The Charleston Water Plan

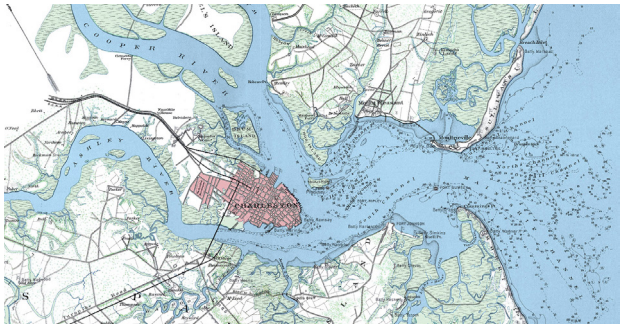
A foundational strategy for managing flood risks and embracing water's place in the City's future

Looking ahead to 2050 and beyond, the Water Plan seeks to:

- **Manage flood risks** from tides, sea level rise, stormwater, storm surge & groundwater
- **Guide safe, resilient growth** to high ground
- **Protect, conserve, and restore** ecologically sensitive areas
- **Accentuate the City's sense of place** and historic character around water

Scan or Click to view the Water Plan
Online Storymap

Key Messages



Water is part of Charleston and is woven throughout its history, nature, and culture.

Sea level rise increases risk from all types of flooding that have long affected Charleston's landscape.

Flooding is manageable but the location & types of development will change in response to rising water.

Charleston can continue to thrive with investment in adaptation that strengthens the City's character, culture, and economy.

Elevation Matters.

Value the high ground for growth through context-sensitive development. Connect the low ground to manage water.

Make Space for Water.

Prioritize where water is and wants to be. Defend, Adapt, Grow & Reserve are foundational strategies to guide planning and development decision-making.

Act Now, Adapt Over Time.

Benefits must justify the costs, but costs come before benefits. Think big and act now with adaptive capacity, or room to adjust and manage future conditions.

Principles

Safety First. Protect and connect critical assets from flooding.

Work from the Ground Up. Build with nature to protect, conserve, & restore the environment.

Change for Good. Provide resources and access to address environmental justice.

Work Together. Coordinate and communicate across communities, sectors & departments.

Build Value. Invest incrementally for long-term resilience, and adjust to new data and inputs.

Key Recommendations

City-wide Actions

The Water Plan can help the City begin the process of adaptive transformation. In response to current and future flood risks, the City must embrace learning, coordination, incremental adaptation, and infrastructure and development investments for a resilient future.

Protect & Connect

- In anticipation of sea level rise, **improve infrastructure corridors for utility and transportation resilience.** Elevate critical roads, intersections, evacuation routes, and access to critical facilities.
- As part of the Zoning Ordinance update, **study benefits and negative impacts of proposed elevation-based development approach** that underpins the 2021 City Comprehensive Plan. Updates should incorporate the latest empirical floodplain and sea level rise data.

Build with Nature

- **Amplify a "conservation ethic" for the protection and maintenance of the City's natural infrastructure.** Incentivize in City projects the conservation, protection, maintenance and restoration of marshes, wetlands, tidal creeks, urban forests, and green spaces, and develop a City-wide marsh migration and sustainability strategy.
- **Work with the South Carolina Dept. of Health & Environmental Control (DHEC) and the U.S. Army Corps of Engineers (USACE) to streamline the permitting process** for drainage improvements in sensitive habitats (ditches, water control structures, stormwater outfalls, etc.).
- **Incentivize stormwater management and inland tidal flooding policies** that use a nature-based approach to attenuate flooding, improve water quality and enrich biodiversity.

Provide Resources & Access

- **Improve efficient and equitable collection of stormwater and drainage fees.** Review fee structure to ensure approved and planned drainage and stormwater projects and capital improvement project cycles are aligned and fully funded. Phase in collection of stormwater fees on all properties with programs to support overburdened property owners.
- Maintain and expand **public access to water.**

Coordinate & Communicate

- **Develop a comprehensive communication strategy** on flood risk, flood project planning delivery timelines, and flood preparedness, including flood detection, real-time alerts, response and recovery. The strategy should ensure communications reach underserved, socially vulnerable and non-english speaking communities.

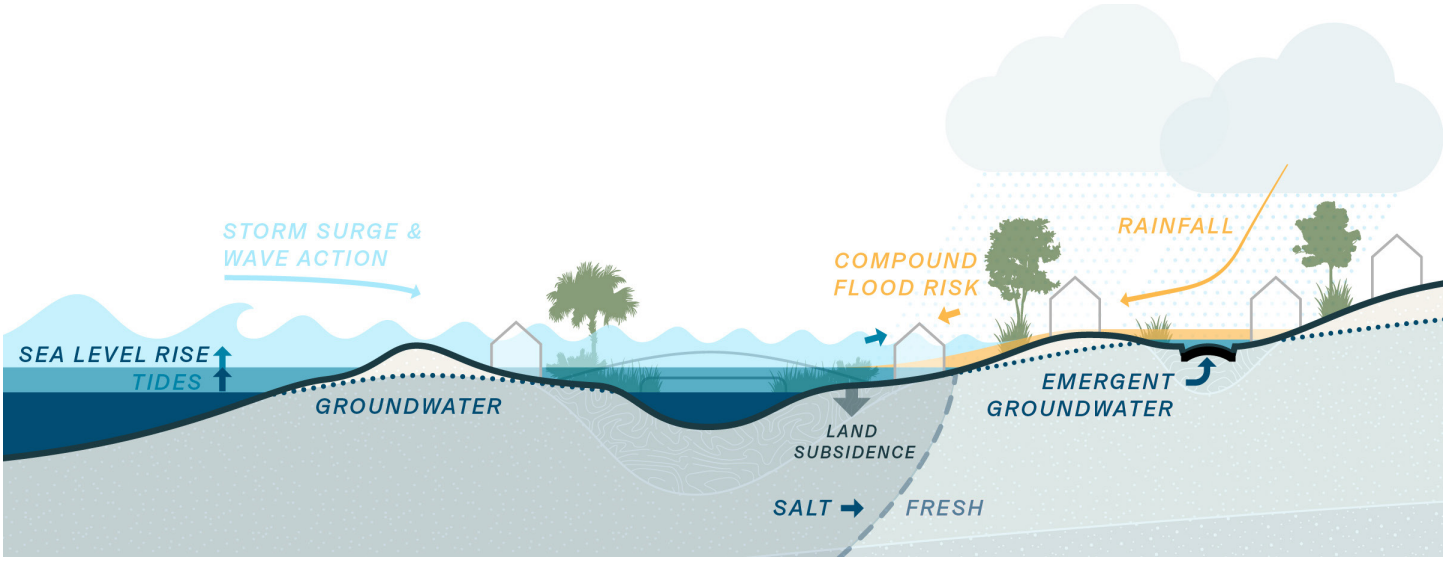
Invest & Adjust

- **Immediately develop, acquire, and/or procure comprehensive stormwater drainage models** for all City hydrologic basins. Complete an inventory of the City's drainage infrastructure, key features, and operations conditions, including coordination with surrounding and interconnected jurisdictions (Town of James Island, County, and public service districts).
- **Develop a City-wide adaptive management program** for relevant City programs and departments impacted by changing water levels and related environmental thresholds. Align to common time scales if possible, such as every ten years with the Comprehensive Plan update. Prioritize the needs of historically underserved communities in cost-benefit analyses to address long-term environmental justice concerns.

Forces of Water in Charleston

Flood Risks

Charleston's flood risks result from forces of water that can occur at the same time, compounding flooding across the City. Sea level rise is the primary long-term flood risk driver because it affects creeks and drainage capacity upstream: as sea levels rise, drainage slows.



How Much? How High?

Changing forces of water will affect every aspect of life in Charleston. Elevation is a key concept for understanding how water impacts the City and how to adapt. The number of tidal floods per year is rapidly increasing as sea levels rise. Rainfall events coinciding with high tides can create widespread, compound flooding across the City.

Sea Level Rise

+24-48" projected by **2070**

+14" projected by **2050**

+13" measured since **1900**

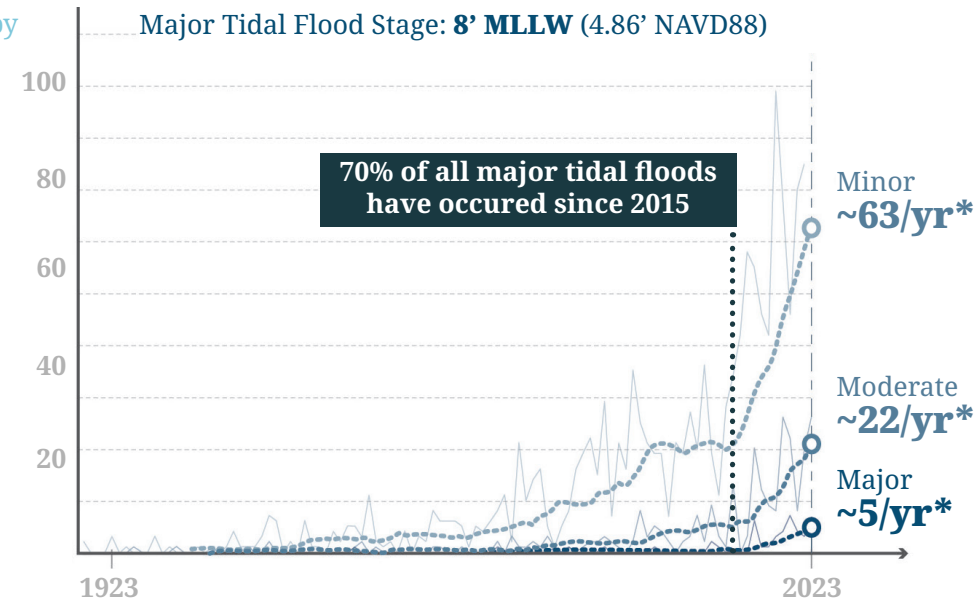
Rainfall

7.8" / 24 hrs
25-year Storm

10.2" / 24 hrs
100-year Storm

Source: NOAA Atlas 14

Tidal Flooding



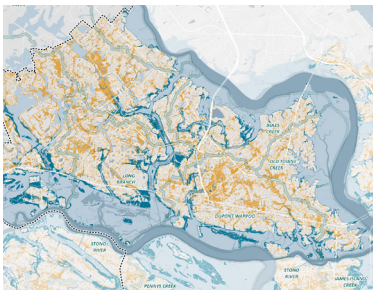
*Ten-year moving average

Source: City of Charleston Sea Level Rise Strategy

Identifying Flood Risk Drivers

Flood Modeling & Mapping

A conceptual flood risk model (HEC-RAS) identified areas to prioritize for potential flooding from stormwater and sea level rise. The Water Plan recommends developing a city-wide comprehensive flood risk model.



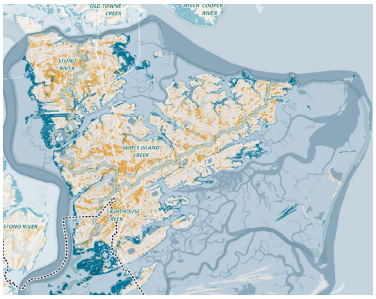
West Ashley

Experienced Today

- Stormwater & isolated compound
- Storm surge at edges & creeks

Projected for 2050

- Compound stormwater + high tide
- Tidal flooding at edges & creeks (especially Church Creek Basin & south of Savannah Highway)
- Expanded storm surge inland



James Island

Experienced Today

- Stormwater
- Isolated tidal (especially at James Island and Folly Creeks)
- Storm surge

Projected for 2050

- Compound stormwater + high tide
- Tidal flooding at edges & creeks (expanding creek connection from James Is. Creek to the Stono River)
- Higher storm surge

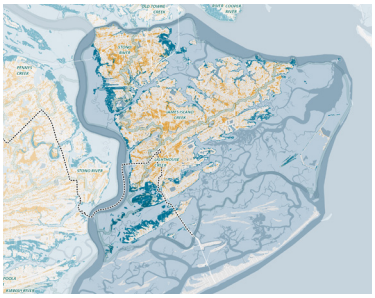
Johns Island

Experienced Today

- Upland stormwater
- Storm surge at edges & creeks

Projected for 2050

- Compound stormwater + high tide
- Tidal flooding at edges & creeks
- Storm surge at edges & creeks



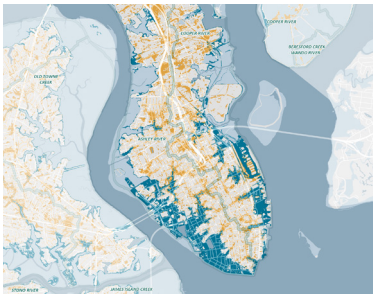
Cainhoy & Daniel Island

Experienced Today

- Storm surge at edges & creeks

Projected for 2050

- Potential stormwater drainage tipping point as sea level rises
- Tidal flooding at edges & creeks
- Expanded storm surge inland



Peninsula

Experienced Today

- Compound stormwater + high tide
- Tidal flooding at edges & creeks
- Storm surge

Projected for 2050

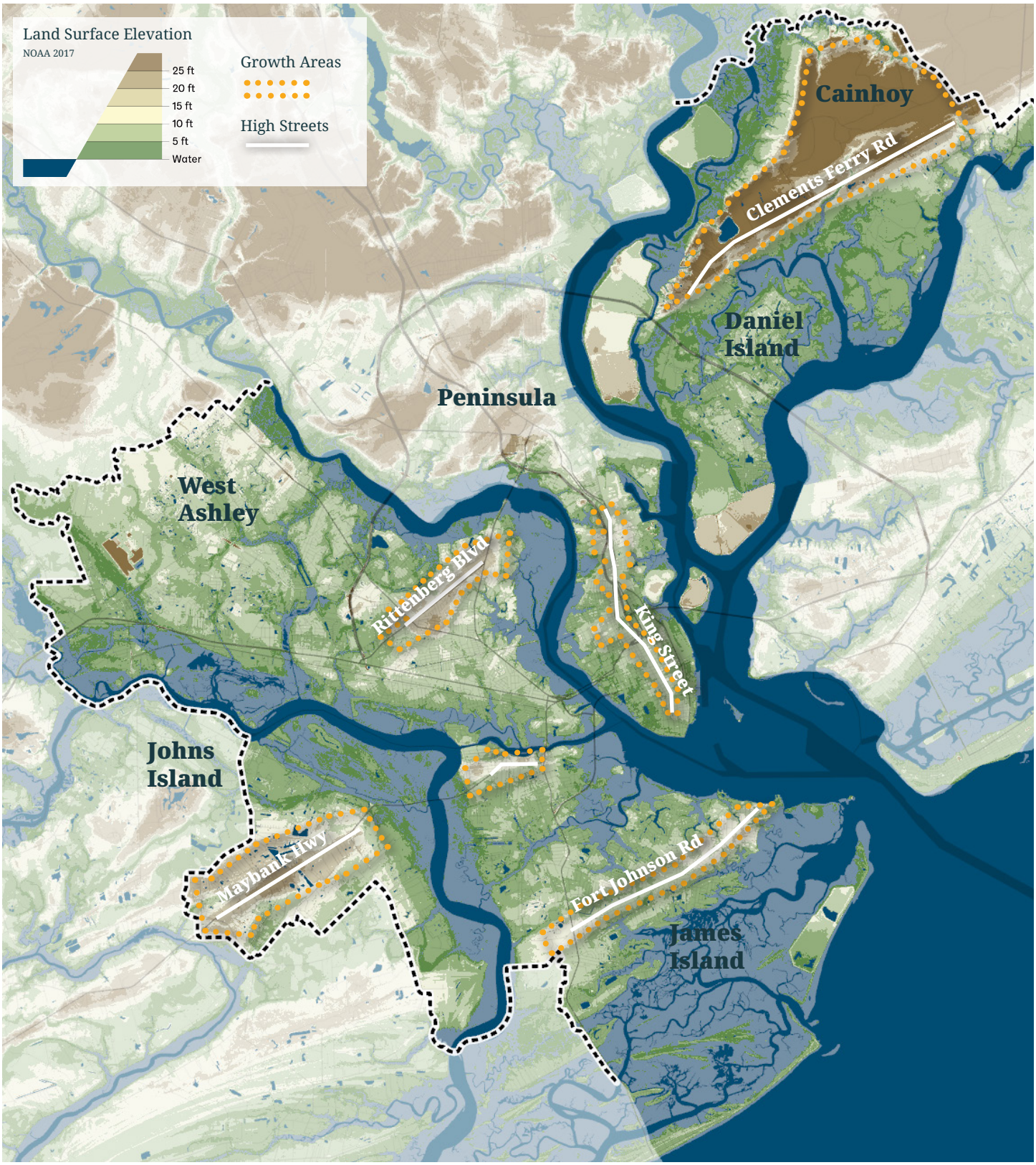
- Operations & maintenance of internal stormwater system and tide control gates (within raised edge)
- Storm surge and wave overtopping management (within raised edge)

Tidal Flood Risk (2024) Tidal Flood Risk (2050) Stormwater Flood Risk

Elevation Matters

Prepare High Ground, Connect Low Ground

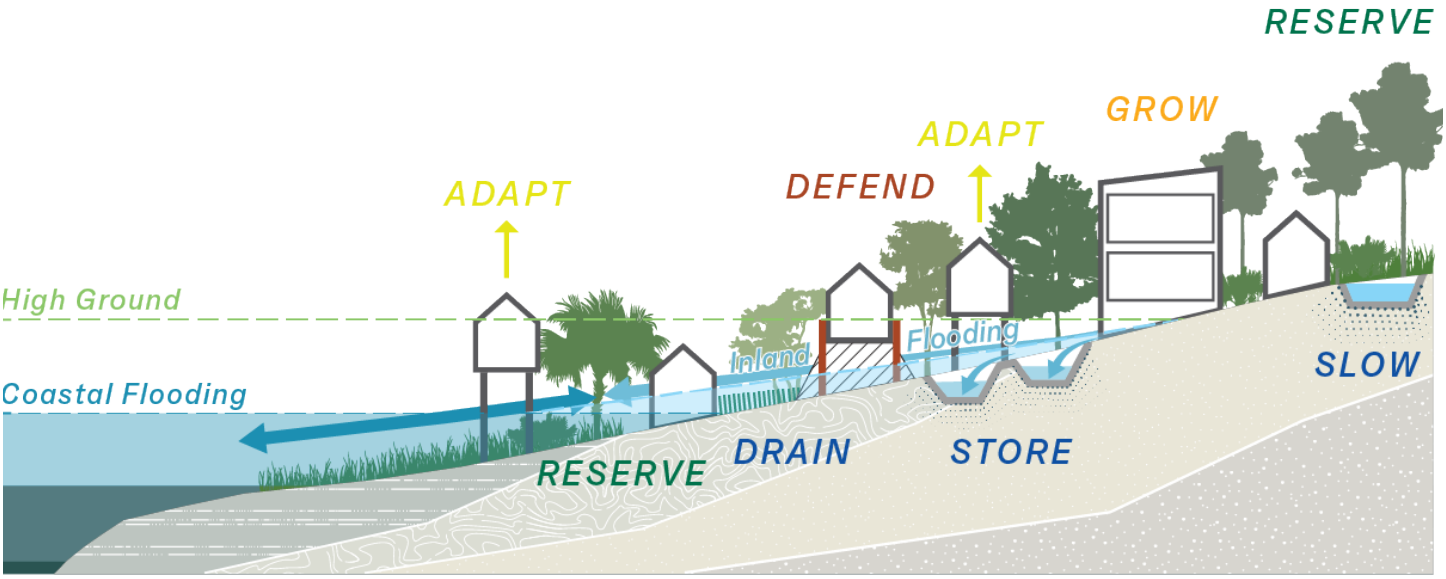
People and value will migrate away from flood risk over time. High ground should be prepared for appropriate growth & redevelopment, while low areas should be prepared & supported for adaptation and designed to interconnect.



Working with the Land

Planning Strategies

Water Plan strategies build upon Dutch Dialogues® Charleston and the 2021 Charleston City Plan. These strategies are fundamentally based on land elevation, land use, water levels, and flood risk factors and are intended to help migrate population and property value to safe ground.

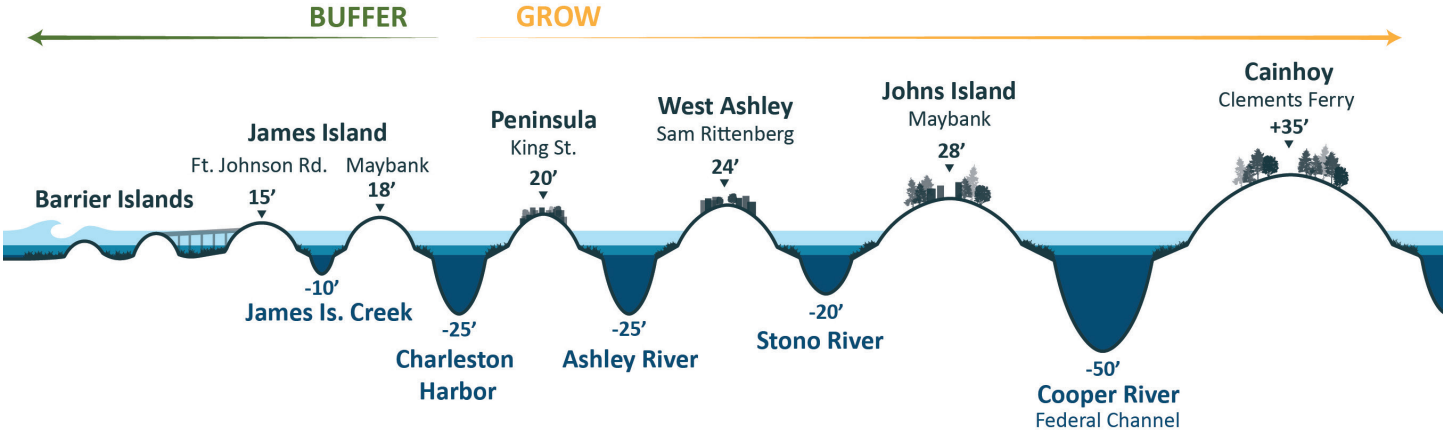


Reserve Restore and preserve natural ecosystems. These areas provide essential ecological, water management, and economic benefits.

Adapt Retrofit vulnerable infrastructure and communities to be more resilient to increasing water risks. Build adaptive capacity into future investments.

Defend Protect critical facilities, buildings, and infrastructure in areas of regional significance. Engineering measures such as berms, barriers, and pumps should be designed to provide additional community benefits.

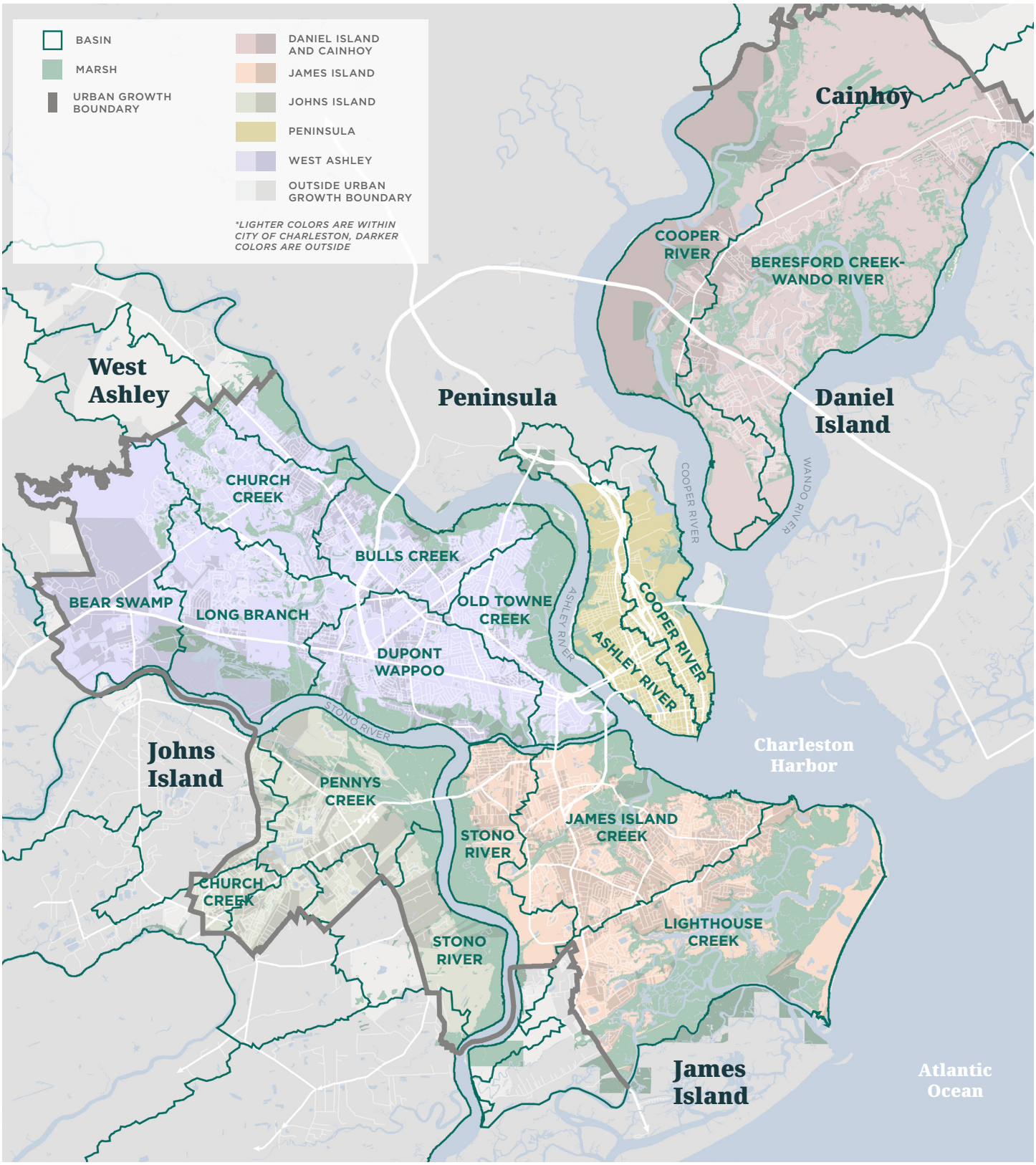
Grow Responsibly grow in areas with the lowest vulnerability. Safety from flooding should direct new development and redevelopment to areas of higher ground. Growth must occur in tandem with integrated water management approaches.



Integrating Systems & Scales

Planning Areas, Basins & Projects

Planning areas are defined by Charleston's rivers and are subdivided into drainage basins. Each basin has its own character, hydrologic system, water risks, and adaptation project opportunities.



Adaptation Paradigms

Aligning Action & Environmental Change

Infrastructure and development patterns will shift in response to sea level rise and landscape change. Adaptation paradigms will help guide new investments, operations, and maintenance for long-term resilience.

West Ashley

- **Emerging Sea Island.** Inner West Ashley (approximately within the Mark Clark Expressway/I-526), surrounded by rivers and creeks, includes the highest, best-connected development corridor in the City along Sam Rittenberg Blvd. and will emerge as a new sea island as sea levels rise.
- **Connecting Creeks.** Outer West Ashley will transform into clusters of development surrounded by the expanding Long Branch and Church Creeks.

James Island

- **Transforming Sea Island.** As James Island Creek rises with sea level, it will increasingly connect to the Stono River and reinforce James Island as two distinct land masses. Maybank Highway in the north and Ft. Johnson Road in the south follow ancient dune ridges defining these new island forms. Key roads between them should be raised to maintain access, and communities at the edges will need to plan together to manage more water.

Johns Island

- **Balancing Growth Pressure.** Johns Island's rural character and remaining forested wetlands within the UGB should be protected and conserved, while new development follows the ridge along Maybank Highway. The gently sloping Stono River edge is prioritized and reserved for marsh migration and adaptation over time.

Cainhoy & Daniel Island

- **Building for Future Conditions.** New development should occur with respect for sensitive natural context, including forests and wetlands, and should not become future buyouts.
- **Monitoring Tipping Points.** The Daniel Island drainage system was designed and constructed at one time and performs well under current conditions. Sea level rise may lead to a tipping point in drainage function and should be monitored.

Peninsula

- **Developing a Polder.** For the lower Peninsula, a polder, or raised edge (Battery extension) with interconnected internal stormwater management is proposed to protect the historic city and critical regional infrastructure. All forms of water, including tides, must be managed as an integrated system.
- **Adapting Open Systems.** Communities outside the raised perimeter can adapt by raising roads and buildings while protecting and expanding marsh habitat.

High Ground Marsh Growth & Redevelopment Areas Community Adaptation Areas

Seeing Solutions

What are Water Plan projects?

The projects recommended in the Water Plan span a variety of implementation strategies, scales, and approaches. Some of them comprise multiple smaller projects, including opportunities to take advantage of recently completed City initiatives. Projects are identified across the City, however not all planning areas are subject to the same levels or types of flood risk. There are two types of projects in the Water Plan:

Prototyipcal Projects Concept-level water management solutions targeted for areas of potential flooding identified through conceptual modeling. These solutions represent the full range of Water Plan strategies, from Defend, Adapt, Grow and Reserve to Slow, Store and Drain.

- **Over 100** prototypical projects are identified in the Water Plan.

Feature Projects Collections of prototypical solutions that together form a larger concept or have an impact greater than the sum of their parts. Feature projects were developed through community design workshops and can be implemented over time.

- **Eight** feature projects are identified in the Water Plan.

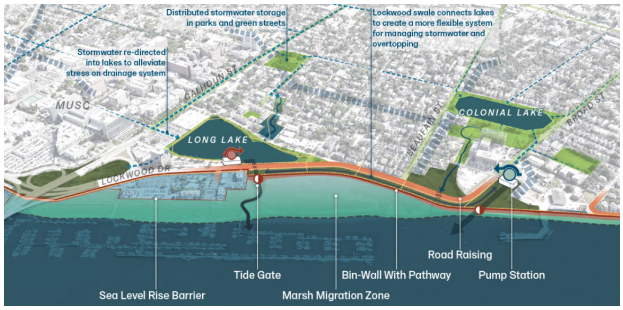
Qualitative Project Selection Criteria

These criteria were distilled through stakeholder dialogue around Water Plan principles. They shape Water Plan projects and help the City set future project targets. All Water Plan projects address criteria in each category.

Flood Protection	1. Provides adaptation pathway for City's 25- and 50 year sea level rise targets. 2. Adaptable to future increases in rainfall volume and intensity. 3. Leverages existing or planned stormwater infrastructure. 4. Factors subsurface soil and groundwater conditions.
Environmental Justice & Accessibility	1. The project directly benefits communities facing significant environmental burdens. 2. The community is involved in defining projects and project benefits. 3. Provides public access to water & nature. 4. Incoporates culture and history of underrepresented communities.
Nature	1. Demonstrates conservation principles (preservation or restoration). 2. Incorporates green infrastructure for water management. 3. Incorporates strategies for water quality enhancement. 4. Anticipates future landscape change and succession.
Community	1. Aligns with existing plans, studies, and/or planned projects. 2. Addresses multiple hazards (heat, social vulnerability, etc.) 3. Stakeholders (and potential stakeholders) are clearly identified. 4. The project will advance data collection and build local knowledge.
Investment	1. Demonstrates a replicable, scalable, or prototypical solution. 2. Potential funding and/or revenue source identified, including eligibility for Federal funding and/or cost share (USACE, CSRM, Tidal/Inland studies). 3. Incorporates an approach to long-term operations and maintenance. 4. Benefits City tax base/future financial viability.

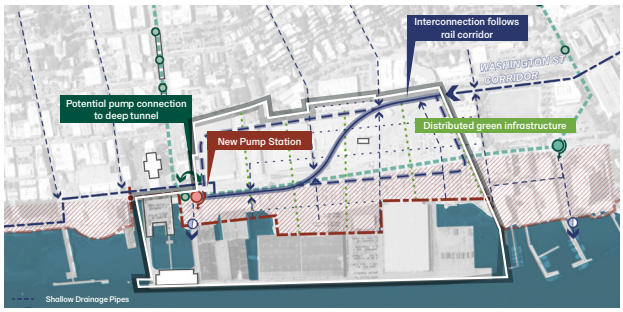
Make Space for Water

Feature Projects



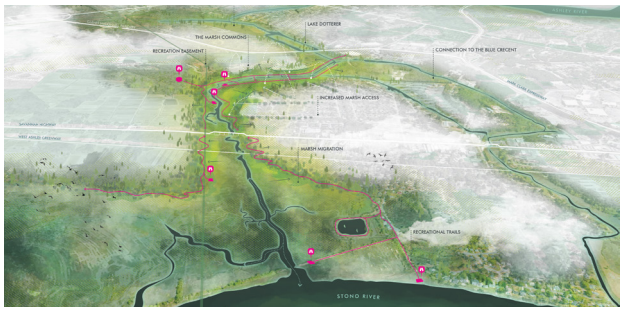
Lockwood Lakes (Peninsula)
Stormwater interconnections to leverage existing assets, shallow and deep.

Newmarket Creek Headwaters (Peninsula)
A neighborhood wetland stormwater park connecting to the future Lowcountry Lowline.



Union Pier Terminal (Peninsula)
A water system framework for future development and Eastside interconnections.

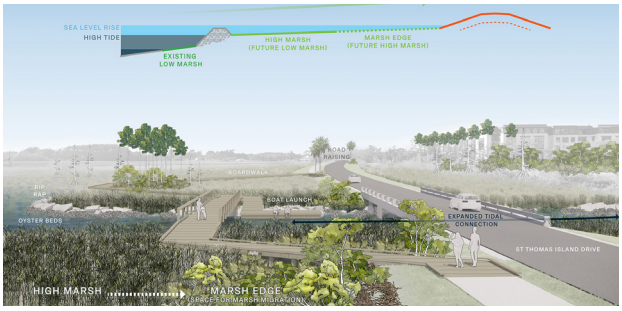
Blue Crescent (West Ashley)
An emergent blue-green network for water and recreation in the heart of West Ashley.



Long Branch Creek Commons (West Ashley)
New public amenities and flood mitigation strategies that migrate with the marsh.

Willow Walk Stormwater Park (James Is.)
A test case to mitigate repetitive flooding at the intersection of multiple jurisdictions.

River Road Resilience (Johns Island)
Targeted road raising and creek restoration to preserve key corridors for people and nature.

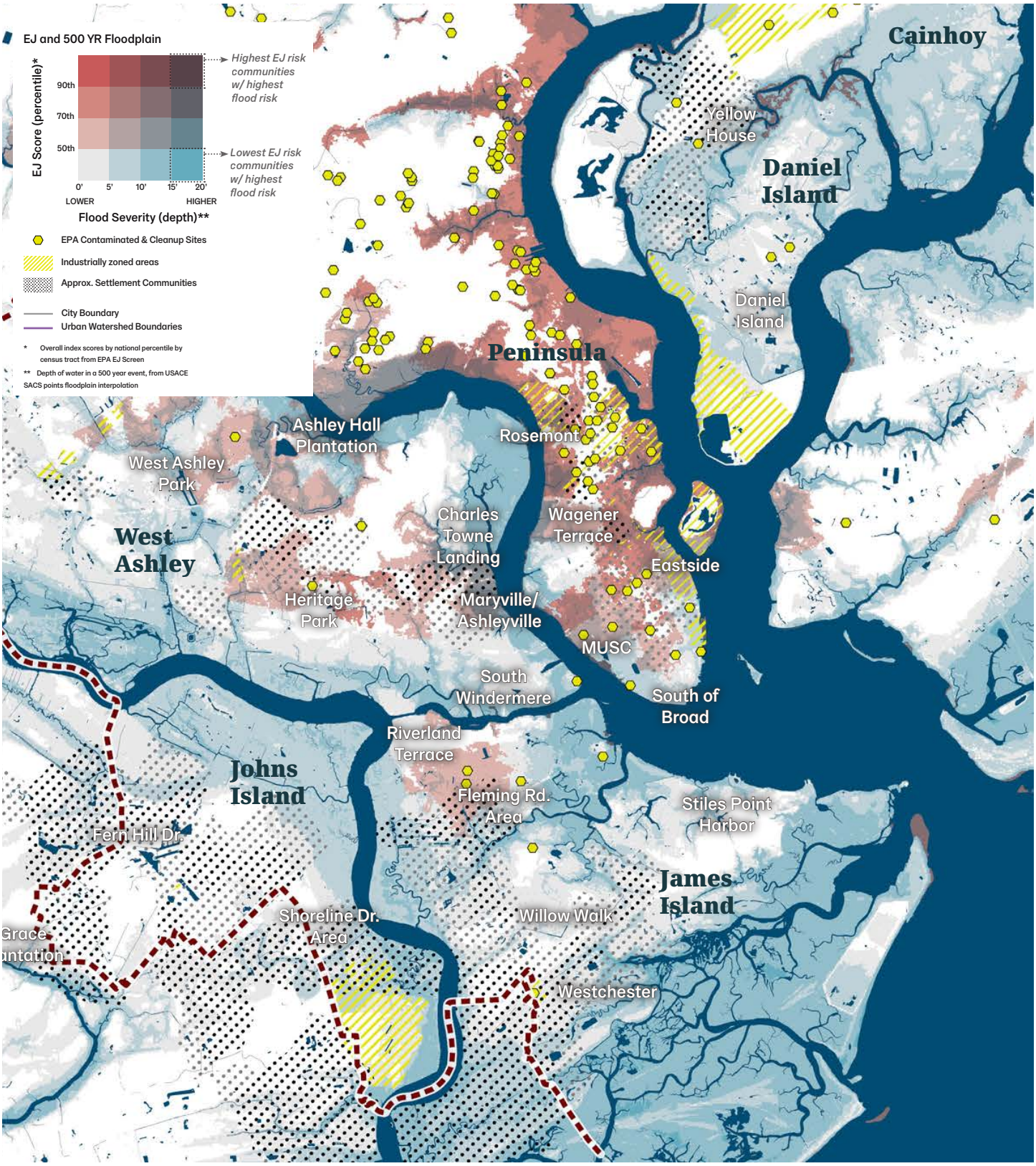


St. Thomas Island Resilience (Cainhoy)
Enabling marsh migration while safeguarding access to Daniel Island.

Change for Good

Flood Risk & Environmental Justice

Flood risk amplifies challenges faced by historically disadvantaged communities. The Water Plan maps intersecting vulnerabilities to help prioritize resources and remediate environmental injustice.



Act Now, Adapt Over Time

How to Use the Water Plan

The Water Plan is Charleston's first City-wide strategy for long-term water management and adaptation, and is intended as a tool to help align immediate and near-term actions with long-term safety, resilience, and value. The Water Plan's policy recommendations and conceptual project ideas build on the City's successes and existing assets to help manage incremental, but transformational, change.

For the City

- To **benchmark successful efforts** to date
- As a **screening tool** for criteria and goal alignment
- To develop **resilient CIPs** (Capital Improvement Program & Projects)
- To inform **policy guidelines** and regulations
- To support **funding strategies** (including federal & state grants)
- To guide long-term **operations & maintenance**

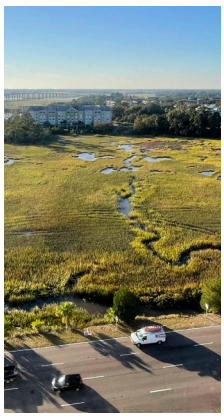
For Communities

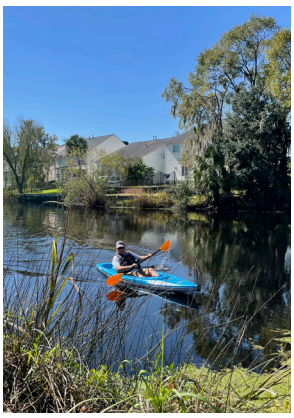
- As **inspiration and motivation** for positive, achievable adaptation
- To understand **risks & opportunities** around water
- To inform individual and collective **actions and advocacy**
- As a starting point for **Community Adaptation Planning** (per basin)

Next Steps

- **Assign responsibilities & track progress**
  - Comprehensive map of City projects & initiatives per basin
  - Adaptive Management program
- **Proceed with partnerships** at the regional, state and federal level
- **Collect & monitor** data to support project development
  - City-wide stormwater & flood risk modeling
  - Multivariate water data collection & monitoring (tide, groundwater, rainfall)
- Project **Scoping, Design & Engineering**

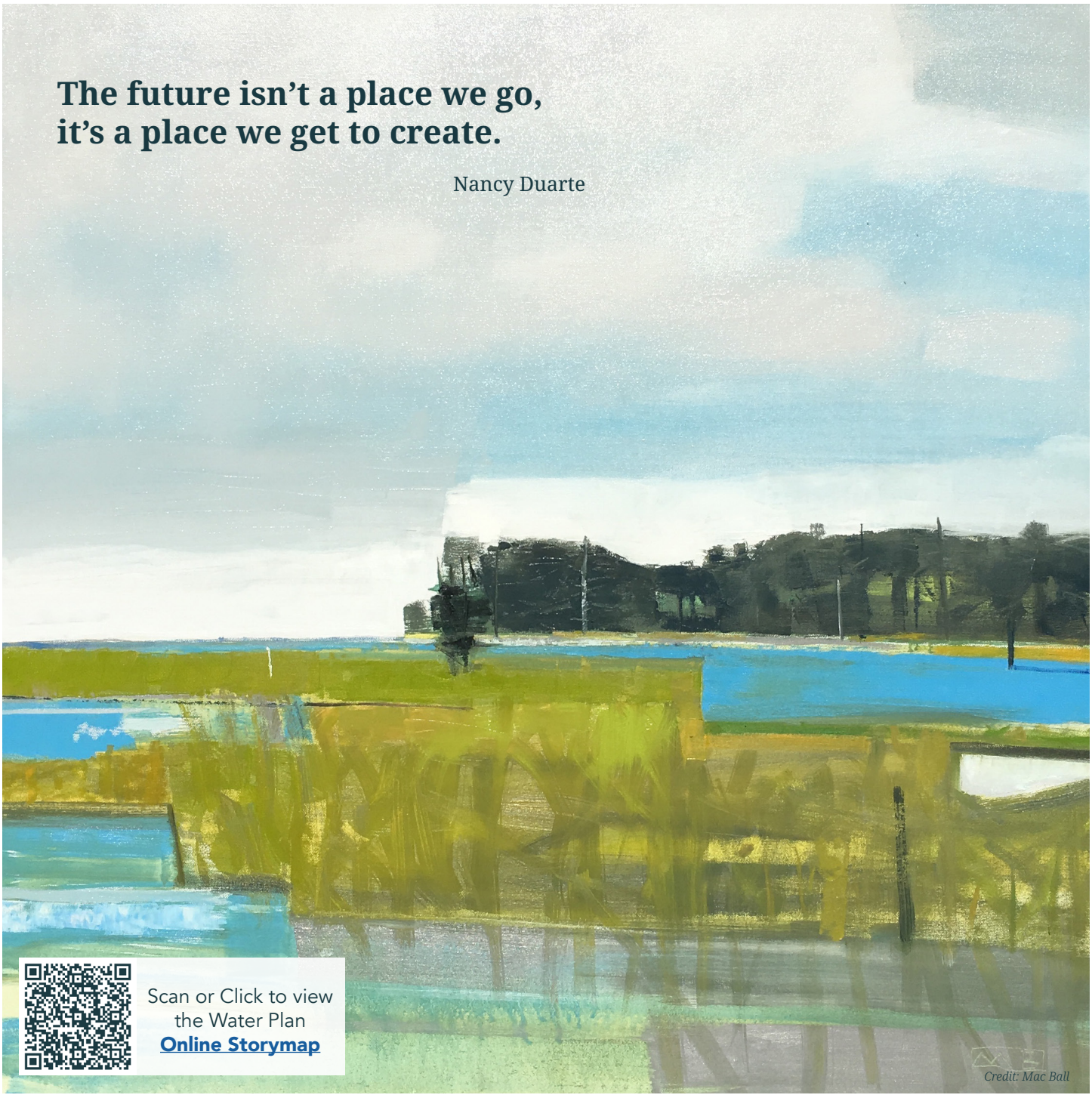






The Charleston Water Plan

A foundational strategy for managing flood risks and embracing water's place in the City's future



Project Team

BLACK & VEATCH · WAGGONNER & BALL A MOFFATT & NICHOL STUDIO · moffatt & nichol · Biohabitats · Community Solutions Consulting