |
| CDM Smith          | Wingate Engineers             |
| Eustis Engineering | WSP                           |
| GAEA Consultants   | Royal Haskoning               |
| Moffatt Nichol     | Biohabitats                   |
| MSMM               | Stantec                       |
| Procella Design    | Dewberry                      |

**Institutional Partners**

- |                           |                                     |
|---------------------------|-------------------------------------|
| Royal Netherlands Embassy | Greater New Orleans Foundation      |
| Trust for Public Land     | American Planning Association       |
| Deltares                  | Kinder Institute at Rice University |
| Yale Urban Design Studio  | LSU Coastal Sustainability Studio   |
| GNO, Inc.                 | The Water Institute of the Gulf     |

**Public Partners**

- |   |                            |
|---|----------------------------|
| Louisiana Office of Community Development (OCD) | City of Hampton            |
| City of New Orleans                             | City of Rotterdam          |
| St. Bernard Parish                              | City of Amsterdam          |
| Jefferson Parish                                | City of Charleston         |
| City of Norfolk                                 | City of Houston            |
|   | US Army Corps of Engineers |

**Designers & Strategists**

- HR&A Advisors
- Asakura Robinson
- Bosch Slabbers Landscape + Urban Design
- Carbo Landscape Architects
- Dana Brown & Associates
- GCR
- H+N+S Landscape Architecture
- Palmhout Urban Landscapes
- Reed Hilderbrand
- Robbert de Koning Landscape Architect
- SCAPE Landscape Architecture
- CSRS
- FutureProof
- Manning Architects

**Community Education & Engagement**

- Friends of Lafitte Greenway
- Groundwork
- The Hawthorne Agency
- Bright Moments
- I See Change
- Ripple Effect
- The Nature Conservancy