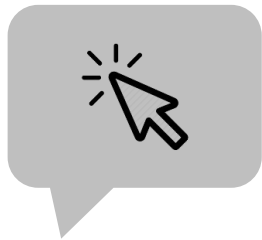




WELCOME TO THE CITY PLAN WATER & LAND FEEDBACK SESSION!

AS YOU JOIN...

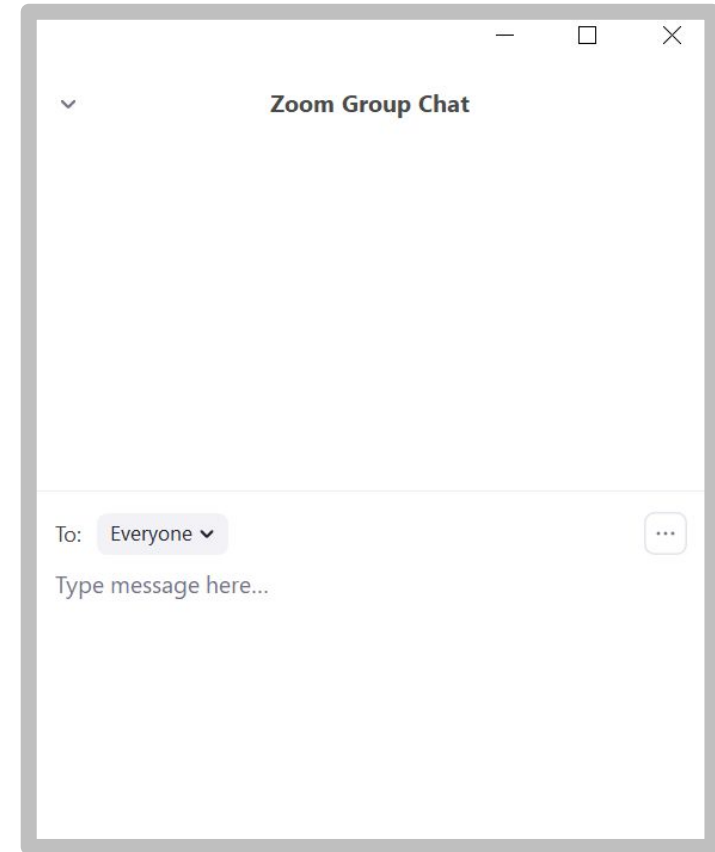


Chat

Open chat and share:

- your name & pronouns (she/her, he/him, they/them)
- your neighborhood/community, and
- Complete this sentence in a few words:
- **“I am here because...**

”





CITY PLAN WATER & LAND FEEDBACK SESSION



VIRTUAL GATHERING REMINDERS

The following reminders help to minimize disruption and ensure a more positive experience for all.



BE PATIENT WITH EACH OTHER AND THE TECHNOLOGY.



KEEP YOURSELF MUTED UNLESS SPEAKING TO MINIMIZE BACKGROUND NOISE.



SINCE WE CAN'T BE TOGETHER IN PERSON, WE ENCOURAGE PARTICIPANTS TO SHARE THEIR VIDEO IF THEY FEEL COMFORTABLE.



FOR THOSE ON THE PHONE – DIAL *9 TO RAISE YOUR HAND AND *6 TO UNMUTE.



FEEL FREE TO USE THE CHAT BOX TO SHARE IDEAS, COMMENTS AND QUESTIONS – ESPECIALLY IF YOU ARE MORE COMFORTABLE WRITING THAN SPEAKING.



WE WANT TO HEAR FROM AS MANY OF YOU AS POSSIBLE. PLEASE BE MINDFUL OF HOW MUCH TIME YOU ARE SPEAKING.



TODAY'S AGENDA

WELCOME: WHY WE'RE HERE

QUESTIONS/THOUGHTS

INTRODUCTION TO THE WATER & LAND ANALYSIS

QUESTIONS/THOUGHTS

WATER & LAND ANALYSIS KEY FINDINGS

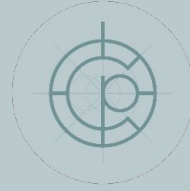
QUESTIONS/THOUGHTS

SELECT DRAFT RECOMMENDATIONS

DISCUSSION

QUESTIONS/THOUGHTS

CLOSING & UPCOMING ENGAGEMENT ACTIVITIES



INTRODUCTION TO WATER & LAND ANALYSIS



COMMUNITY INPUT: Defining the Problem

20% responded their home or property has been damaged by flooding in the past.

*This percentage was **3-5 points higher** among youth, tenants and lower-income respondents.*

78% responded they are somewhat or very concerned about their home or property being impacted by flooding in the future.

Responses were roughly split **40/40** between those who have and haven't taken actions to protect their home from flood damage (**15%** not applicable).

*The percentage of those who have taken actions was **10 points lower** among youth and tenants. The percentage of 'Not Applicable' was roughly **double** for Black/African-American respondents, lower-income respondents, youth and tenants*

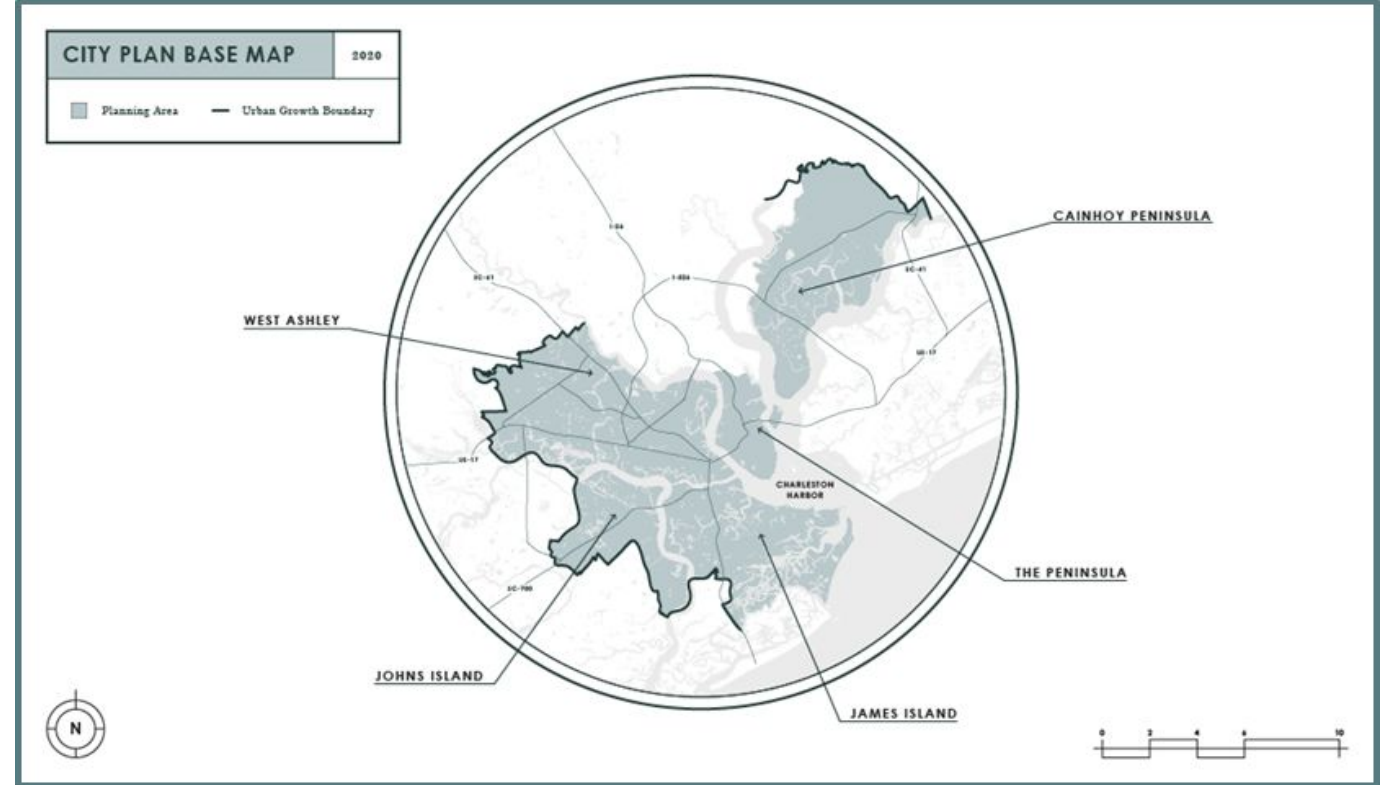
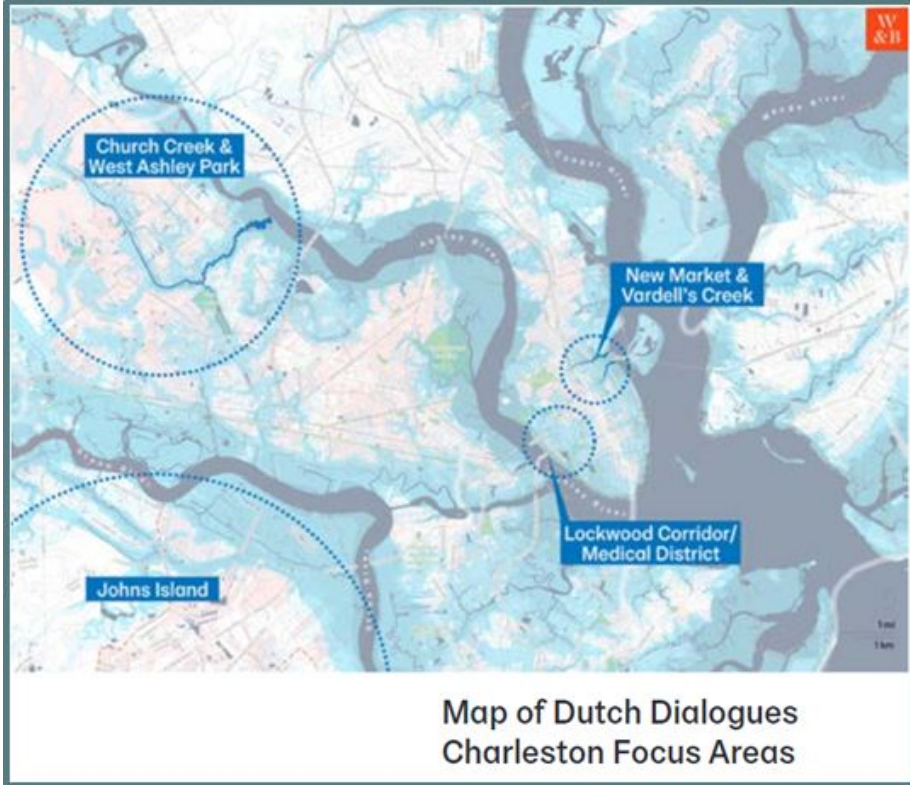


**WATER
FIRST**

*anchored in where water
is and where water is
going to be*

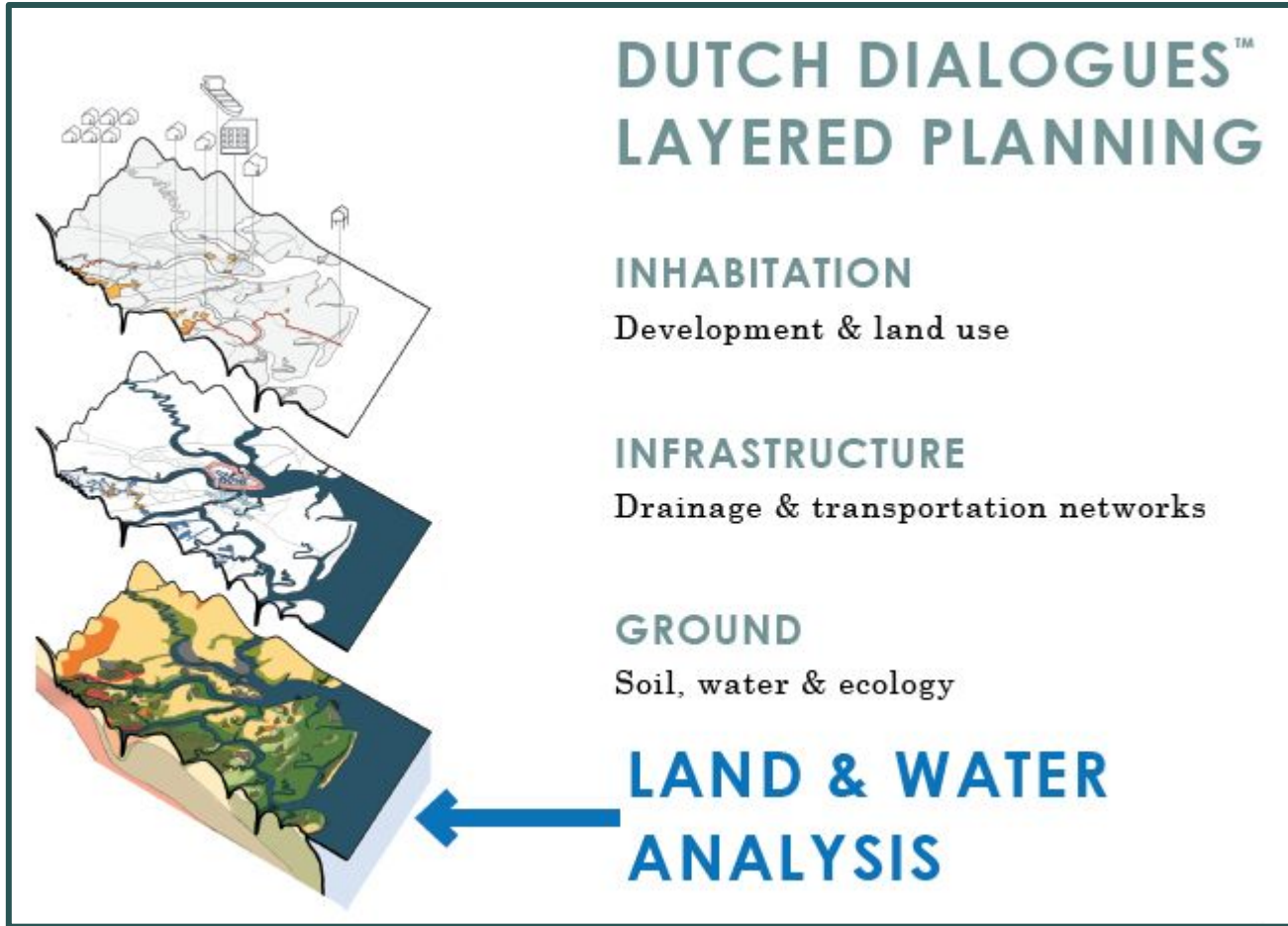


CITYWIDE ANALYSIS





LAND & WATER ANALYSIS



The City Plan will guide development and planning decisions for the next 10 years, primarily through recommendations for land use (*inhabitation*) and guiding priority investments for improved drainage and transportation networks (*infrastructure*).

The piece we were missing was the **Land and Water Analysis**, which provides a technical understanding of the relationship between Charleston’s landscape and its current and future flooding challenges related to sea level rise and climate change.

The Land & Water Analysis was completed by Waggoner & Ball, the Water Institute of the Gulf, Robinson Design Engineers and Surculus Design.



SUPPLEMENTAL EFFORTS

SECOND EDITION

Flooding and Sea Level Rise STRATEGY

Charleston SOUTH CAROLINA

FEBRUARY 2019

Dutch Dialogues™ Charleston

September 2019

WAGGONNER & BALL THE WATER INSTITUTE OF THE GULF Kingdom of the Netherlands

City of Charleston Stormwater Design Standards Manual Update 2020

Develop to Mimic Natural Systems

Restrict Release of Additional Water

Design for Bigger Rainstorms

Prevent Poor Use of Fill

Design for Future Sea Level Rise

Incentivize Green Infrastructure

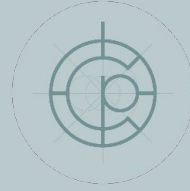
Add Standards Appropriate for Small Sites

Add Special Rules for Areas with Flooding

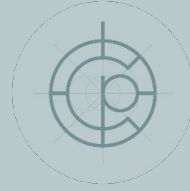
And...

All Hazards Vulnerability & Risk Assessment

USACE Peninsula Flood Risk Management Study



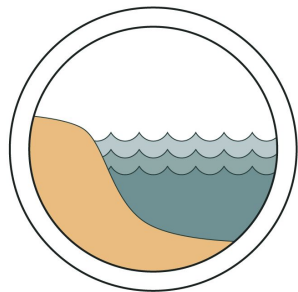
QUESTIONS/THOUGHTS?



KEY FINDINGS (CITYWIDE)



DIFFERENT TYPES OF FLOODING REQUIRE DIFFERENT STRATEGIES.

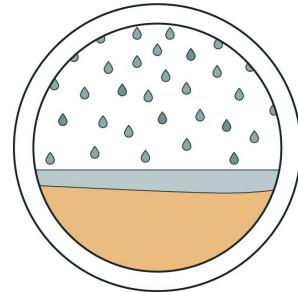


TIDAL

Where and how much development should occur.

As sea level rises, high tides will reach further inland and the marsh will begin to migrate inward.

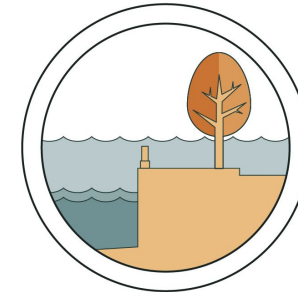
Development in low-lying areas will be increasingly vulnerable to regular tidal flooding and marsh migration.



RAINFALL

What type of design and infrastructure

Heavy rain incidents (rain bombs) are increasing in frequency with climate change. Rainfall-related flooding can be prevented with resilient design and infrastructure - which will vary depending on elevation and other conditions.



STORM SURGE

Which adaptation and defense strategies.

Surge-related flooding happens less often but can be highly destructive. Lower-lying areas are the most vulnerable. In addition to avoiding low-lying areas, damage from storm surge can be mitigated through a variety of adaptation and defense strategies.

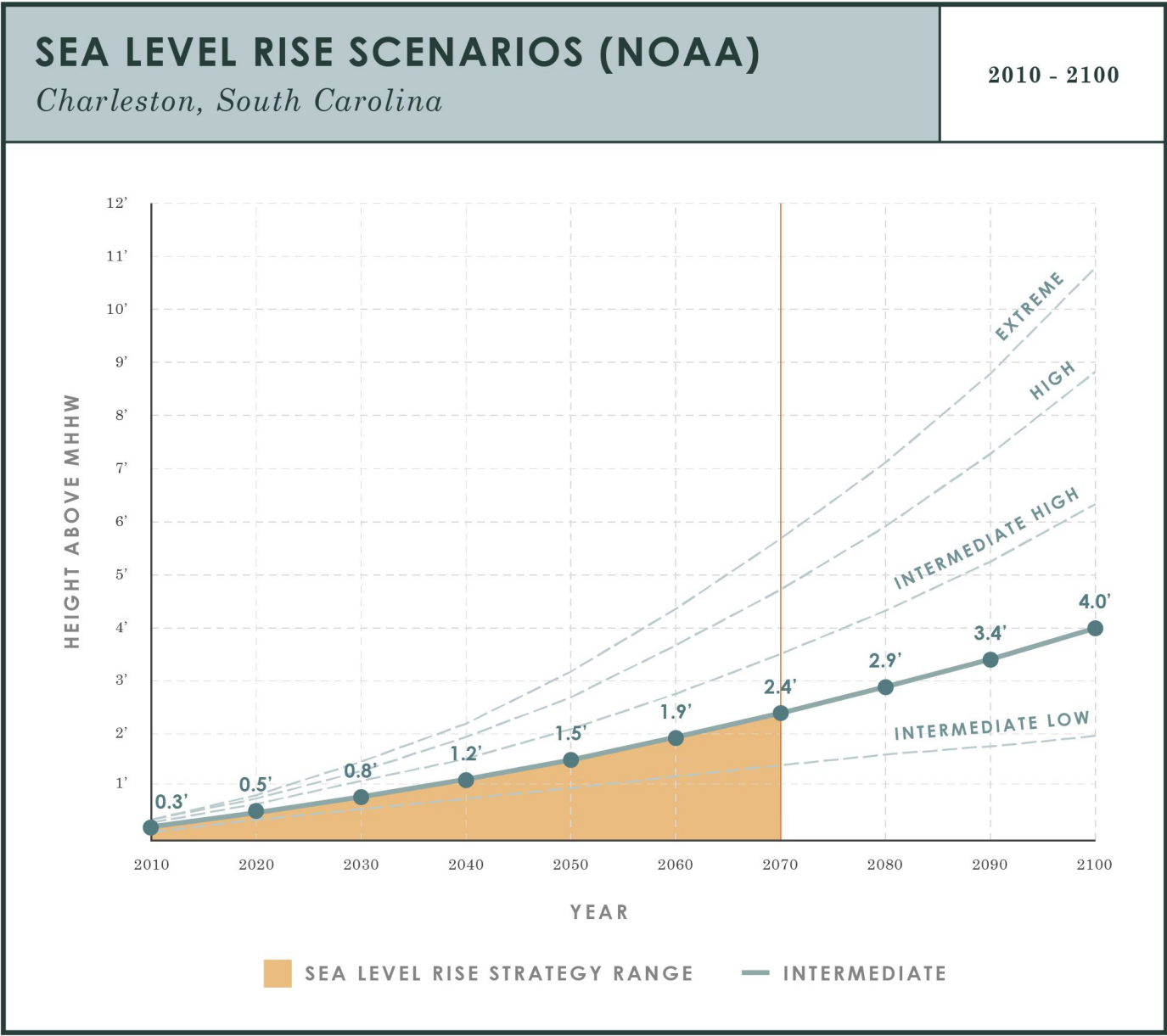
In Charleston, it's possible for an area to experience all three at the same time. Many areas of the city may experience compound flooding, a combination of flooding from high tides and rainfall (and associated run-off).



SEA LEVEL RISE

The timeline of this analysis is based on a 50-year (2020-2070) intermediate sea level rise scenario: 1.9 feet by 2070, and 3.6 inches in the next 10 years.

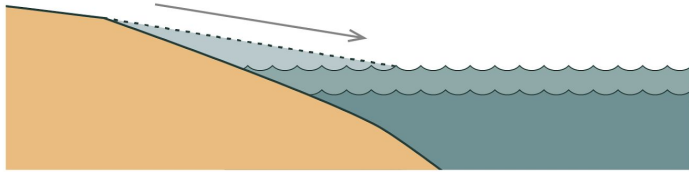
A tide above 7 feet in Charleston causes tidal flooding. In this scenario, 7-foot tides will become the average daily high tide by 2040.





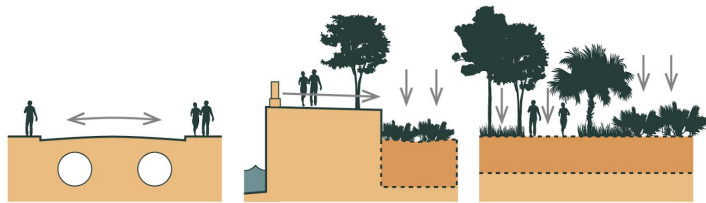
BEYOND ELEVATION

Though low-lying areas are certainly more vulnerable to tidal flooding and storm surge; other site-specific conditions can contribute to the intensity, frequency and impact of flooding.



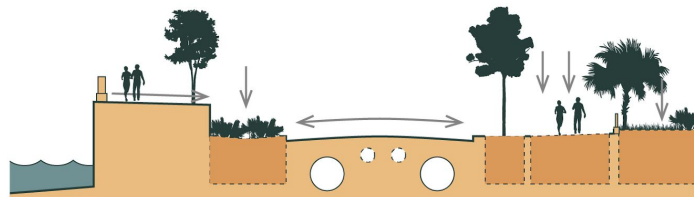
WATERSHED TYPES

determine how far water needs to travel to drain and how much tidal influence. The city is composed of 94 unique watersheds and 197 subwatersheds and each handles water differently.



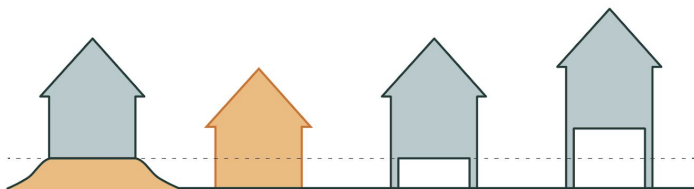
SOILS & VEGETATION

determine how well the landscape can absorb water.



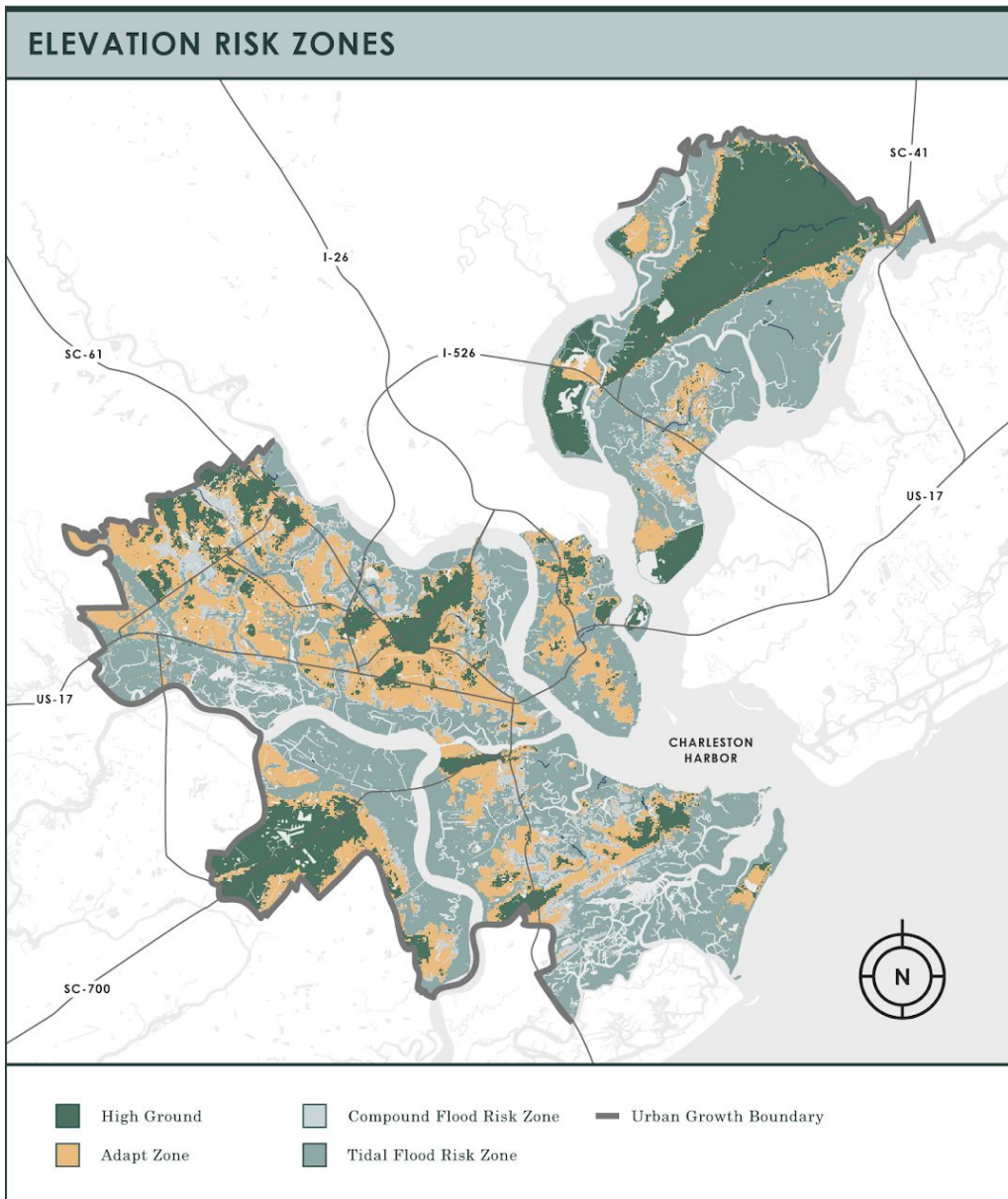
INFRASTRUCTURE

determines the capacity and efficiency of drainage systems and protective structures.



VULNERABILITY

signifies the amount of buildings and structures in harm's way.



HIGH GROUND

High ground is defined as land outside of the FEMA 100 year floodplain and above the NOAA max category 3 storm surge. *High ground has the lowest flood risk and stormwater detention here has the greatest watershed benefit.*

ADAPT ZONE

The adapt zone consists of land outside of the FEMA 100 year floodplain that is still within the NOAA maximum storm surge of a category 3 hurricane. *Rain and storm surge flooding in this zone is infrequent but not impossible.*

COMPOUND FLOOD RISK ZONE

This zone encompasses areas within the floodplain above the tidal flood risk zone where *flood risk comes from a mixture of rainfall, runoff and tidal conditions.*

TIDAL FLOOD RISK ZONE

This zone encompasses the lowest land in Charleston. Nearly 100% of this zone is in the 100 year floodplain. *Flooding is frequent and can come solely from tidal events independent of precipitation. Sea level rise driven marsh migration occurs in this dynamic zone.*



DEFENDING THE PENINSULA

*The Charleston Peninsula is unique due to its existing and future barrier protections under study; requiring a **tailored approach to elevation-based land use recommendations** for the peninsular area.*

*The City, in partnership with the Army Corps of Engineers, is **studying a barrier protection approach** to this area.*

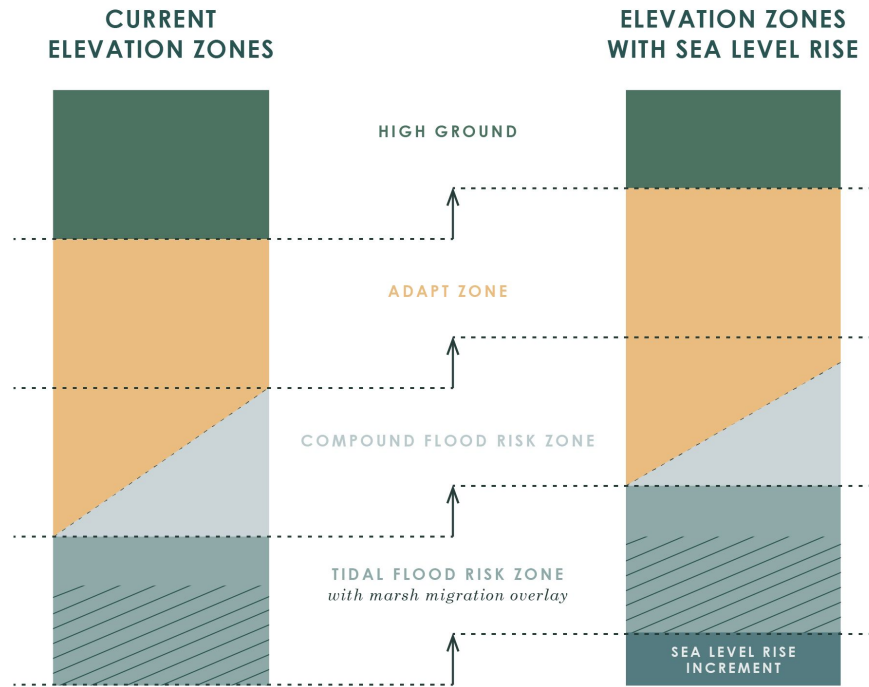




SEA LEVEL RISE & MARSH MIGRATION

ELEVATION ZONES & SEA LEVEL RISE

The elevation zones shift upwards with sea level rise. By defining risk in terms of elevation, risk mitigation strategies can be adapted to future sea level rise scenarios.



RISK ZONES SHIFT UP WITH SEA LEVEL RISE
Zones may not shift evenly depending on drainage conditions

MARSH MIGRATION: WHAT TO EXPECT



MARSH MIGRATION is when the existing marsh gradually shifts inland onto previously dry land as a result of sea level rise.



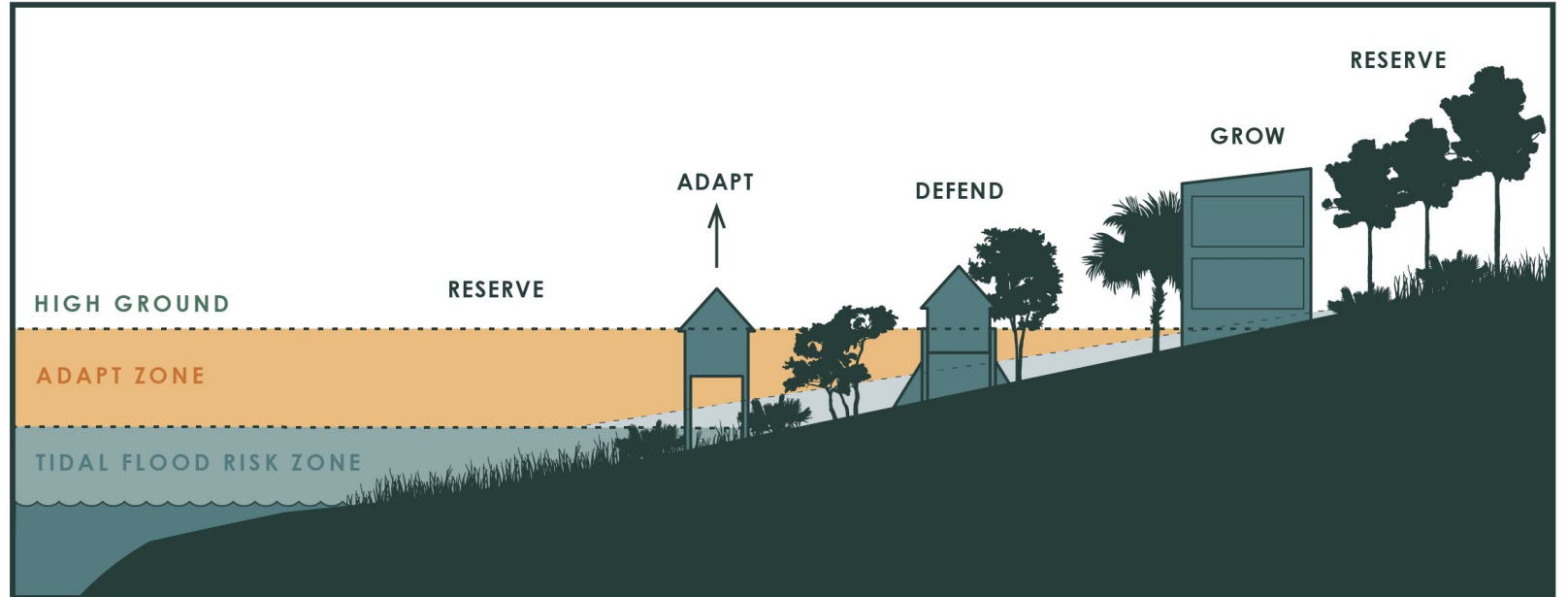


PLANNING STRATEGIES

A combination of planning strategies should be applied in all land use categories to reduce impacts of flooding and sea level rise and increase resilience.

Site-specific conditions such as *watershed type, soils and vegetation, infrastructure and vulnerability* should inform which combination of planning strategies is most appropriate.

These strategies can be primarily implemented through *zoning, stormwater regulations and other policy tools.*



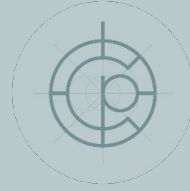
PLANNING STRATEGIES

ADAPT Retrofit vulnerable existing infrastructure to be resilient to water risks. Raising structures reduces risk with limited to no increase in watershed sensitivity. However, adaptive capacity is limited by building typology.

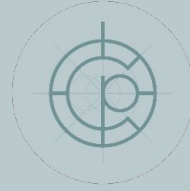
RESERVE Restore and preserve natural ecosystems. Reserve is applicable to all zones and should factor future change. Ecosystems providing stormwater benefits and essential wildlife habitats exist throughout Charleston and should be preserved.

GROW Responsibly increase development and population density. Growth makes the most sense in areas with low sensitivity and low risk. Growth must occur in tandem with water management.

DEFEND Protect buildings and infrastructure with engineered measures such as berms, flood walls and pumps. Defensive measures should be reserved for areas with the highest risk and lowest sensitivity (e.g. where the displacement of floodwater will not exacerbate risk elsewhere).



QUESTIONS/THOUGHTS?

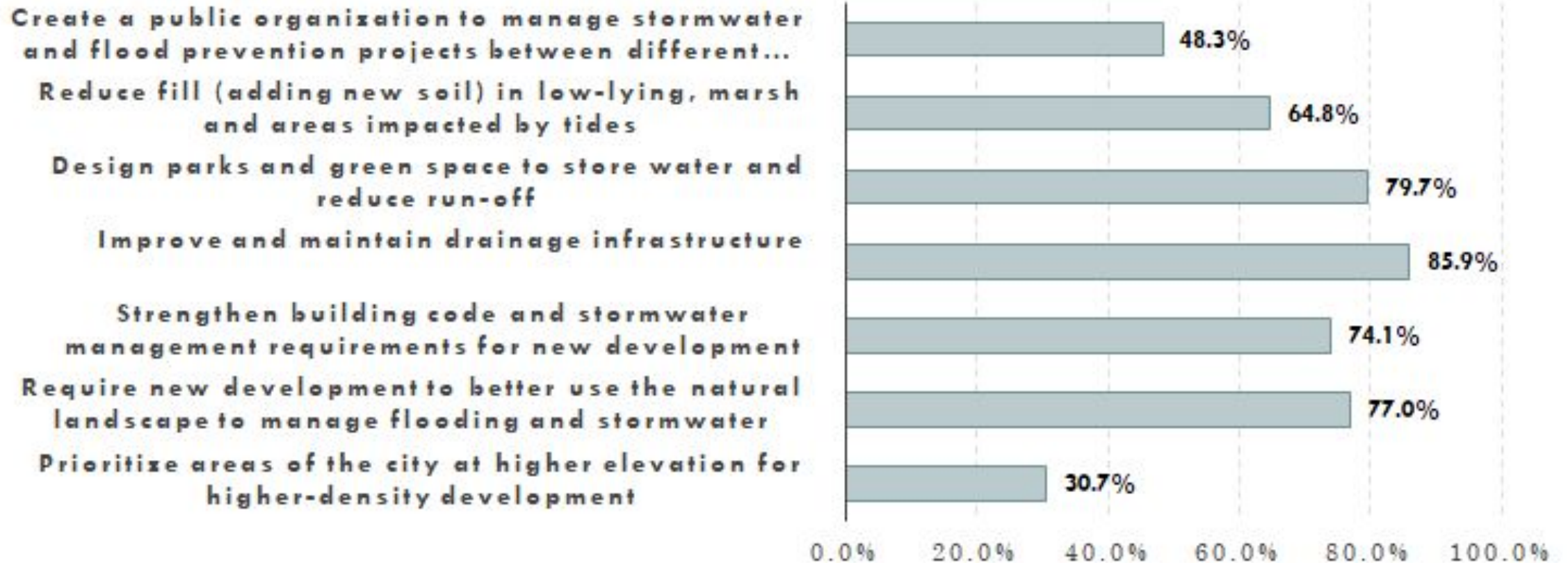


SELECT DRAFT RECOMMENDATIONS



COMMUNITY INPUT: Survey Results

THE RECENT DUTCH DIALOGUES STUDY ADOPTED BY CITY COUNCIL RECOMMENDED A VARIETY OF STRATEGIES TO DECREASE IMPACTS OF FLOODING AND BETTER MANAGE WATER. WHICH OF THE FOLLOWING STRATEGIES WOULD YOU SUPPORT?





COMMUNITY INPUT: *Land Use*

1. **Restrict development in low-lying areas**; reserve new development for higher elevations.
2. Encourage infill and redevelopment to conserve and **protect existing marsh, wetland, and coastal forests**.
3. Protect pre-development hydrology (**natural water management systems**). Reduce practice of fill-and-build as much as feasible.
4. Incentivize and require when possible **more green infrastructure** in new development (ex: pervious surfaces, rain harvesting, preservation of green space and trees).
5. **Mitigate additional cost burden** of heightened regulations to prevent impact on affordability.
6. Streamline **elevation approval** in historic district.
7. **Update zoning ordinance** to be based on elevation and flood risk, as well as projected sea level rise.



WATER ANALYSIS IMPLICATIONS FOR LAND USE

Future Land Use maps follow the below guideposts, based on the results of the Water & Land Analysis:

Reserve higher intensity land use categories for the High Ground zones.

Assign lowest-impact land use categories such as conservation and parks to the majority of areas within the Tidal Flood Risk zone.*

Everywhere in between these two zones can accommodate all mid- to low-intensity land use categories, with the appropriate site-specific planning and mitigation strategies.

**The peninsula of Charleston is unique due to its existing and future barrier protections under study; requiring a tailored approach to elevation-based land use recommendations for the peninsular area.*



SELECTED DRAFT PLAN RECOMMENDATIONS: *Land Use*

1. Make **best use of high land** around the city for residential, commercial and mixed use development, **especially areas around current or future public transit corridors.**
2. **Reduce densities on low ground, and eliminate development in future marsh migration areas.** Adapt and defend structures currently in these areas wherever feasible.
3. Strategies for **middle ground require additional study.** Development in these areas will depend on **analysis of individual drainage basins and stormwater easements.**
4. Underscore responsibility of **effective water management on higher ground** of the city to better protect middle and lower ground downstream.
5. Encourage use of **green stormwater infrastructure** including clusters of trees, use of pervious surfaces, green roofs, etc.



COMMUNITY INPUT: *Natural Resources*

1. **Preserve valuable natural ecosystems and wildlife** to improve quality of life and mitigate flooding. (Marsh rehabilitation, acquisition of vulnerable undeveloped land, conservation easements).
2. Increase **access citywide to clean and healthy green space and water**. Increase equitable access to fresh and affordable food and encourage urban gardens.
3. Protect the greenbelt surrounding the city and enforce the **Urban Growth Boundary (UGB)**.
4. For future infrastructure projects, focus on **natural solutions rather than structural** (like natural reefs, planting trees and vegetation, building/restoring canals).
5. **Prioritize most impacted and historically disadvantaged communities and older communities.**
6. Ensure ongoing and **improved communication and engagement with residents**, specifically in underserved areas, about efforts to address flooding, mitigation measures, environmental issues; and to prevent displacement.



SELECTED DRAFT PLAN RECOMMENDATIONS: *Natural Resources*

1. Implement recommendations of the **Trees to Offset Stormwater study** including updating the city’s tree protection ordinance to preserve clusters of trees during the development process, track and increase tree canopy percentages around the city, and prioritize underserved areas or areas with aging inventory for tree planting.
2. Continue to promote natural resource planning and zoning policies that align with the “living with water approach” outlined in the **Dutch Dialogues: Charleston study**, including encouraging the use of green infrastructure such as bio-swales, porous pavements, rain gardens, and wetland buffers.
3. Plan and develop land use strategies to account for **marsh migration** due to sea level rise and the necessary **wetland buffers** associated with new marshland.



SELECTED DRAFT PLAN RECOMMENDATIONS: *Natural Resources*

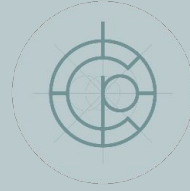
4. Support **land conservation around the edges of the Urban Growth Boundary (UGB)**, specifically along the Brownswood Road corridor and south of Cane Slash and Plow Ground Roads on Johns Island and along southern parts of Folly Road on James Island, as well as areas adjacent to the UGB in West Ashley and the Wando area on the Cainhoy Peninsula.
5. Continue to provide and expand the parks system to include large and small parks and promote equitable access and **safe alternative connectivity to green spaces and water around the City.**
6. Develop policies that amplify **environmental justice considerations** in land use and natural resources planning.



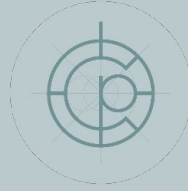
COMMUNITY INPUT: Other

THESE IDEAS WILL BE ADDRESSED IN OTHER PLAN ELEMENTS SUCH AS RESILIENCY AND PRIORITY INVESTMENT

1. Address the **root cause of sea level rise and climate related disasters** through more sustainable and energy efficient building practices; weatherization programs; facilitation of solar panel installation; and transportation planning to encourage fewer car trips.
2. Invest in citywide solar energy grid/other types of **renewable energy**.
3. Create an **interconnected water plan** for the City, including requirements for new capital projects and public spaces to include stormwater management features and green infrastructure.
4. Increase **regional collaboration** to improve existing drainage infrastructure and ensure improved and more consistent maintenance.



GROUP DISCUSSION



DISCUSSION SHARE OUT



STOP BY IN PERSON TO PROVIDE FEEDBACK

OPEN HOUSE FRIDAYS

EVERY FRIDAY IN APRIL 9:00 AM TO
5:00 PM.

2 George St, in the public meeting
room (across from the Permit Center)

(The April 23rd open house will end
early at 3:00 pm for the Commission
on Disability Issues)

FIND OUT MORE AT:
[CHARLESTONCITYPLAN.COM/CALENDAR](https://charlestoncityplan.com/calendar)

CITY PLAN POP-UPS

WANDO AND DANIEL ISLAND

Pop-up: Monday, April 12, 3:30 p.m. to 6:30 p.m.
Keith School Museum, 1509 Clements Ferry Rd

WEST ASHLEY

Pop-up: Saturday, April 17, 11:00 a.m. – 2:00 p.m.
St. Andrews Middle School, 721 Wappoo Rd

JAMES ISLAND

Pop-up: Tuesday, April 20, 3:30 p.m. – 6:30 p.m.
Baxter Patrick James Island Library, 1858 S
Grimball Rd

JOHNS ISLAND

Pop-up: Saturday, April 24, 11:00 a.m. – 2:00 p.m.
Haut Gap Middle School, 1861 Bohicket Rd

PENINSULA

Pop-up: Wednesday, April 28, 3:30 p.m. – 6:30
p.m.
Arthur Christopher Community Center, 265
Fishburne St



JOIN VIRTUALLY TO GIVE FEEDBACK

SPECIAL TOPIC

HOUSING ANALYSIS

Monday, March 29, 6:00 p.m. to 7:30 p.m.

WATER & LAND ANALYSIS

Wednesday, March 31, 6:00 p.m. to 7:30 p.m.

REGISTER ON ZOOM AT:
CHARLESTONCITYPLAN.COM/CALENDAR

BY AREA

WANDO AND DANIEL ISLAND

Wednesday, April 14, 6:00 p.m. to 7:30 p.m.

WEST ASHLEY

Monday, April 19, 6:00 p.m. – 7:30 p.m.

JAMES ISLAND

Thursday, April 22, 6:00 p.m. – 7:30 p.m.

JOHNS ISLAND

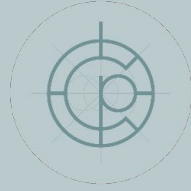
Monday, April 26, 6:00 p.m. – 7:30 p.m.

PENINSULA

Thursday, April 29, 6:00 p.m. – 7:30 p.m.



QUESTIONS?



THANK YOU FOR YOUR PARTICIPATION!

LET US KNOW HOW WE'RE DOING!

**TAKE 1-MINUTE ANONYMOUS SURVEY BEFORE YOU
LEAVE. *LINK IN CHAT.***