

July 3, 2024

TO: Nantucket Conservation Commission

FROM: Burton Balkind, President for the Nantucket Coastal Conservancy

RE: The Public Beach Below the Bluff in Sconset

COPY: Jeff Carlson and Will Dell'Erba, Nantucket Select Board, Coastal Resilience Advisory Committee (CRAC)

We are increasingly concerned about the state of the public beach below the bluff in Sconset.

Since the Conservation Commission is Nantucket's regulatory body charged with upholding both the local Wetland Bylaw and the State Wetlands Protection Act, both of which protect our island's wetland resources including coastal beaches, we respectfully request that you take immediate action to address this situation.

As you know, the stretch of shoreline below the bluff (parcels 48 8 and 49 9) is a legacy to the citizens of Nantucket from the Proprietors. Because of the installation of the geotube coastal engineering structure (CES) on the beach in 2013 (a temporary measure necessitated to abate an emergency which immediately destroyed a third of the beach), and the subsequent lack of mitigation, maintenance, and monitoring, our beach is slowly but surely eroding away. In fact, [one expert stated \(in November 2022\), that given the current rate of erosion, the beach seaward of the geotubes will be completely lost within ten years.](#)

Three years ago, on June 30, 2021, the Conservation Commission found that the project had failed and [voted to issue a removal order for the geotubes.](#) In September of 2022, [the removal order was upheld in Superior Court.](#) The permit issued by the ConCom for the installation has since expired, as has the license issued by the Town to the permit holder.

Yes, we are aware that the original permit holder (private property owners on Baxter Road), as well as the Town, have applied to expand the geotubes four-fold and that you are in the midst of the public hearing on that application.

However, the new application for expansion does not obviate your responsibility to do what is necessary to protect the coastal beach in question. Action is needed. No one of us wants our legacy to be the disappearance of this beach, do we? Please put this matter on an agenda for an upcoming meeting. Thank you.

ATTACHMENTS (4): Photos of Sconset Beach before the geotubes. Taken by Sharon Van Lieu.





New Tools for Visualizing, Communicating, and Assessing Sea Level Rise and Coastal Flood Risk

Nantucket Coastal Resilience Advisory Committee

July 23, 2024









MODELED
VISUALIZATION

5 ft. above ground level
Water Height: 8'-4" above MSLW
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**MODELED
VISUALIZATION**

5 ft. above ground level
Water Height: 8' 2" above MSLW
© 2023 Climate Central





MODELED VISUALIZATION

2 ft. above road level
Water height: 8' 5" above MHW
© 2024 Climate Central



MODELED VISUALIZATION

5 ft. above road level
Water height: 11' 0" above MHHW
© 2024 Climate Central

Climate Central Projects and Resources - Sea Level Rise Program



FloodVision®



Edge of America
Tour



Coastal Risk
Screening Tool

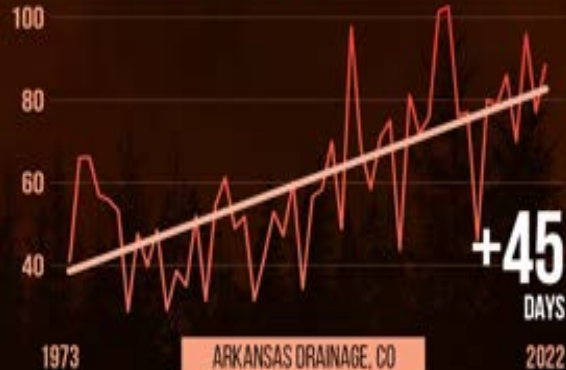


Risk Finder

Climate Matters Program

FIRE WEATHER DAYS

Change in hot, dry, windy days



Arkansas Drainage (1973-2022) shows an increase in the number of hot, dry, windy days. Data source: NOAA National Climatic Data Center.

CLIMATE CO CENTRAL

NIGHTTIME TORNADOES

% of all tornadoes, 1950-2019



Percent of all tornadoes (1950-2019) that occurred between sunset and sunrise. Source: NOAA National Climatic Data Center.

CLIMATE CO CENTRAL

MAJOR U.S. POWER OUTAGES

WEATHER-RELATED, 2000-2023



Number of major weather-related power outages (100+ people without power for 2+ hours). Source: FEMA, National Weather Service, and others.

CLIMATE CO CENTRAL

City

Type a city name

Date

• Today •

● Single date
● Multi-day average

Select type of map:

Climate Shift Index

> Advanced settings

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climate data email

Based on NOAA GFS forecast
generated on 2024-06-
24T18:00Z.

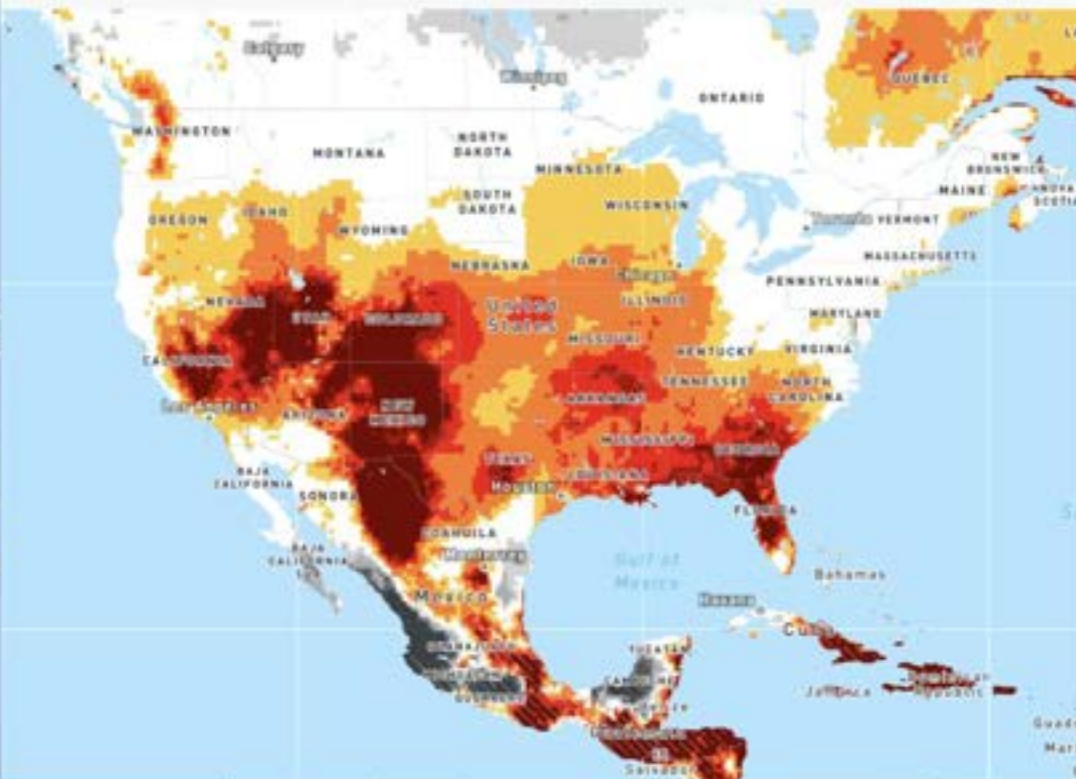
Climate Shift Index

Learn more...
for average temperatures, Jun 25, 2024

Change in likelihood due to climate change



Statistical uncertainties



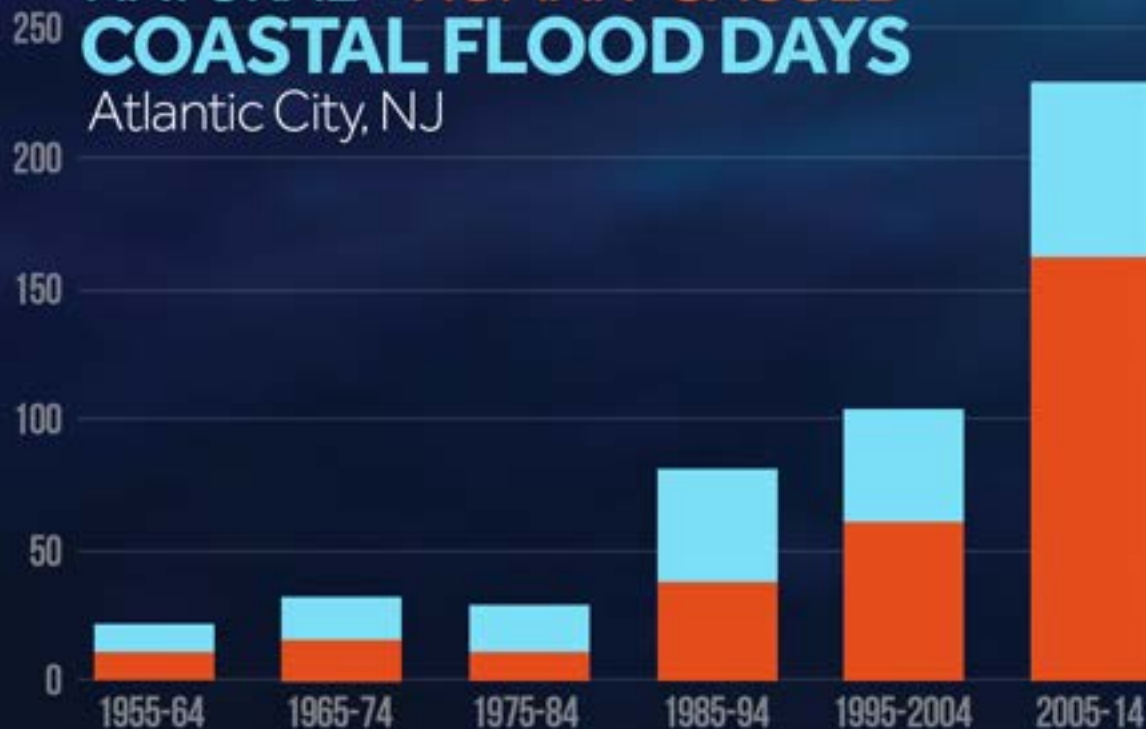
CSI Level	Interpretation
0 No effect	The influence of climate change is not detectable.
1 Moderate	Climate change made the conditions at least 1.5 times more likely.
2 Strong	Climate change made the conditions at least 2 times more likely.
3 Very Strong	Climate change made the conditions at least 3 times more likely.
4 Extreme	Climate change made the conditions at least 4 times more likely.
5 Exceptional	Climate change made the conditions at least 5 times more likely.
-1 Moderate	Climate change made the conditions at least 1.5 times less likely.
-2 Strong	Climate change made the conditions at least 2 times less likely.
-3 Very Strong	Climate change made the conditions at least 3 times less likely.
-4 Extreme	Climate change made the conditions at least 4 times less likely.
-5 Exceptional	Climate change made the conditions at least 5 times less likely.

What's happening in the hatched areas labeled "Statistical uncertainties"?

csi.climatecentral.org

NATURAL + HUMAN-CAUSED COASTAL FLOOD DAYS

Atlantic City, NJ



Orange shows human-caused global sea level rise effects.
Must top NWS 'nuisance' thresholds.

Source: Kopp et al. 2016 (PNAS), NOAA, & Climate Central

CLIMATE  CENTRAL

CLIMATE & ENVIRONMENT

Climate change added \$8 billion to Superstorm Sandy's damages, study says



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Study: Climate change to blame for \$8 billion of Hurricane Sandy damages

A decade on, scientists find rising seas pushed flooding into the homes of 75,000 more people.



Flood Vision program aims to bring a new perspective on water level rise in Jacksonville

A look at a new program from Climate Central sets a better perspective on sea level rise in Jacksonville.



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These Days When It Rain It Pours - How Climate Change Is Increasing Local Flooding Risks

by Chief Meteorologist Steve LaPointe | Tue, May 21st 2024 at 7:00 AM

Updated Tue, May 21st 2024 at 1:41 PM

Devastating floods leave Detroiters with toxic mold



by Michael Gerstein, Climate Central and Jena Brooker

September 29, 2023 4:45 am



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BridgeDetroit is powered by generous support from the Knight, Ford, Skillman, Kresge, Wilson, McGregor, and Hudson Webber foundations, and the Community Foundation for Southeast Michigan.





Edge of America (EOA) Tour: FloodVision®



Edge of America (EOA) Tour: Groundbreaking Expedition from Maine to Texas





Floodvision Interface

[Home](#)[Gallery](#)[Bulk rendering](#)

Ft. above road level

MHHW (ft.)

NOAA 2022 Projections

IPCC 2021 AR6 Projections

Nantucket

Search



[Copy clip to G Drive](#)

movie length [s] 30

1 Main St, Nantucket, MA 02554, USA

Receiver level: 12.1 ft, road level: 3.6 ft



[Render Driver Side](#)

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[Add to rendering queue](#)







MODELED VISUALIZATION

NOAA 2022 intermediate high sea level rise
scenario for 2050 + 1% annual chance flood
0' 10" above road level

Water height: 5' 3" above local high tide line
© 2024 Climate Central





MODELED VISUALIZATION

NOAA 2023 intermediate-high sea level rise (slr) scenario for 2050 + 1% annual chance flood
2' 10" above road level
Water height: 0' 3" above local high tide line
© 2024 Climate Central





MODELED VISUALIZATION

NOAA 2022 intermediate-high sea level rise
scenario for 2050 + 1% annual chance flood
4' 4" above road level

Water height: 5' 3" above local high tide line
© 2024 Climate Central



CLOSED



MODELED VISUALIZATION

NOAA 2022 intermediate high sea level rise
scenario for 2050 + Annual flood
2' 6" above road level
Water height: 2' 3" above local high tide line
© 2024 Climate Central





MODELED VISUALIZATION

NOAA 2023 intermediate-high sea level rise
scenario for 2050 + 1% annual chance flood
2' 7" above road level
Water height: 5' 3" above local high tide line
© 2024 Climate Central

FRANCIS ST.





MODELED VISUALIZATION

NOAA 2020 high sea level rise
scenario for 2100 + 1% annual chance flood
7' 9" above road level
Water height: 10' 4" above local high tide line
© 2024 Climate Central

Massachusetts Coast Flood Risk Model

Zoom in to view Massachusetts Coast Flood Risk Model (MC-FRM) scenarios and community facilities and infrastructure.

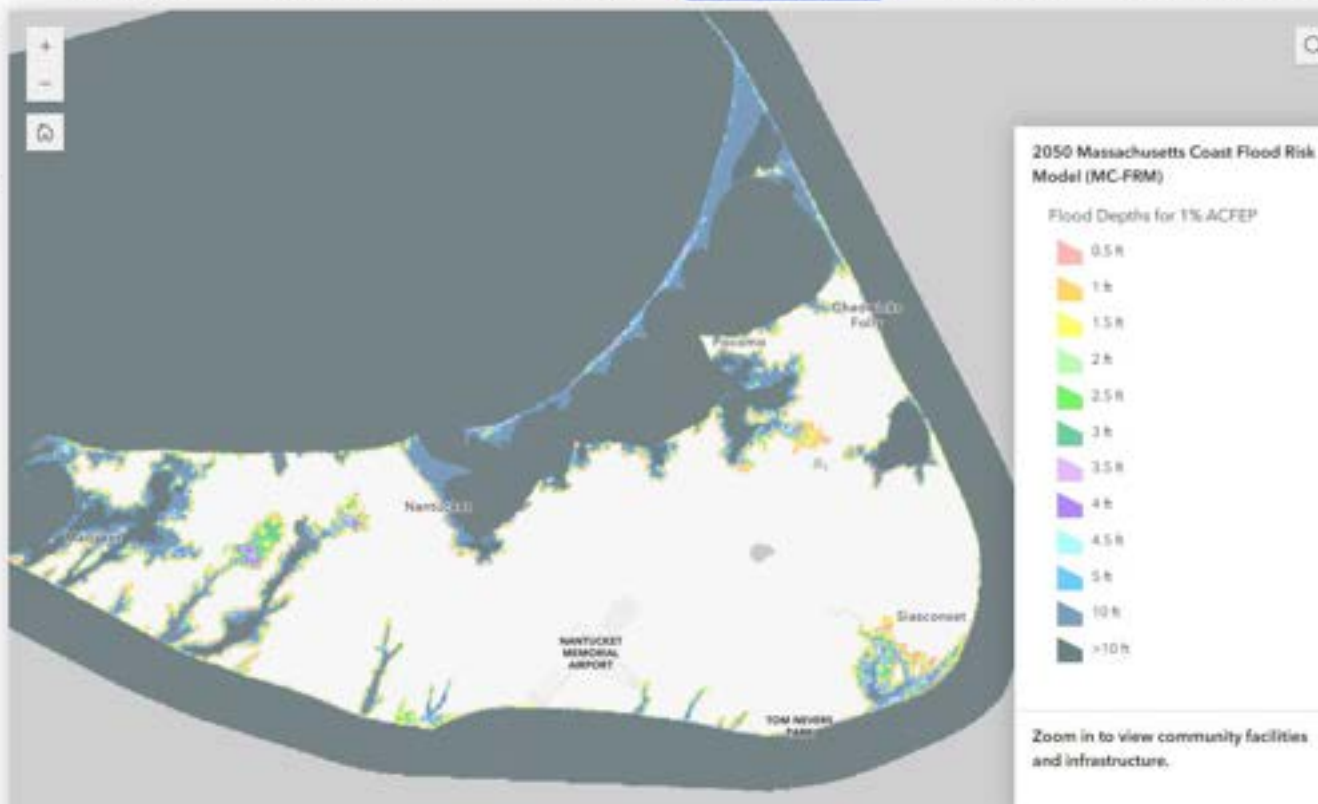
This interactive map and associated scenarios display extents and depths of flooding produced from the MC-FRM for 2030, 2050, and 2070. The future time horizons account for sea level rise due to continued high emissions of greenhouse gases and storm surges associated with coastal storms (hurricanes and northeasters). See below for the sea level rise projections from a baseline year of 2000.

Region	Relative Mean Sea Level (feet, NAVD83)		
	2030	2050	2070
North (Salisbury to Provincetown)	1.2	2.4	4.2
South (Provincetown to Westport)	1.2	2.5	4.3

The **Flooding** scenarios (e.g., 2030 Flooding) display the full range of annual coastal flood exceedance probabilities (ACFEP). Coastal Flood Exceedance Probabilities shown in the legend display the modeled outputs ranging from 0.1% (0.001, otherwise known as the 1,000-year storm) to 100% (1.0), which corresponds to the one-year storm.

The **Flood Depths** scenarios (e.g., 2030 Flood Depths - 1%) show the relative depth of water above land during a coastal flooding event with a 1% ACFEP.

To use the interactive map, zoom in to explore the MC-FRM layer. The map legend shows either the ACFEP range (for

[2030 Flooding](#)
[2030 Flood Depths - 1%](#)
[2050 Flooding](#)
[2050 Flood Depths - 1%](#)
[2070 Flooding](#)
[2070 Flood Depths - 1%](#)






MODELED VISUALIZATION

1' 2" above road level
Water height: 4' 11" above local high tide level
© 2024 Climate Central



MODELED VISUALIZATION

0' 2" above road level

Water height: 10' 0" above local high tide level

© 2024 Climate Central

EASY ST





EASY ST

MODELED VISUALIZATION

1' 4" above road level
Water height: 6' 11" above local high tide line
© 2024 Climate Central





MODELED VISUALIZATION

7.9' above road level

Water height: 4' 11" above local high tide line

© 2024 Climate Central





MODELED VISUALIZATION

NOAA 2022 high sea level rise
scenario for 2100 + 1% annual chance flood
8' 2" above road level
Water height: 10' 4" above local high tide line
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MODELED VISUALIZATION

2' 10" above road level
Water height: 4' 11" above local high tide line
© 2024 Climate Central





MODELED VISUALIZATION

1' 3" above road level

Water height: 4' 11" above local high tide line

© 2024 Climate Central

FloodVision Feedback

- What are your reactions to the visualizations? What do you think others' reactions will be?
- What are the ways you would use these visualizations?
- What recommendations do you have for these? (labeling, more realistic, etc.)
- What other needs can our team be thinking about for future tools and content for local communities facing the impacts of climate change?

Connect with people, communities



Connect with government officials



Where should we drive?

Are you interested in having FloodVision visit and collect data near you?

Please tell us your thoughts via the form found at <https://bit.ly/floodvision>



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FloodVision®

Are you interested in having FloodVision visit and collect data near you? Please fill out the form below:

First name *

Last name *

Email *

State *

City *

Which of the following best describes you? *

Tell us where you would like to see FloodVision capture images of future flood risk

We are also looking for fast-charging EV charging locations to power our journey. Do you have a fast-charging residential EV charger that we can use? *

☐ Yes
☐ No

Did a Climate Central staff member direct you to fill out this form? *

☐ Yes
☐ No

Thank You!!!

Allison Kopicki

akopicki@climatecentral.org

Kelly Van Baalen

kvanbaalen@climatecentral.org

FloodVision®

- High quality first-floor elevation data for quantitative flood risk assessments
- Photorealistic flood visualizations for effective risk communication

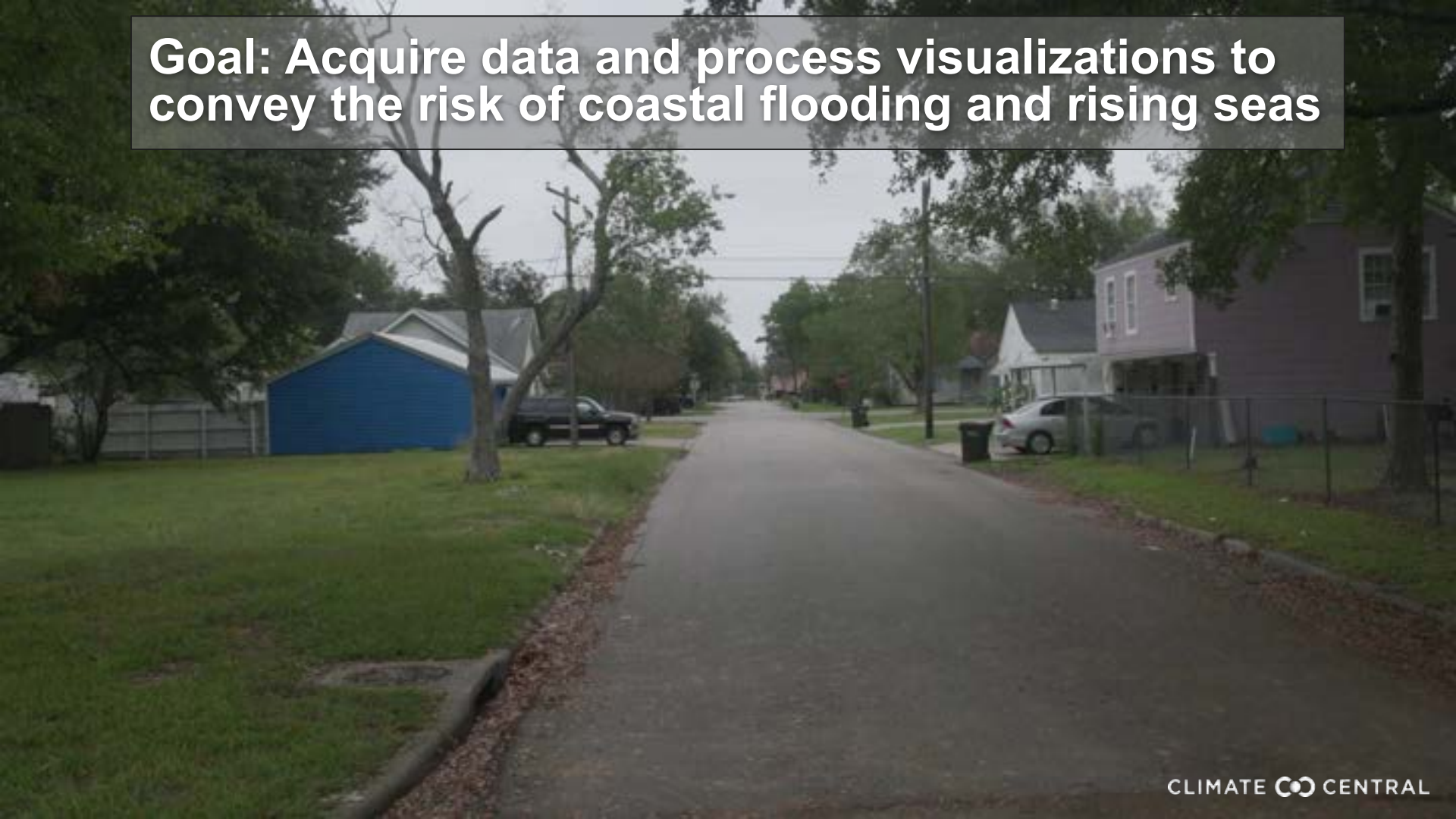






SIMULATION

Goal: Acquire data and process visualizations to convey the risk of coastal flooding and rising seas



Goal: Acquire data and process visualizations to convey the risk of coastal flooding and rising seas



Goal: Acquire data and process visualizations to convey the risk of coastal flooding and rising seas



**MODELED
VISUALIZATION**

NOAA 2022 Intermediate-High Sea Level Rise
Scenario for 2050

Water Height: 1' 8" above MHHW

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CLIMATE CHANGE

What will Miami look like with more sea rise? This high-tech car helps us picture it

BY ALEX HERRERO

UPDATED MARCH 26, 2023, 3:42 PM

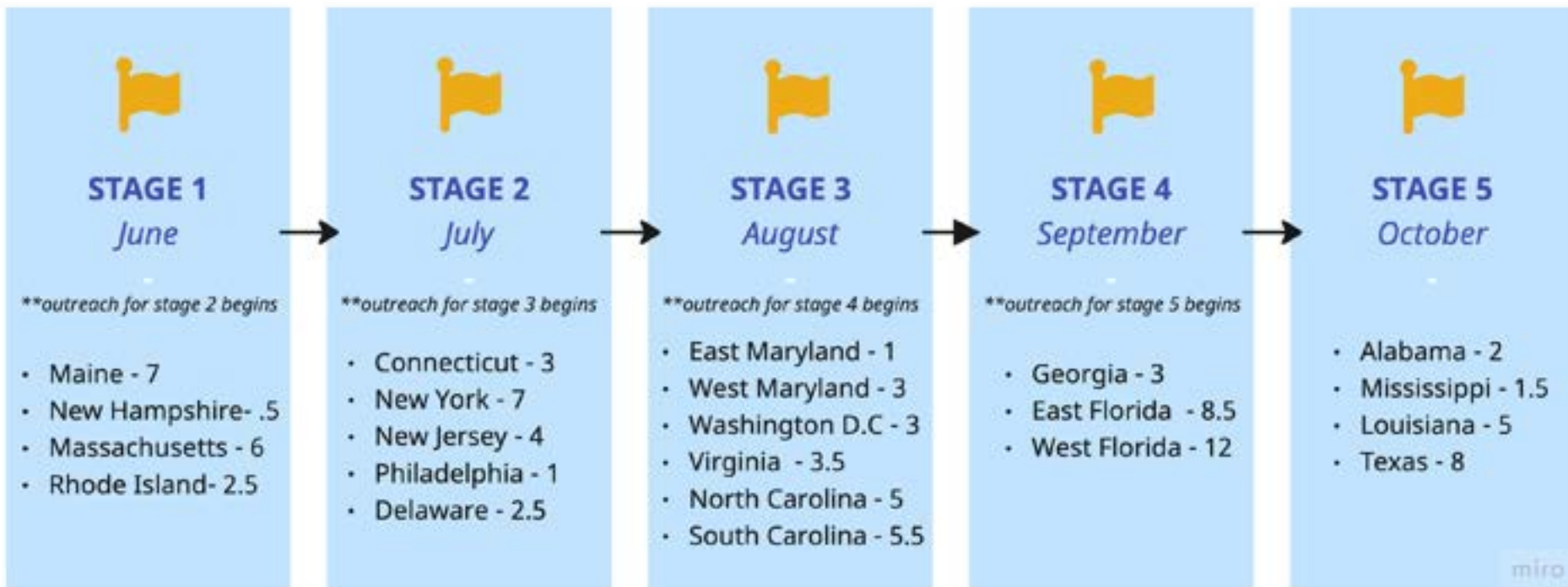
 Miami Herald

What will Miami look like with more sea rise? This high-tech car helps us picture it

"We know the images are more powerful than any map we can make, or any graphic we can show you." (1 MB) +



Tour Stage Framework



[nature](#) > [nature communications](#) > [articles](#) > articleArticle | [Open access](#) | Published: 18 May 2021

Economic damages from Hurricane Sandy attributable to sea level rise caused by anthropogenic climate change

[Benjamin H. Strauss](#) , [Phillip M. Orton](#), [Klaus Bittermann](#), [Maya K. Buchanan](#), [Daniel M. Gilford](#), [Robert E. Kopp](#), [Scott Kulp](#), [Chris Massey](#), [Hans de Moel](#) & [Sergey Vinogradov](#)

[Nature Communications](#) **12**, Article number: 2720 (2021) | [Cite this article](#)

27k Accesses | 86 Citations | 2329 Altmetric | [Metrics](#)

Abstract

In 2012, Hurricane Sandy hit the East Coast of the United States, creating widespread coastal flooding and over \$60 billion in reported economic damage. The potential influence of climate change on the storm itself has been debated, but sea level rise driven by anthropogenic climate change more clearly contributed to damages. To quantify this effect, here we simulate water levels and damage both as they occurred and as they would have

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Associated content

Collection

Climate Finance

Sections

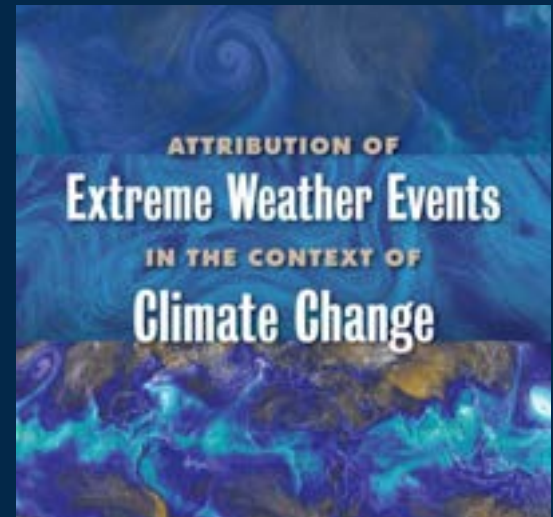
Figures

References

[Abstract](#)[Introduction](#)[Results](#)[Discussion](#)[Methods](#)[Data availability](#)[Code availability](#)[References](#)

Event Attribution

- Doesn't answer "cause" question
 - Change in likelihood
 - Change in magnitude



The image shows the header and "Latest analyses" section of the World Weather Attribution website. The header features a logo with three overlapping squares in orange, red, and purple, followed by the text "world weather attribution". Below the header is a navigation bar with links: Home, About, Analyses, News, Projects, and Resources. The "Latest analyses" section contains three articles, each with a thumbnail image and a brief description.

Image	Text
	Climate change likely increased extreme monsoon rainfall, flooding highly vulnerable communities in Pakistan
	Without human-caused climate change temperatures of 40°C in the UK would have been extremely unlikely
	Climate change increased heavy rainfall, hitting vulnerable communities in Eastern Northeast Brazil

The image shows a snippet of a news article from The Washington Post. The article is titled "Study finds that climate change added 10% to Ian's rainfall". The byline is "By Seth Borenstein | AP" and the date is "September 29, 2022 at 10:18 p.m. EDT". The article is categorized under "National", "Climate & Environment", "Education", "Health", "Innovations", "Investigations", "National Security", "Obituaries", and "Science".

The Washington Post

National Climate & Environment Education Health Innovations Investigations National Security Obituaries Science

Study finds that climate change added 10% to Ian's rainfall

By Seth Borenstein | AP
September 29, 2022 at 10:18 p.m. EDT



Metadata includes:

- Address
- EFE (Entry Floor Elevation)
- Road Elevation
- Latitude
- Longitude



Metadata includes:

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- EFE (Entry Floor Elevation)
- Road Elevation
- Latitude
- Longitude

MODELED VISUALIZATION

5 ft. above road level
Water height: 8' 3" above MHW
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Metadata includes:

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- Road Elevation
- Latitude
- Longitude

MODELED VISUALIZATION

NOAA 2022 intermediate high sea level rise scenario for 2070

1'-11" above road level

Water height is 1" above MHW

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Metadata includes:

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- Longitude

MODELED VISUALIZATION

10% annual chance flood
1' 6" above road level
Water height: 2' 9" above MHRW
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Metadata includes:

- Address
- EFE (Entry Floor Elevation)
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- Longitude

MODELED VISUALIZATION

NOAA 2023 Intermediate high sea level rise scenario for 2050 + 10% annual chance flood
3.3' above road level

Water height: 4.5' above MHW

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Questions?



go.climatecentral.org/asfpm

QR code for:

- FloodVision StoryMap for Texas
- Recommendation form to suggest tour stops and meetings
- Climate Central tools and products

Coastal Risk Screening Tool

- Interactive sea level rise and coastal flood map
- Easy-to-use Google Maps interface
- Customize year, pollution scenario, sea level rise model, etc.
- View risk by... and risk to...



Year



Water Level



Temperature
Increase



Affordable
Housing



Wetlands



Toxic
Facilities



Coastal Risk Screening Tool

An interactive map showing areas threatened by sea level rise and coastal flooding. Combining the most advanced global model of coastal elevations with the latest projections for future flood levels.

[CHOOSE MAP](#)[WATCH TUTORIAL](#)



View areas at risk by:



YEAR



WATER



TEMPERATURE



WARMING CHOICES



ICE SHEETS



ELEVATION DATASET



AFFORDABLE HOUSING



WETLANDS



WETLANDS GAIN/LOSS



TOXIC TIDE FACILITIES



TOXIC TIDE REGIONS

Risk Screening Tool

View areas threatened by sea level rise and
using the most advanced global model of
the latest projections for future flood levels.

VIEW

COASTAL RISK SCREENING TOOL

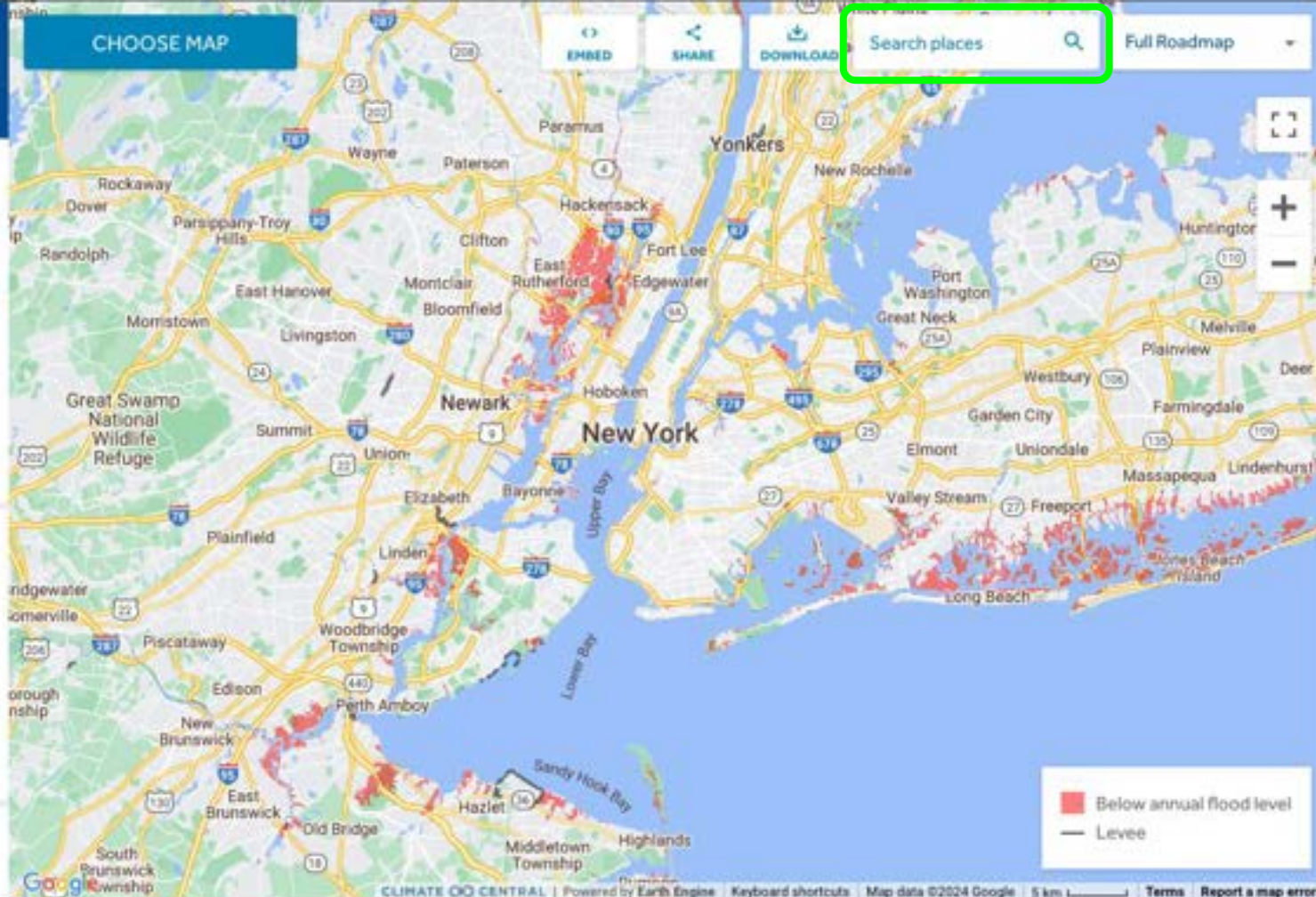
**LAND PROJECTED TO
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Explore sea level rise and coastal flood threats by adjusting the controls below.

[DETAILS AND LIMITATIONS](#)

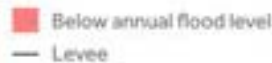
YEAR

2050

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Charleston, SC



Full Roadmap



COASTAL RISK SCREENING TOOL

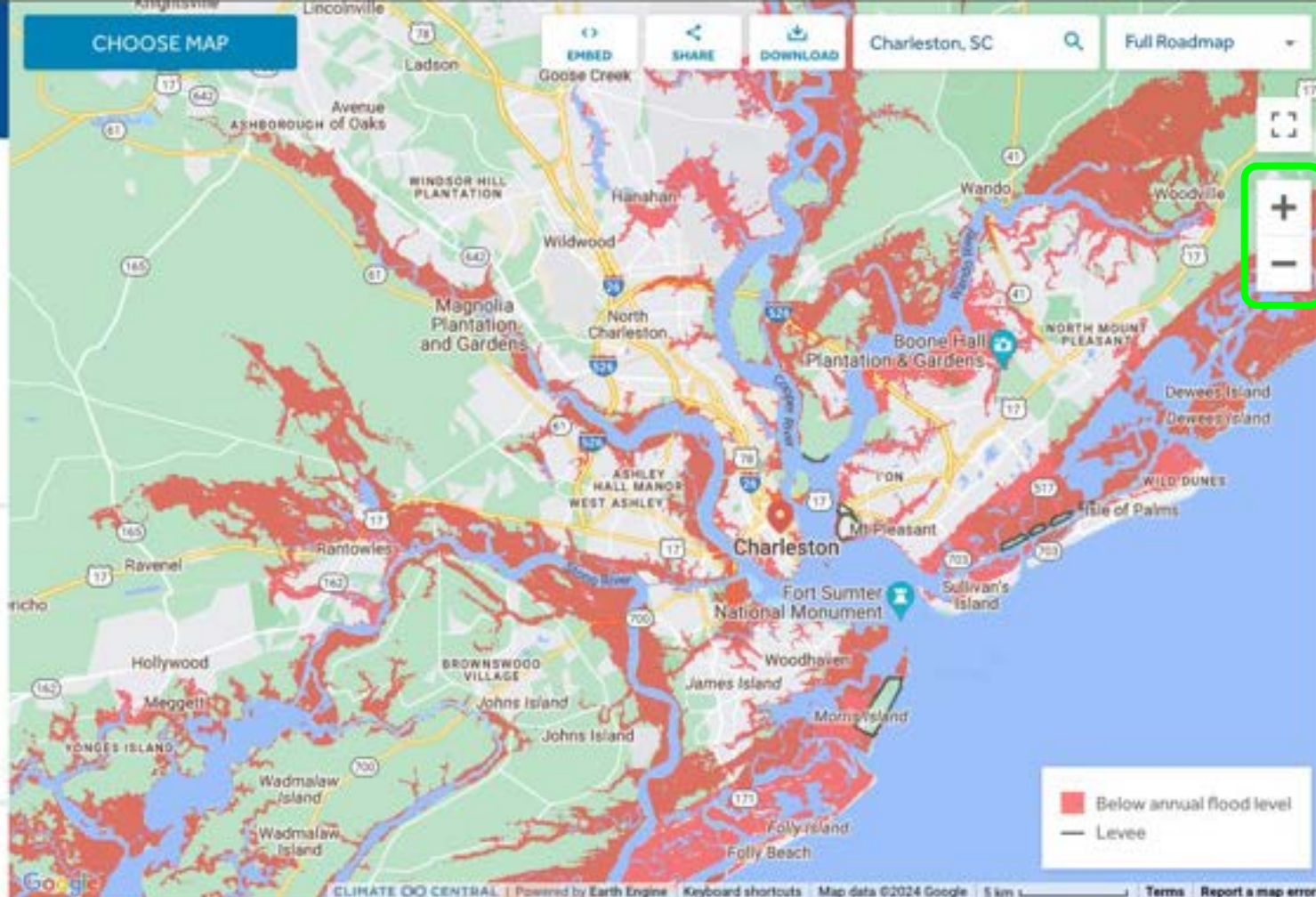
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Explore sea level rise and coastal
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YEAR

2050

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COASTAL RISK SCREENING TOOL

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YEAR

2050

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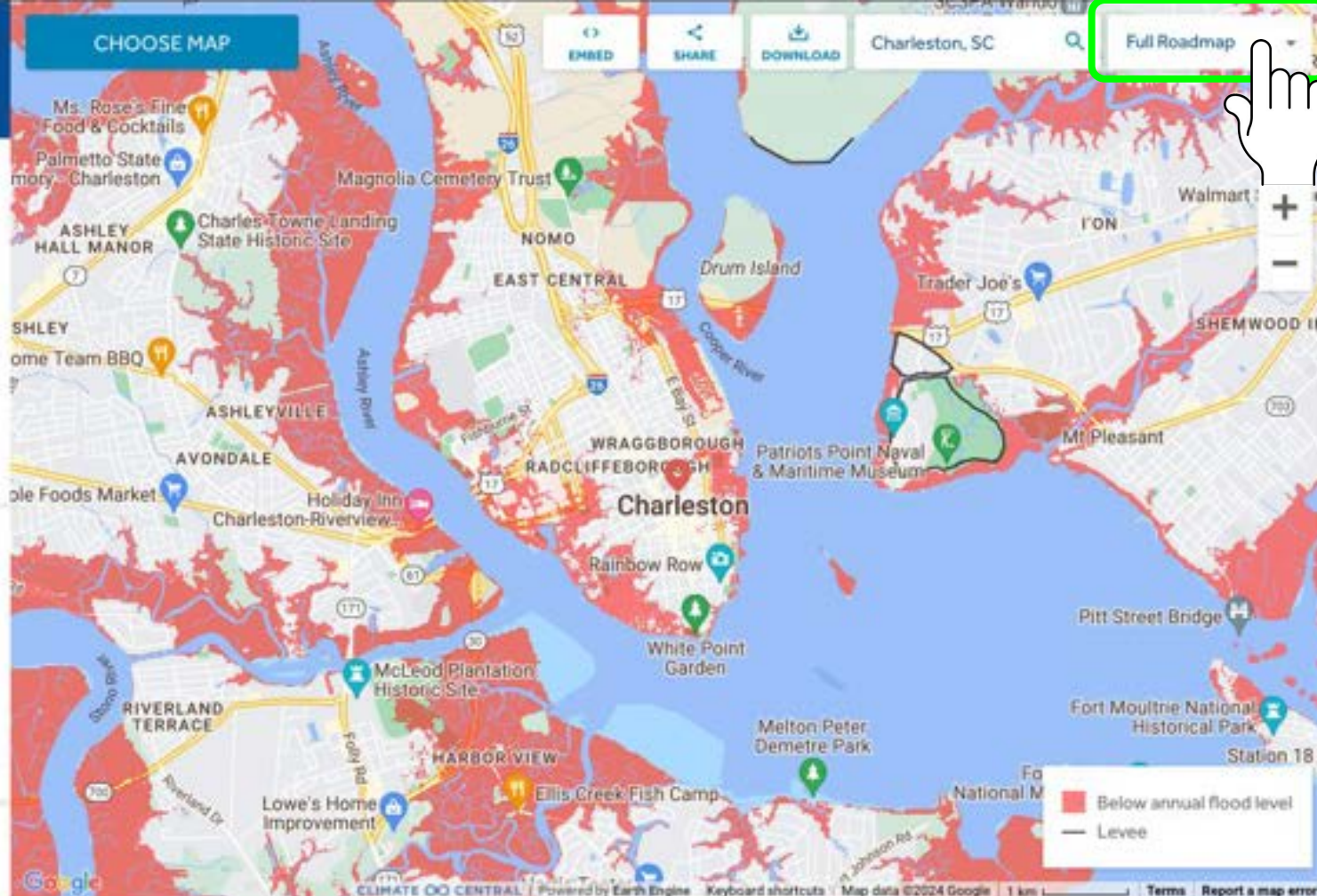
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Full Roadmap



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YEAR

2050

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Full Roadmap

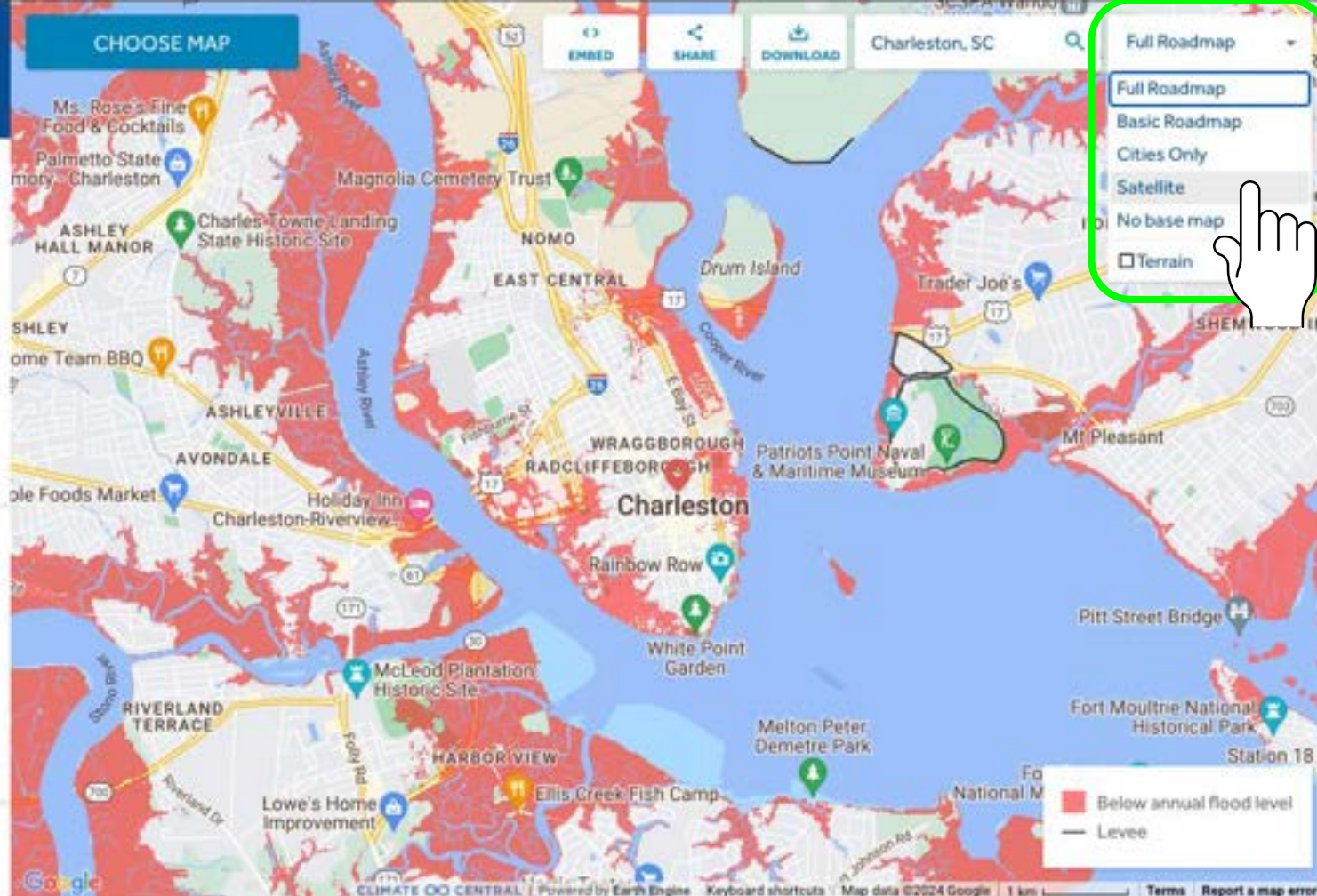
Full Roadmap

Basic Roadmap

Cities Only

Satellite

No base map

☐ Terrain

Below annual flood level
Levee

COASTAL RISK SCREENING TOOL

LAND PROJECTED TO BE BELOW ANNUAL FLOOD LEVEL IN 2050

Explore sea level rise and coastal
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[DETAILS AND LIMITATIONS](#)

YEAR

2050

[CHANGE OTHER SETTINGS](#)[Video Tutorial](#)

CHOOSE MAP

EMBED

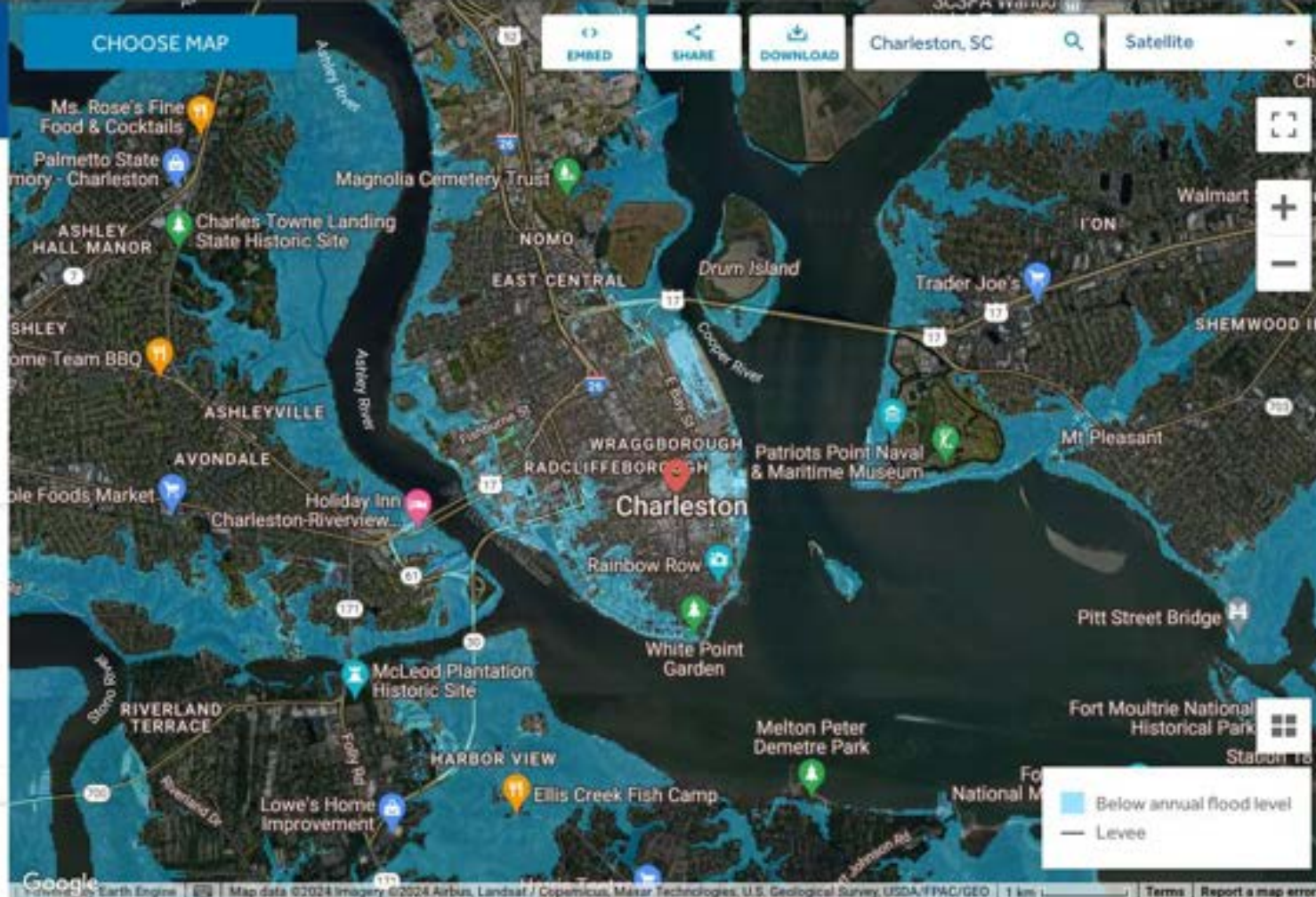
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Charleston, SC



Satellite



Below annual flood level
— Levee

COASTAL RISK SCREENING TOOL

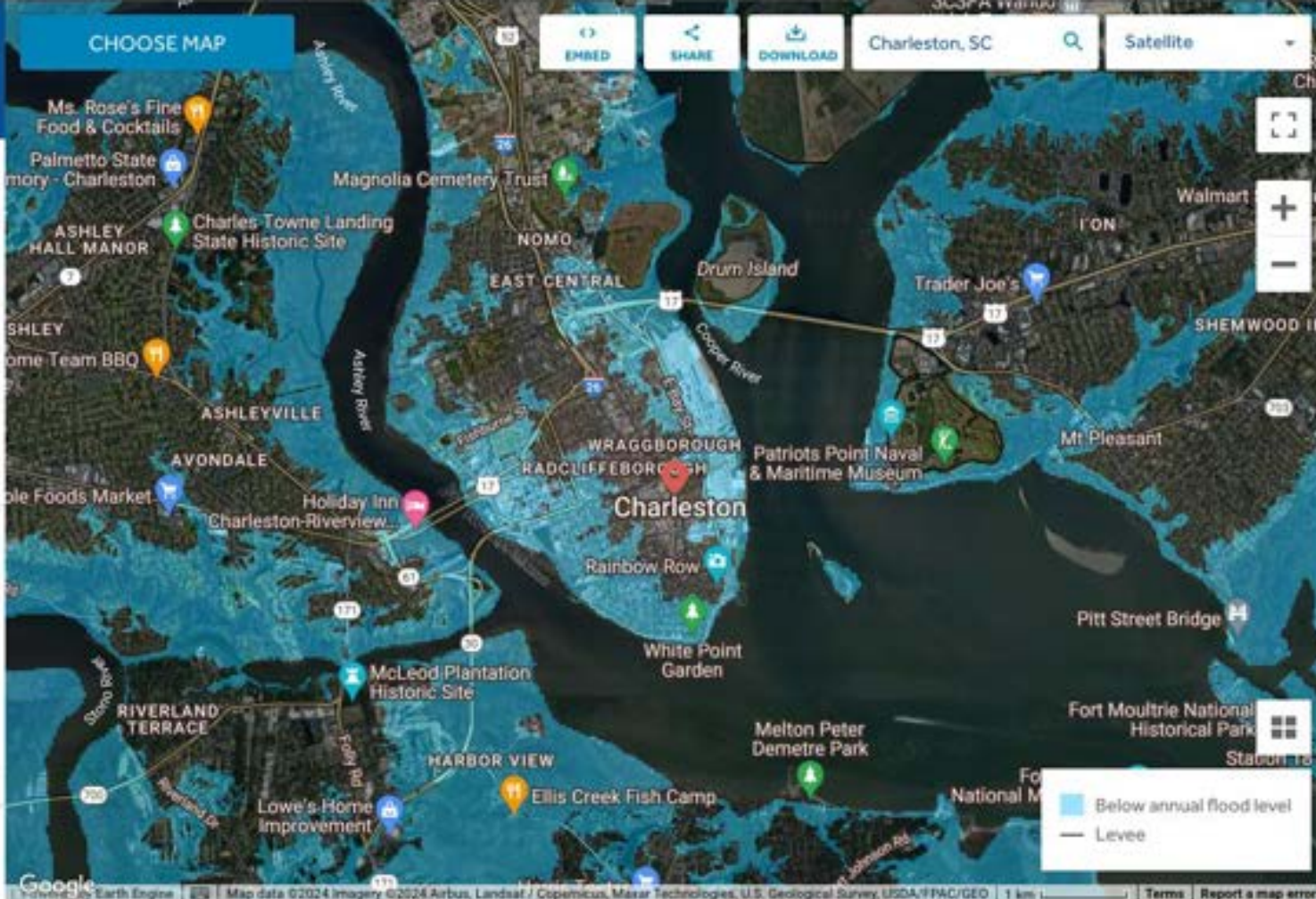
**LAND PROJECTED TO
BE BELOW ANNUAL
FLOOD LEVEL IN 2100**

Explore sea level rise and coastal
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[DETAILS AND LIMITATIONS](#)

YEAR

2100

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COASTAL RISK SCREENING TOOL

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Explore sea level rise and coastal
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[DETAILS AND LIMITATIONS](#)

YEAR

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CHOOSE MAP

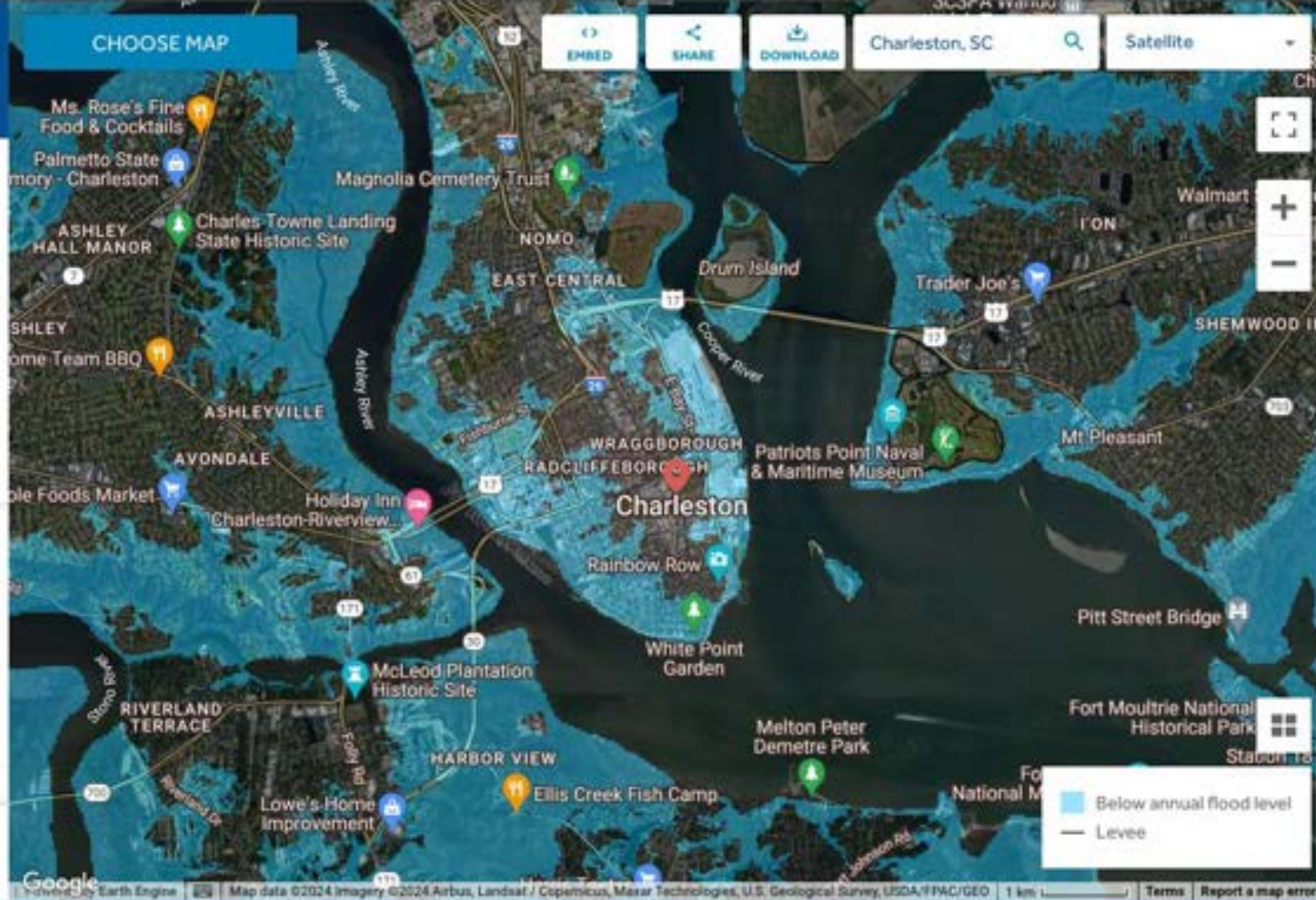
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Charleston, SC

Satellite



COASTAL RISK SCREENING TOOL

LAND PROJECTED TO
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FLOOD LEVEL IN 2100

Explore sea level rise and coastal flood threats by adjusting the controls below.

[DETAILS AND LIMITATIONS](#)

YEAR

2100

[CHANGE OTHER SETTINGS](#)[Video Tutorial](#)

PROJECTION TYPE

sea level rise + annual flood



POLLUTION PATHWAY OR SEA LEVEL SCENARIO

intermediate



LUCK

medium



AREAS TO SHOW AS THREATENED

- ☐ All land below water level
- ☒ Exclude all potentially protected areas

SEA-LEVEL-PROJECTION SOURCE

- ☐ Leading Consensus (IPCC 2021)
- ☐ More Comprehensive and Less Certain (IPCC 2021)
- ☒ NOAA 2022 (U.S. only)
- ☐ Mid-range Legacy Projections (Kopp et al. 2014)
- ☐ Pessimistic Legacy Projections (Kopp et al. 2017)

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Charleston, SC



Satellite



COASTAL RISK SCREENING TOOL

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[DETAILS AND LIMITATIONS](#)

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2100

[CHANGE OTHER SETTINGS](#)[Video Tutorial](#)

CHOOSE MAP

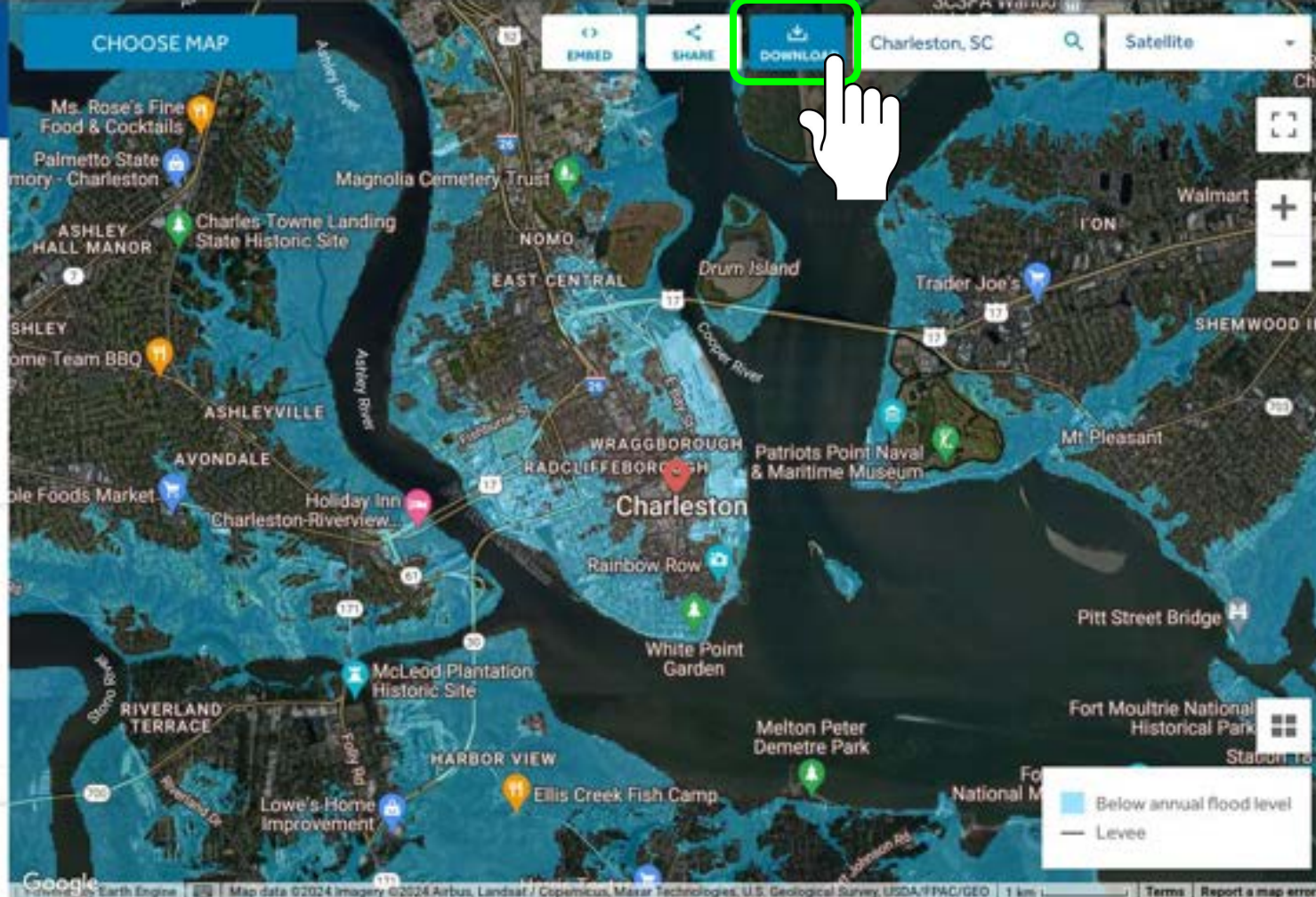
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Charleston, SC

Satellite



COASTAL RISK SCREENING TOOL

LAND PROJECTED TO
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Explore sea level rise and coastal flood threats by adjusting the controls below.

[DETAILS AND LIMITATIONS](#)

YEAR

2100

[CHANGE OTHER SETTINGS](#)[Video Tutorial](#)

Choose Your Download

Map Image

JPEG of this map

Also freely available: data on coastal flood threats to population and infrastructure.

and figures on coastal flood threats to thousands of jurisdictions in the US and around the world.

Commercial Solutions

Land Elevation Data

CoastalDEM®: Climate Central's proprietary, more accurate Digital Elevation Model for coastal areas (**no-cost research licenses available**)

Flood Layers

Global GIS map layers illustrating the extent and depth of sea level rise and coastal flooding

Flood Analysis

Climate Central's Portfolio Analysis Tool quantifies coastal flood risk to the coastal locations you care about

CANCEL

Below annual flood level
Levee

COASTAL RISK SCREENING TOOL

**LAND PROJECTED TO
BE BELOW ANNUAL
FLOOD LEVEL IN 2100**

Explore sea level rise and coastal
flood threats by adjusting the
controls below.

[DETAILS AND LIMITATIONS](#)

YEAR

2100

[CHANGE OTHER SETTINGS](#)[Video Tutorial](#)

CHOOSE MAP

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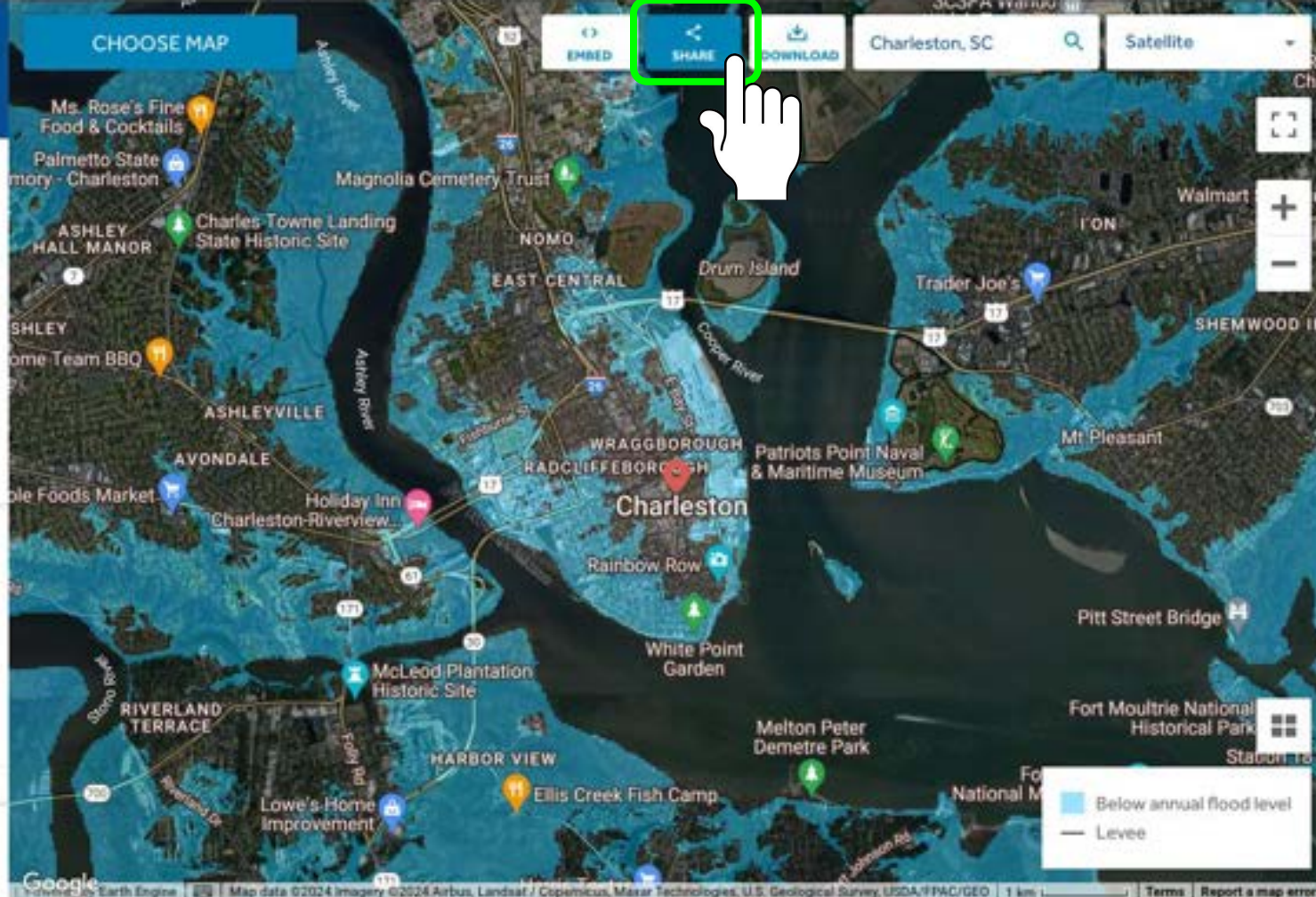


DOWNLOAD

Charleston, SC



Satellite



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Map data ©2024 Imagery ©2024 Airbus, Landsat / Copernicus, Maxar Technologies, U.S. Geological Survey, USGS/FPAC/GE0

1 km

[Terms](#) [Report a map error](#)

COASTAL RISK SCREENING TOOL

LAND PROJECTED TO BE BELOW ANNUAL FLOOD LEVEL IN 2100

Explore sea level rise and coastal flood threats by adjusting the controls below.

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DONE

Below annual flood level
— Levee

COASTAL RISK SCREENING TOOL

LAND PROJECTED TO BE BELOW ANNUAL FLOOD LEVEL IN 2100

Explore sea level rise and coastal flood threats by adjusting the controls below.

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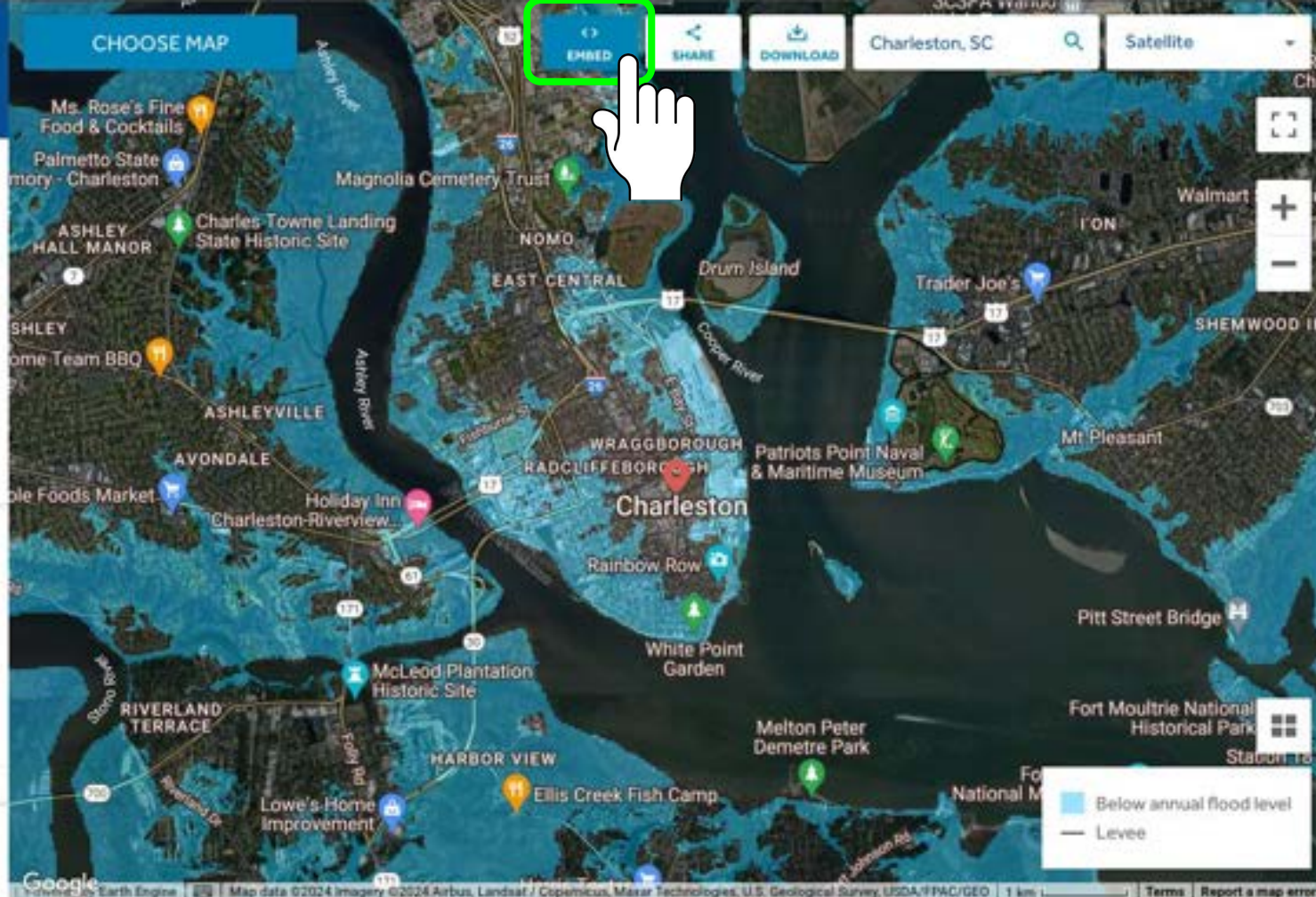
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1 km

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Embed This Map View

COASTAL RISK SCREENING

LAND PROJECT
BE BELOW ANNUAL
FLOOD LEVEL

Explore sea level rise and
flood threats by adjusting
controls below.

DETAILS AND LIMITATIONS

YEAR

2100

CHANGE OTHER SETTINGS

Video Tutorial

MAP HEIGHT

450px



Below annual flood level
Levee

Terms Report a map error

SUPPORT OUR WORK

COASTAL RISK SCREENING TOOL

**LAND PROJECTED TO
BE BELOW ANNUAL
FLOOD LEVEL IN 2100**

Explore sea level rise and coastal
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controls below.

[DETAILS AND LIMITATIONS](#)

YEAR

2100

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CHOOSE MAP

EMBED

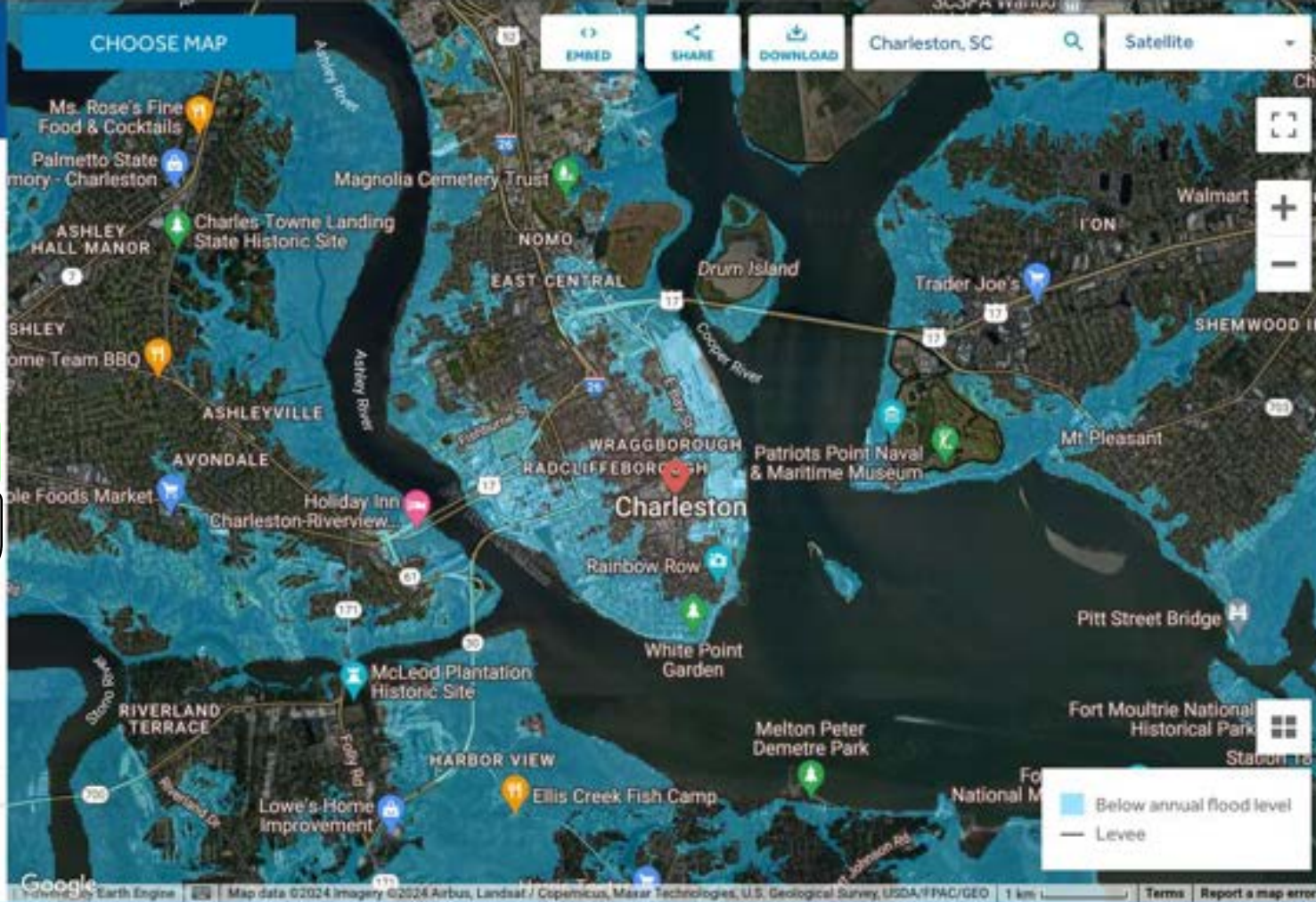
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Satellite



COASTAL RISK SCREENING TOOL

LAND PROJECTED TO
BE BELOW ANNUAL
FLOOD LEVEL IN 2100

Explore sea level rise and coastal flood threats by adjusting the controls below.

[DETAILS AND LIMITATIONS](#)

YEAR

2100

[CHANGE OTHER SETTINGS](#)[Video Tutorial](#)

CHOOSE MAP

About This Map

Overview

Climate Central's sea level rise and coastal flood maps are based on peer-reviewed science in leading journals. As these maps incorporate big datasets, which always include some error, these maps should be regarded as screening tools to identify places that may require deeper investigation of risk.

Outside of the United States, maps are based on global-scale datasets for elevation and tides in addition to sea level rise projections. For the 50 U.S. states, more accurate but still imperfect data are used.

Areas lower than the selected water level and with an unobstructed path to the ocean are shaded red. By default, areas below the water level but that appear to be protected by ridges (and in the U.S., levees) are not shaded.

Our approach makes it easy to map any scenario quickly and reflects threats from permanent future sea-level rise well. However, the accuracy of these maps drops when assessing risks from extreme flood events. Our maps are not based on physical storm and flood simulations and do not take into account factors such as erosion, future changes in the frequency or intensity of storms, inland flooding, or contributions from rainfall or rivers.

The small  information icons scattered throughout the interface, including in the *Change Other Settings* toolbox, provide more detailed and map-specific documentation.

Currently selected settings

Year

2100

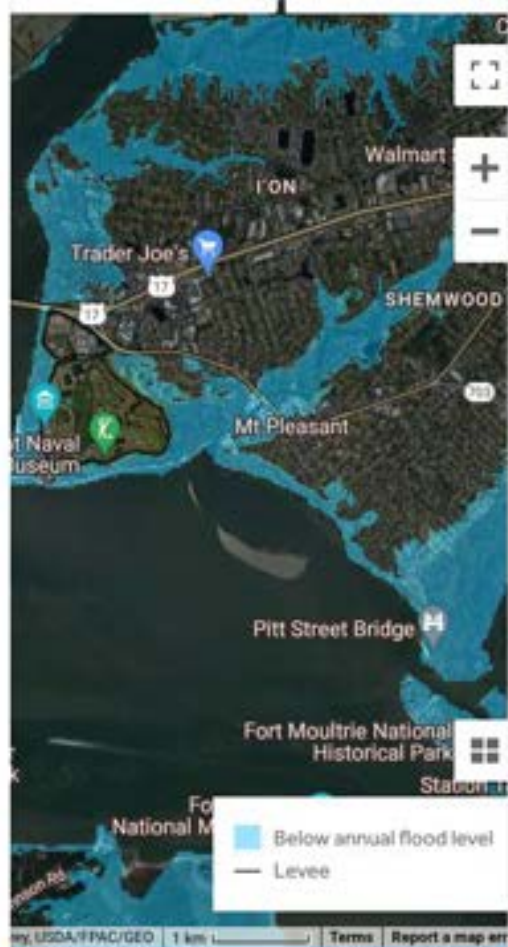
Projection Type

Sea level rise + annual flood

Charleston, SC



Satellite



COASTAL RISK SCREENING TOOL

**LAND PROJECTED TO
BE BELOW ANNUAL
FLOOD LEVEL IN 2100**

Explore sea level rise and coastal
flood threats by adjusting the
controls below.

[DETAILS AND LIMITATIONS](#)

YEAR

2100

[CHANGE OTHER SETTINGS](#)[Video Tutorial](#)

CHOOSE MAP

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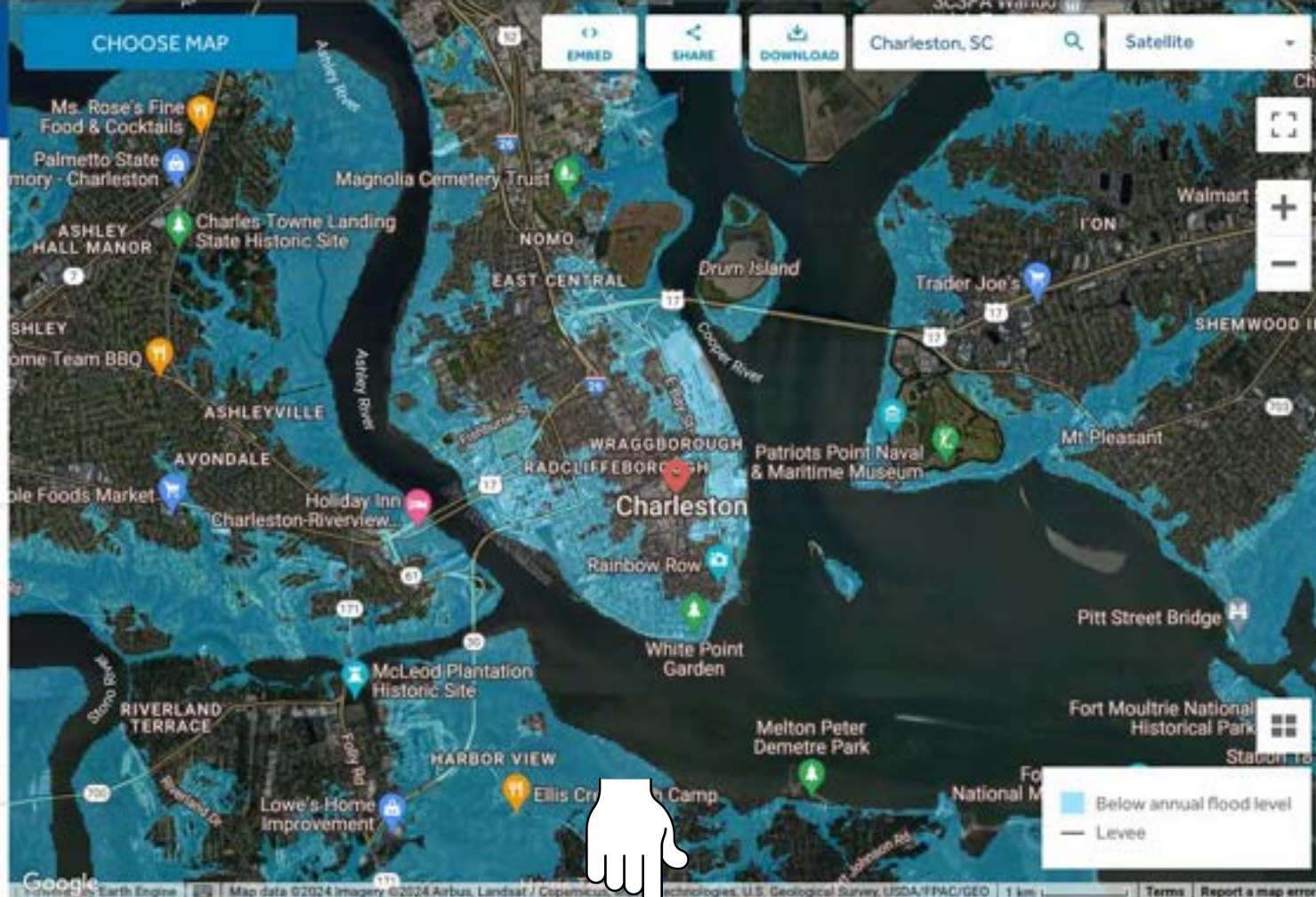
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Charleston, SC

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[ESPAÑOL](#)[GET UPDATES](#)[REQUEST RISK ANALYSIS](#)[SUPPORT OUR WORK](#)

COASTAL RISK SCREENING TOOL

**LAND PROJECTED TO
BE BELOW ANNUAL
FLOOD LEVEL IN 2100**

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flood threats by adjusting the
controls below.

[DETAILS AND LIMITATIONS](#)

YEAR

2100

[CHANGE OTHER SETTINGS](#)[Video Tutorial](#)

CHOOSE MAP

EMBED

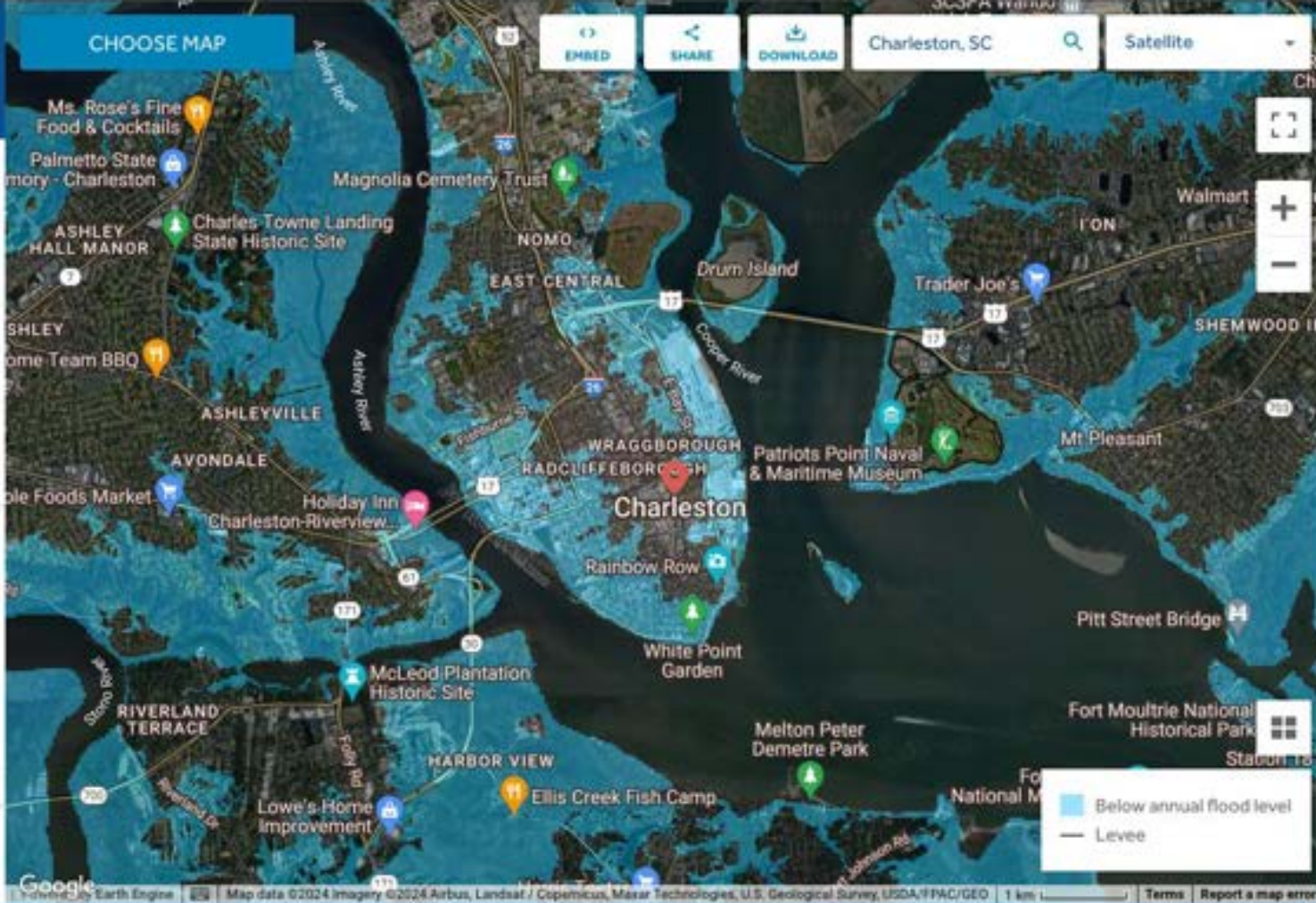
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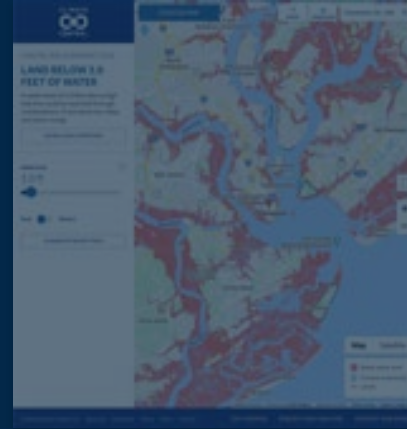
Climate Central Projects and Resources



Edge of America
Tour



FloodVision®



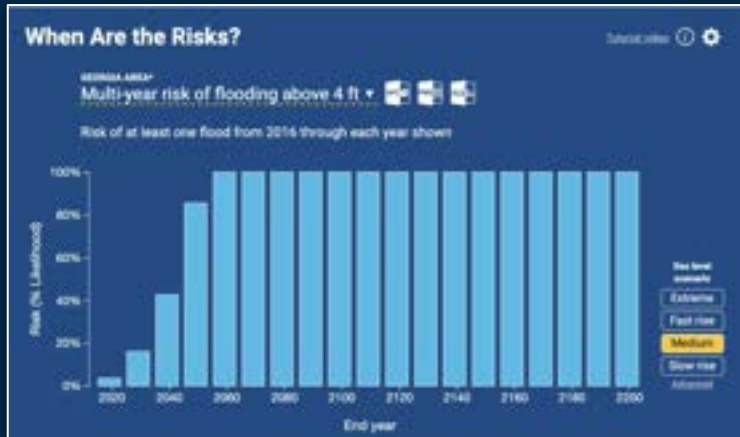
Coastal Risk
Screening Tool



Risk Finder

Risk Finder

- Web tool for assessing sea level rise and coastal flood risk
- Hyper-localized information
- Incorporates 100+ GIS datasets
- Downloadable fact sheets, spreadsheets, and more



What Is at Risk?

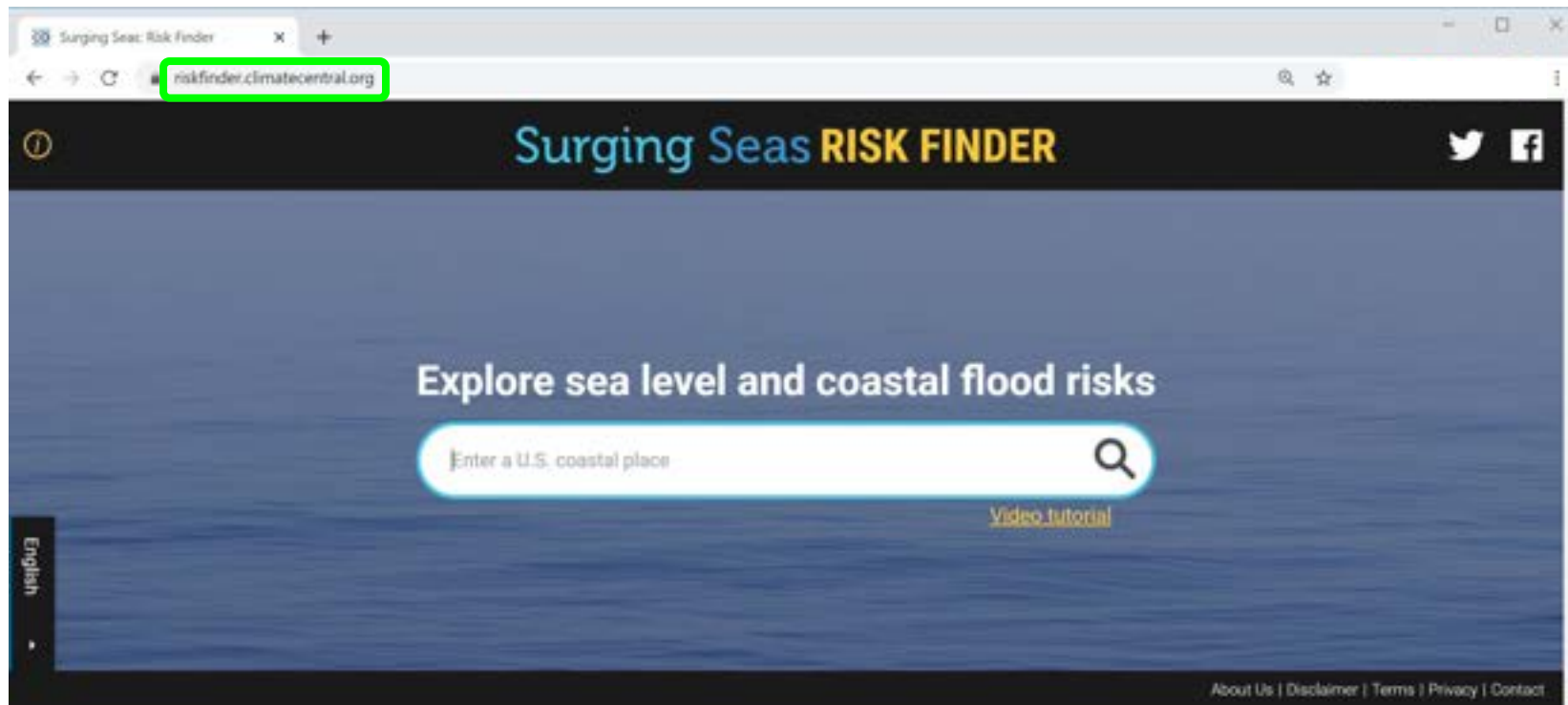
Population Buildings Infrastructure Contamination Risks Land

Total population below 4 ft in Georgia

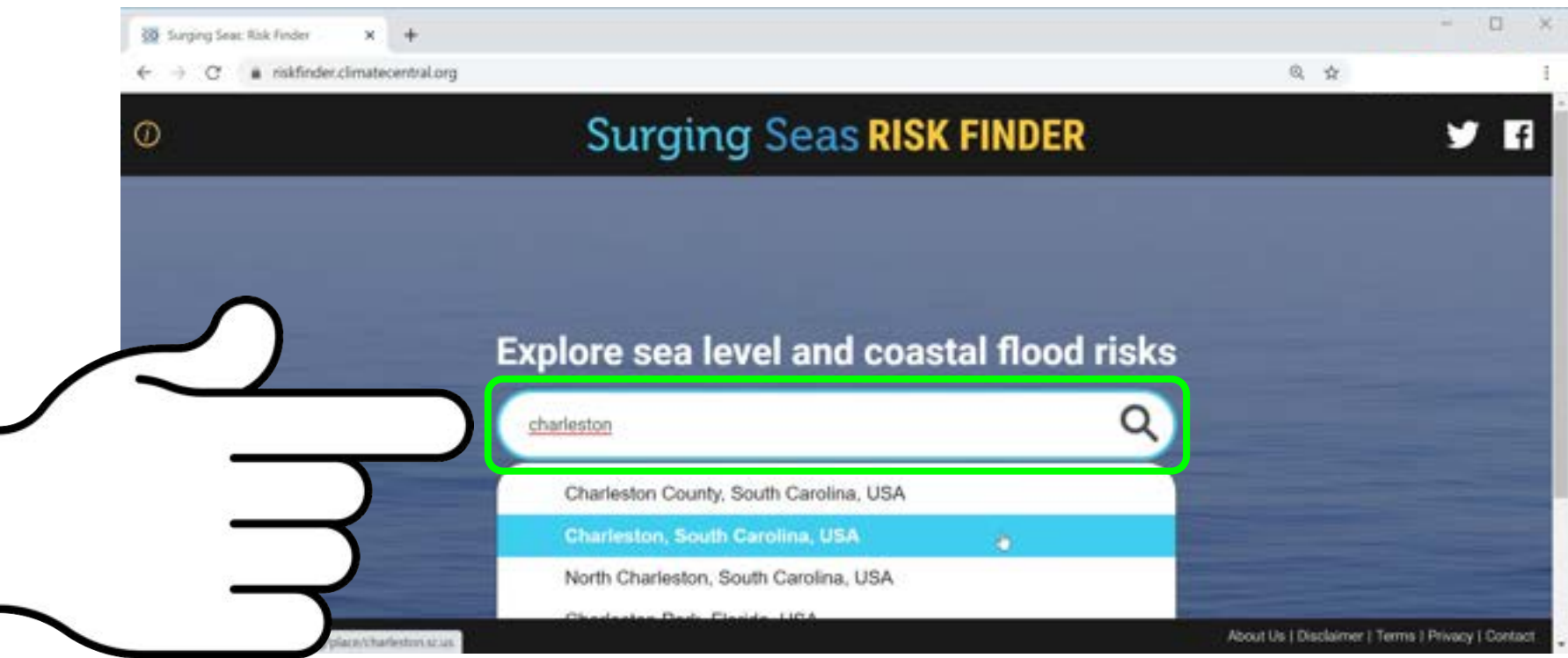
Population: All	Total
Population	32,298
Georgian population	26,874
Low social vulnerability population	18,274
Medium social vulnerability population	10,342
High social vulnerability population	7,783
Population of color	6,831
African-American population	5,094

Sources: New population data, Census 2010; elevation data, SRTM; administrative boundaries, US Census. Details
Values exclude sub-4ft areas potentially protected by levees or other features.

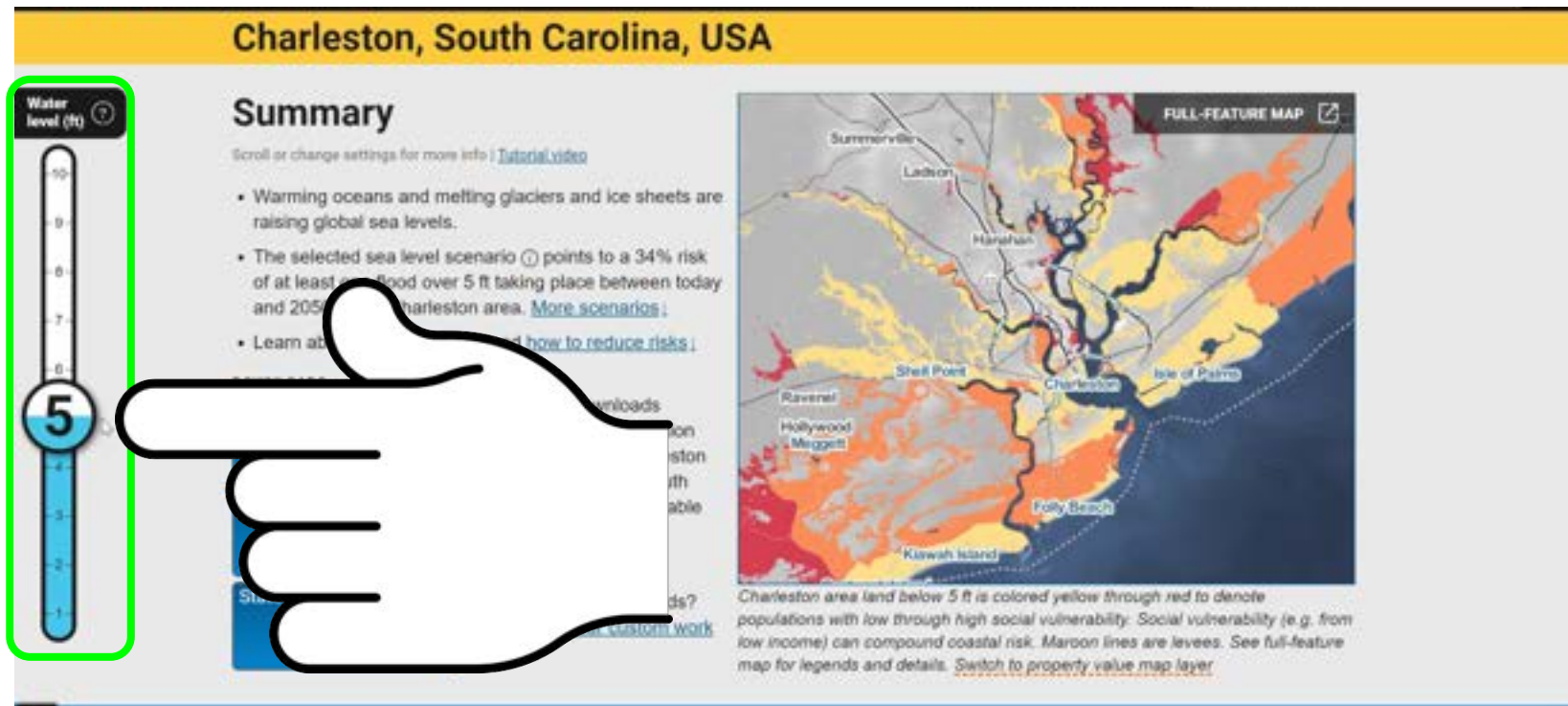
Step 1: Go to riskfinder.org



Step 2: Enter a coastal location



Step 3: Choose a water level



Step 4: Download and share a fact sheet

Charleston, South Carolina, USA

Summary

Scroll or change settings for more info | [Tutorial video](#)

- Warming oceans and melting glaciers and ice sheets are raising global sea levels.
- The selected sea level scenario ① points to a 34% risk of at least one flood over 5 ft taking place between today and 2050 in the Charleston area. [More scenarios](#)
- Learn about [related places](#) and [how to reduce risks](#)

Water level (ft) ?

50
40
30
20
10
0
-10
-20
-30
-40
-50

5

DOWNLOADS

- Local fact sheet
- Local report
- State report

Full-Feature Map

Summerville
Ladson
Hanahan
Charleston
Folly Beach
Isle of Palms

Have more specific questions? [Learn about our cur](#)

ed yellow through red to denote
of vulnerability: Social vulnerability (e.g. from
coastal risk. Maroon lines are levees. See full-feature
etails. [Switch to property value map layer](#)

Step 4: Download and share a fact sheet

COASTAL RISKS FOR CHARLESTON, SC

Select a water level: 5 feet. May occur from sea level rise, coastal flooding, or both.

What's at risk on land below 5 feet?

- High coastal vulnerability population: 5,500
- Residential water: 4.5
- Nonresidential water: 4
- Paved area: 100 miles
- Hospitals: 3

5 feet in historical context

- Highest observations flood: 4.4 feet in 1989
- Statutory: 1 = 100 year flood height: 5.0 feet

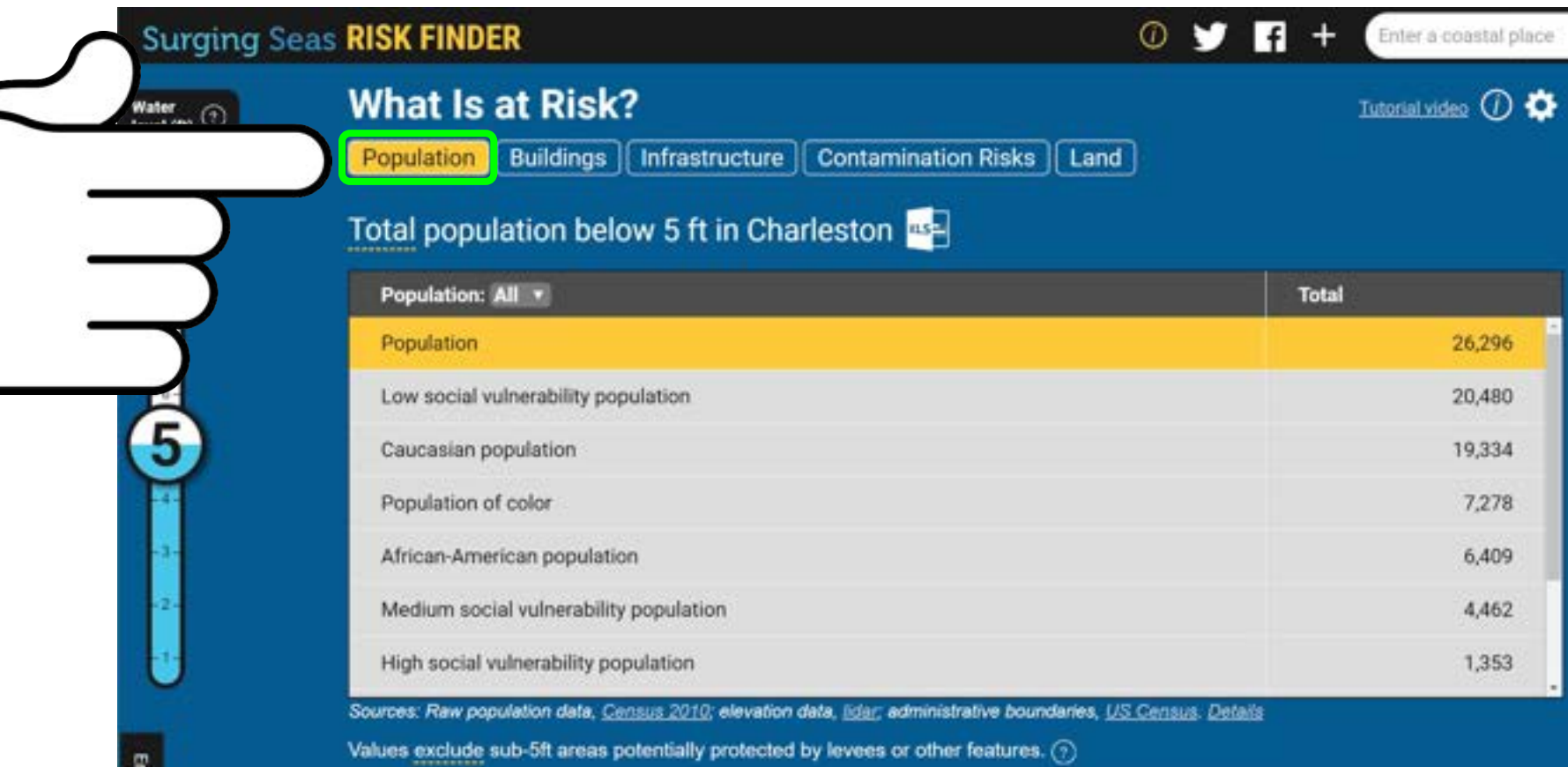
Unnatural Coastal Flooding

Since 1990, while states in Charleston have recorded 101 days exceeding the National Weather Service flood threshold, between similar down-scaled rise, the impact would be 2%. The elevation is 5 miles from Charleston.

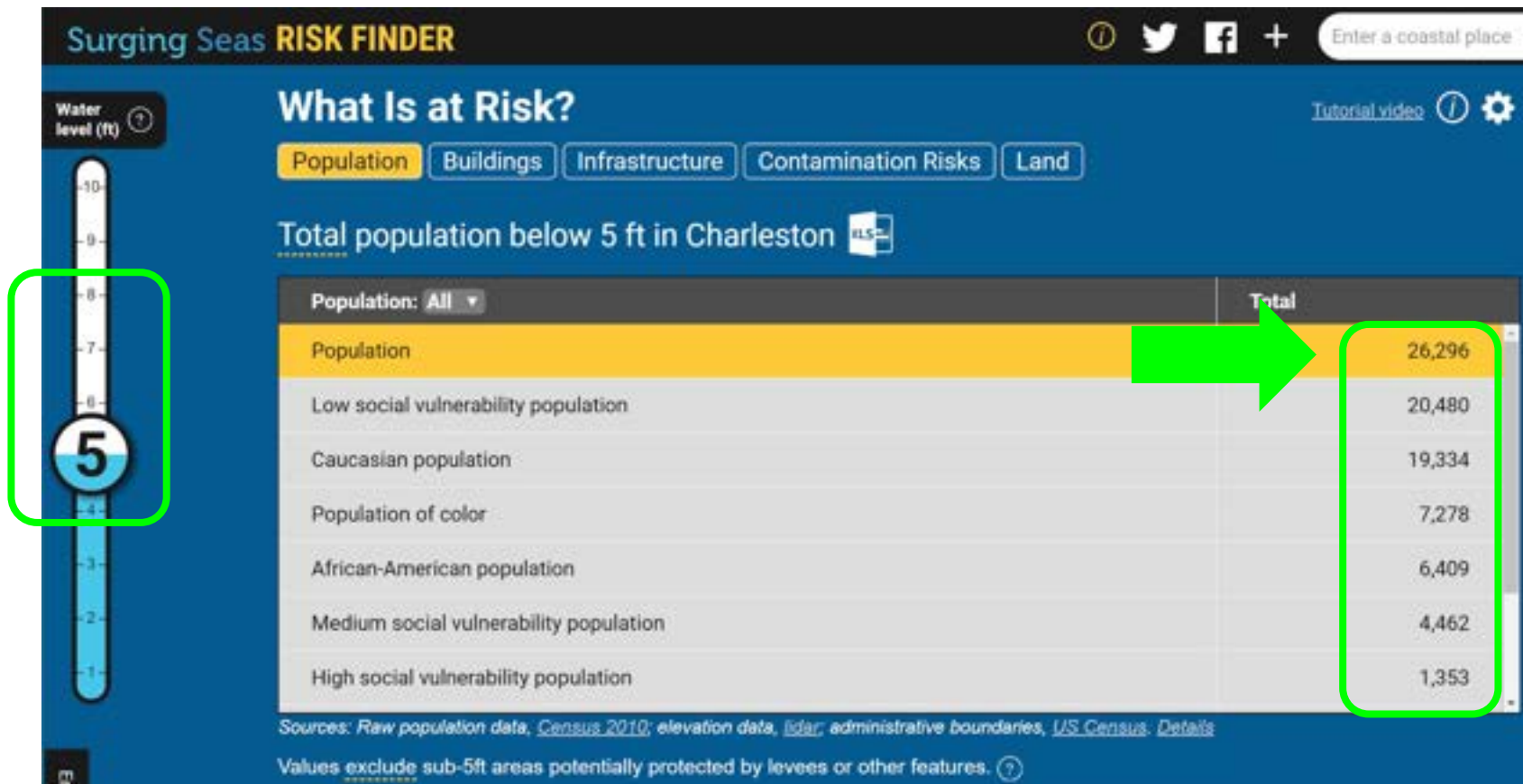
Find more places, water levels and downloads at riskfinder.org

Land and population below 5 feet in Charleston, SC

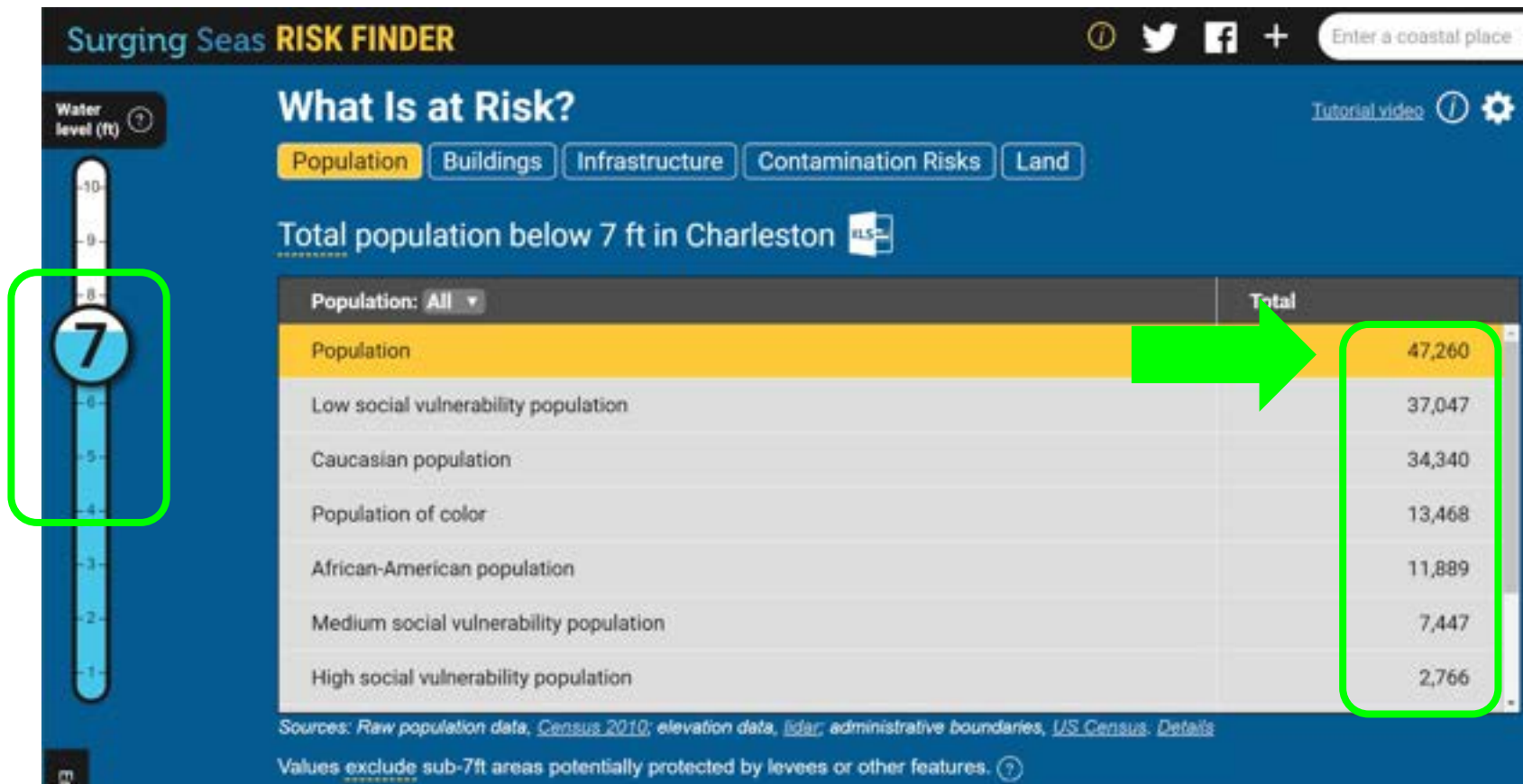
Step 5a: Explore data and pick what is important to you



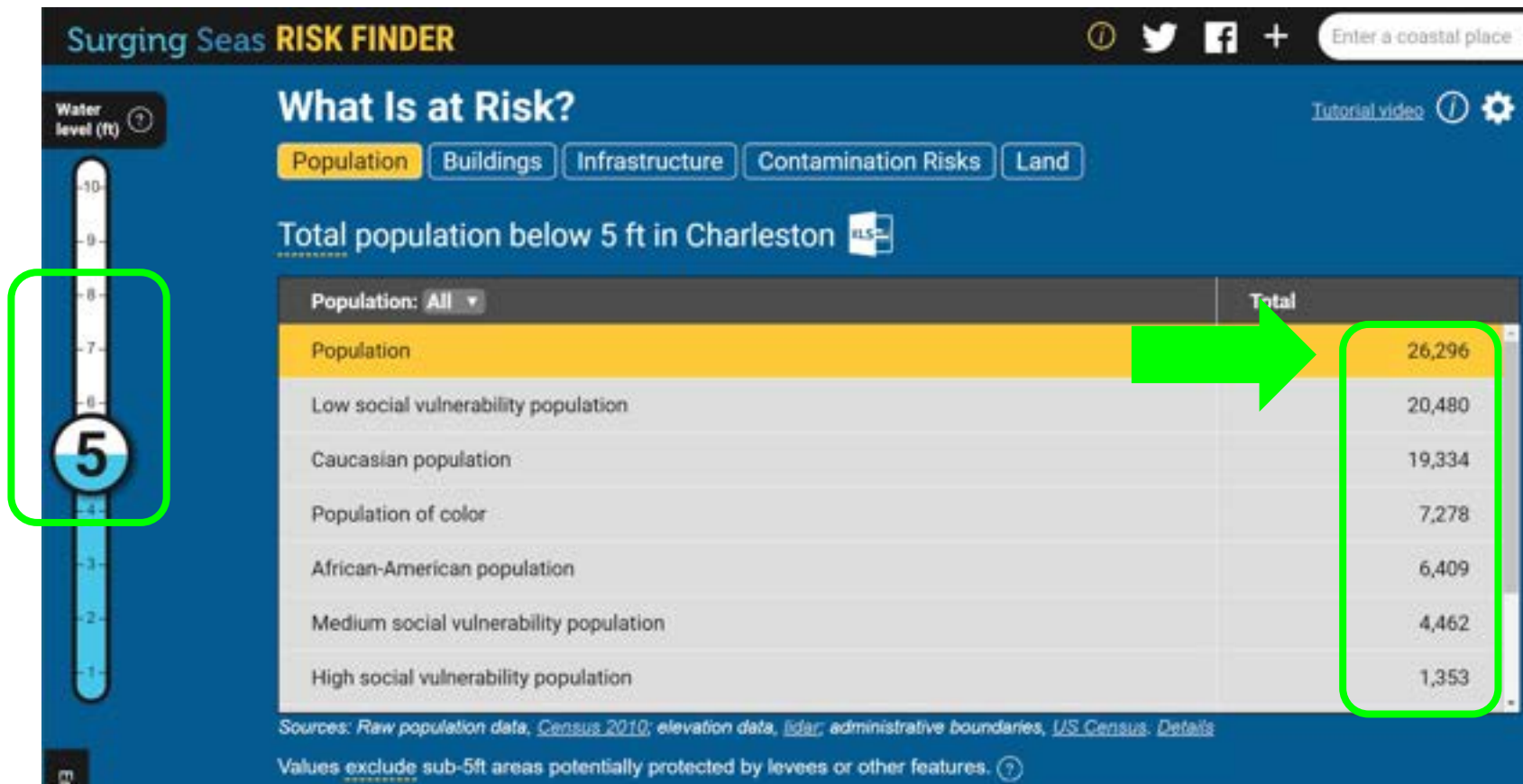
Step 5a: Explore data and pick what is important to you



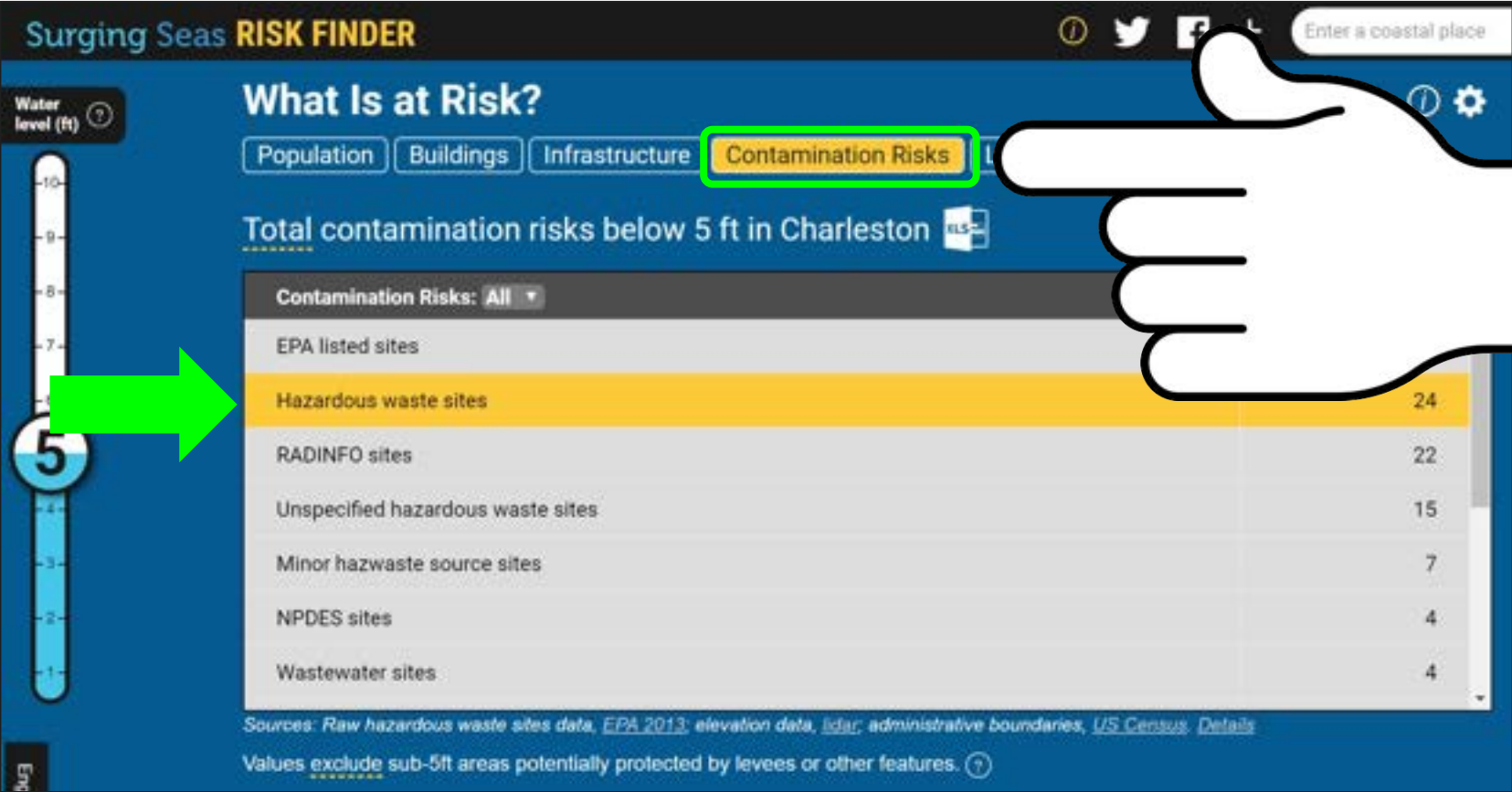
Step 5a: Explore data and pick what is important to you



Step 5a: Explore data and pick what is important to you



Step 5b: Discover hazardous waste sites at risk

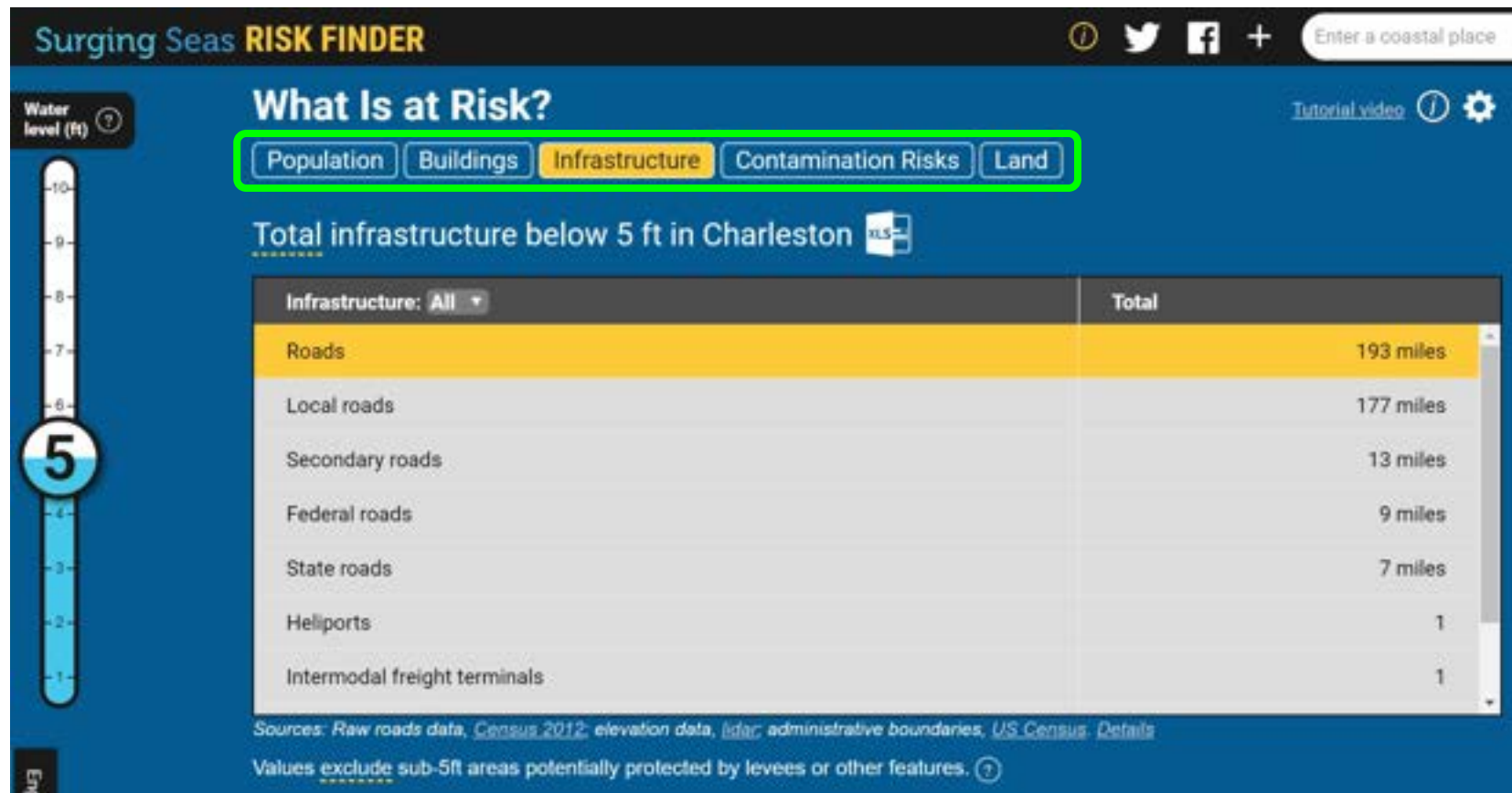




A large, white hand cursor icon with a black outline is positioned over the 'Buildings' section of the website. The hand is pointing towards the 'Buildings' link, which is highlighted in blue. The background shows a blurred view of the website's content, including the 'What Is' section and the 'Total built' statistic.



Step 5e: Discover what else is at risk



Step 6: Download summary Excel spreadsheet of who/what is at risk

Surging Seas **RISK FINDER**

Water level (ft) ?

10

9

8

7

6

5

4

3

2

1

What Is at Risk?

Population

Buildings

Infrastructure

Contamination Risks

Land

Total population below 5 ft in Charleston

Population: All

Population	
Low social vulnerability population	96
Caucasian population	80
Population of color	19,334
African-American population	7,278
Medium social vulnerability population	6,409
High social vulnerability population	4,462
	1,353

Sources: Raw population data, Census 2010; elevation data, lidar; administrative boundaries, US Census. Details

Download Excel icon

Hand pointing to download icon

Step 6: Download summary Excel spreadsheet of who/what is at risk

The screenshot shows a web interface for downloading data. On the left, a vertical slider labeled 'Water level (ft)' has a blue circle with the number '5' around it. A hand icon points to this slider. The main content area is titled 'Get spreadsheet' and contains a list of download options. A green box highlights the first option: 'All available categories in Charleston: Summary*'. Below this are two other options: 'Population in Charleston: Comparison by town*' and 'Population in Charleston: Breakdown by protection status and social vulnerability levels'. A yellow 'Get download' button is at the bottom, also highlighted with a green box. A hand icon points to this button. On the right, there is a section titled 'NEW: COASTAL ANALYSIS TAILORED FOR YOU' with a list of numbers: 26,296, 20,480, 19,334, 7,278, 6,409, 4,462, and 1,353. A hand icon points to this list.

Water level (ft)

What is

Population

Total pop

Population

Population

Low socia

Caucasian

Population

African-Am

Medium s

High socia

Get spreadsheet

Downloads detail population on low-lying land in Charleston with municipality breakdowns, unless otherwise noted. To change focal water level, impact, area type breakdown, or location, close this dialog box and change your selection(s).

Data spreadsheets for water levels 1-10 ft (format: xls)

- ☒ All available categories in Charleston: Summary*
- ☐ Population in Charleston: Comparison by town*
- ☐ Population in Charleston: Breakdown by protection status and social vulnerability levels

*Potential protections from levees or other features not factored in

Get download

NEW: COASTAL ANALYSIS TAILORED FOR YOU

If you find our public tools useful, you may be interested in our other products and services.

Climate risk analysis, rise and threats w

Plan: Where move?

Protect: What do I need to protect, by how much, and when?

Assess: What is the threat to my existing portfolio, assets, or infrastructure?

26,296

20,480

19,334

7,278

6,409

4,462

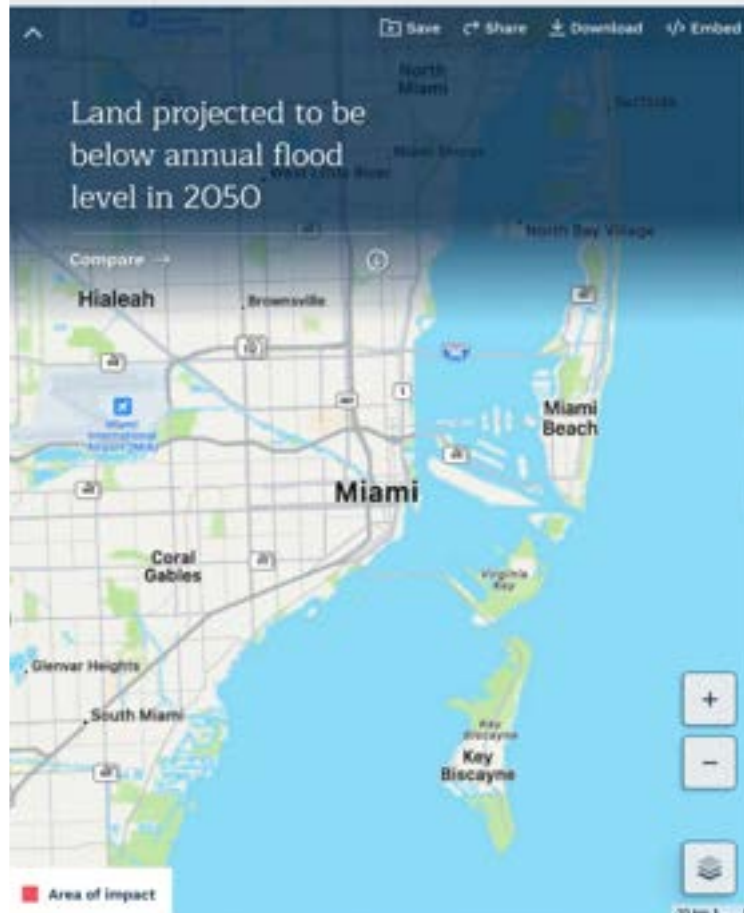
1,353

Coming Soon: Coastal Risk Finder

- Updated sea level rise, coastal flood, elevation, and asset location data
- More solutions focused content
- New user-friendly design based on a comprehensive needs assessment

Scenarios

Risks

 Enter location

[TITLE]

People at risk from sea level rise in Miami-Dade County, FL



(Risk) at risk from (projection) in (location)



(Risk) at risk from (projection) in (location)



[TITLE]

(Risk) at risk from (projection) in (location)



(Risk) at risk from (projection) in (location)



(Risk) at risk from (projection) in (location)



SOLUTIONS

Flood proofing your home



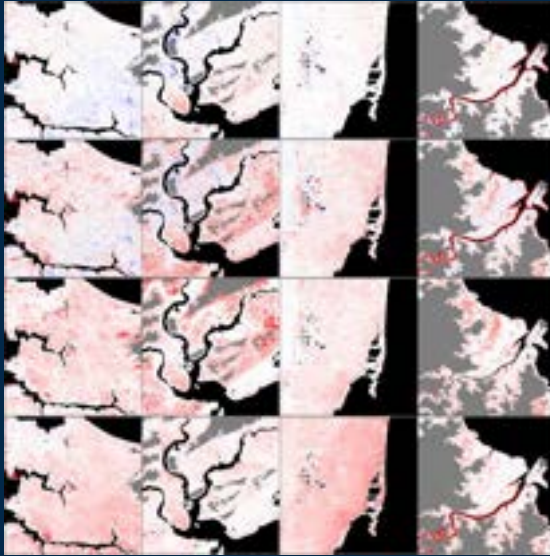
Protecting your community from flooding



Climate adaptation in Miami-Dade County, FL



Flood / Sea Level Rise Layers; Global Land Elevation Data



GIS Coastal Flood Layers (using US elevation data
as well as CoastalDEM[®] v3.0)

About Climate Central

- A climate science research and communications non-profit
- Non-partisan, non-advocacy
- National to international scope
- Providing localized, evidence-based information on climate science, impacts, & solutions

Climate Central Projects and Resources



FloodVision®



Edge of America
Tour



Coastal Risk
Screening Tool



Risk Finder

Thank you!

Links and Contact Info:



go.climatecentral.org/asfpm



Backup Tool Demo Slides



FOR LEASE
Norm Adams
954 331 1776

Andrews Av





SIMULATION

Climate Central Projects and Resources



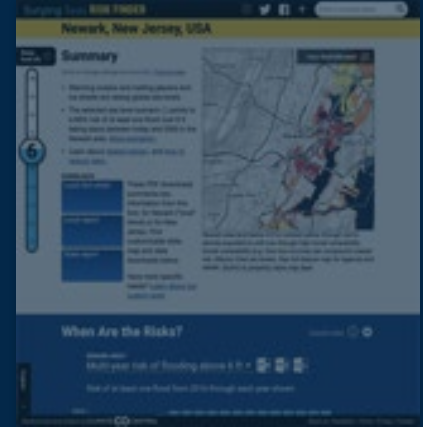
Edge of America
Tour



FloodVision®

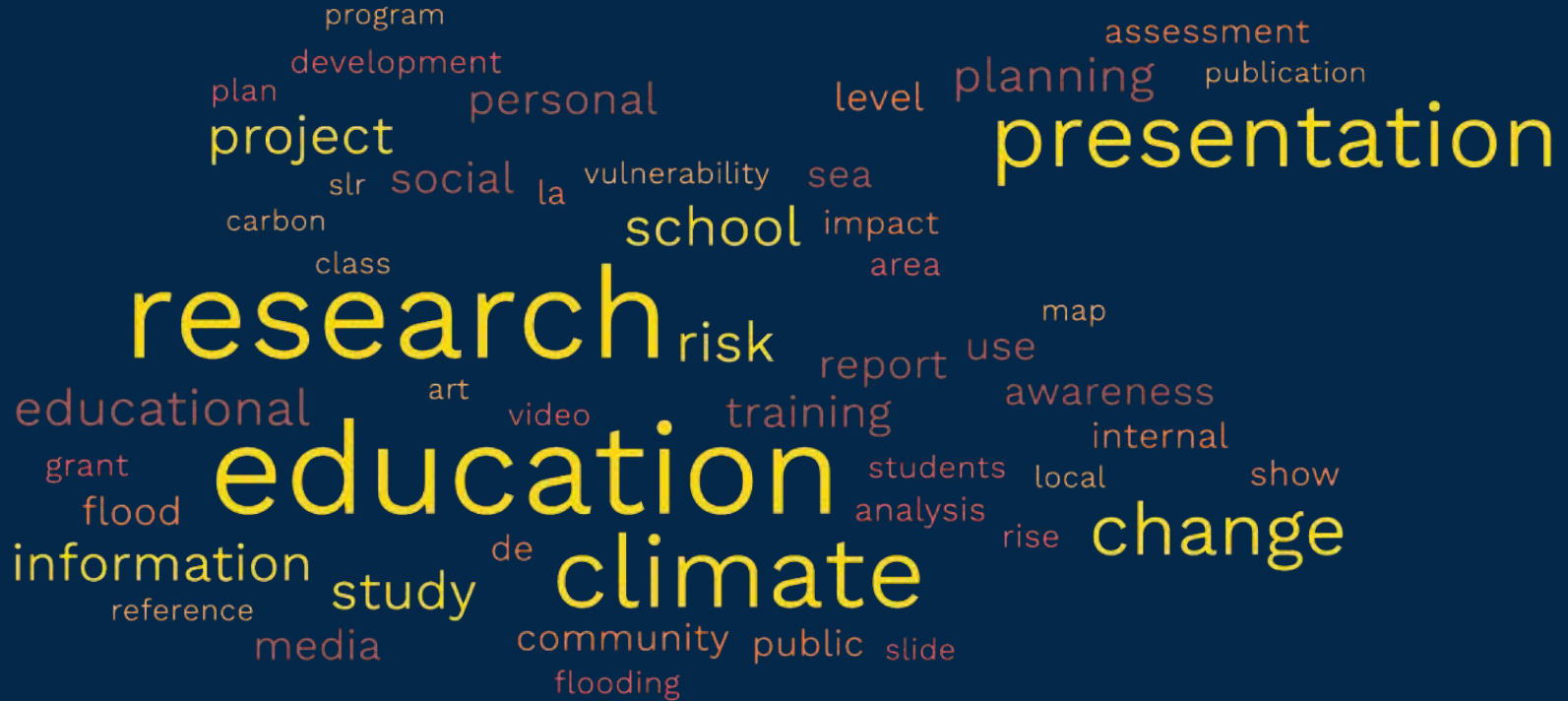


Coastal Risk
Screening Tool



Risk Finder

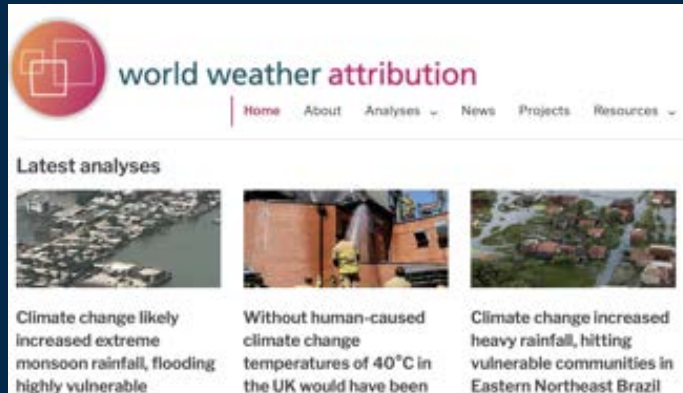
Non-profits use Climate Central tools for...



Academics use Climate Central tools for...



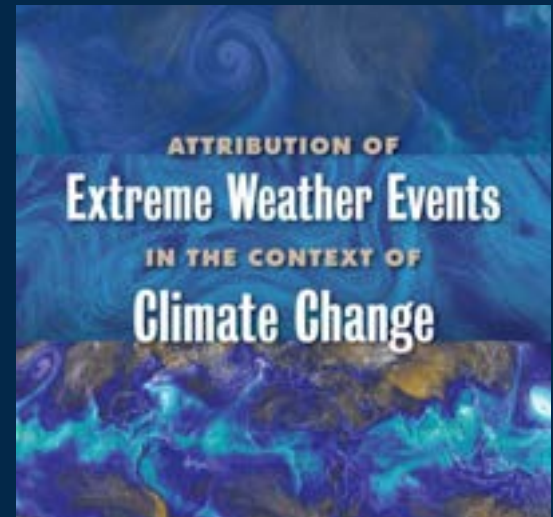
No single weather event can
be linked to climate change



Climate change is an
important factor in many
weather events

Event Attribution

- Doesn't answer “cause” question
 - Change in likelihood
 - Change in magnitude



world weather attribution

[Home](#) [About](#) [Analyses](#) [News](#) [Projects](#) [Resources](#)

Latest analyses



Climate change likely increased extreme monsoon rainfall, flooding highly vulnerable communities in Pakistan



Without human-caused climate change temperatures of 40°C in the UK would have been extremely unlikely



Climate change increased heavy rainfall, hitting vulnerable communities in Eastern Northeast Brazil



Politics Business World Climate Investigations Health Tech Lifestyle Sports U.S. Int'l & More Search

ready, pending

Study finds that climate change added 10% to Ian's rainfall

By Seth Borenstein | AP
September 29, 2022 at 10:18 p.m. EDT

Date

◀ Today ▶

☒ Single date

☐ Multi-day average

Units

☐ Celsius

☒ Fahrenheit

☐ Kelvin

Advanced settings

☒ Show place labels

Select type of map:

Temperature anomaly ▼

Show temperature difference from:

Minimum temperature

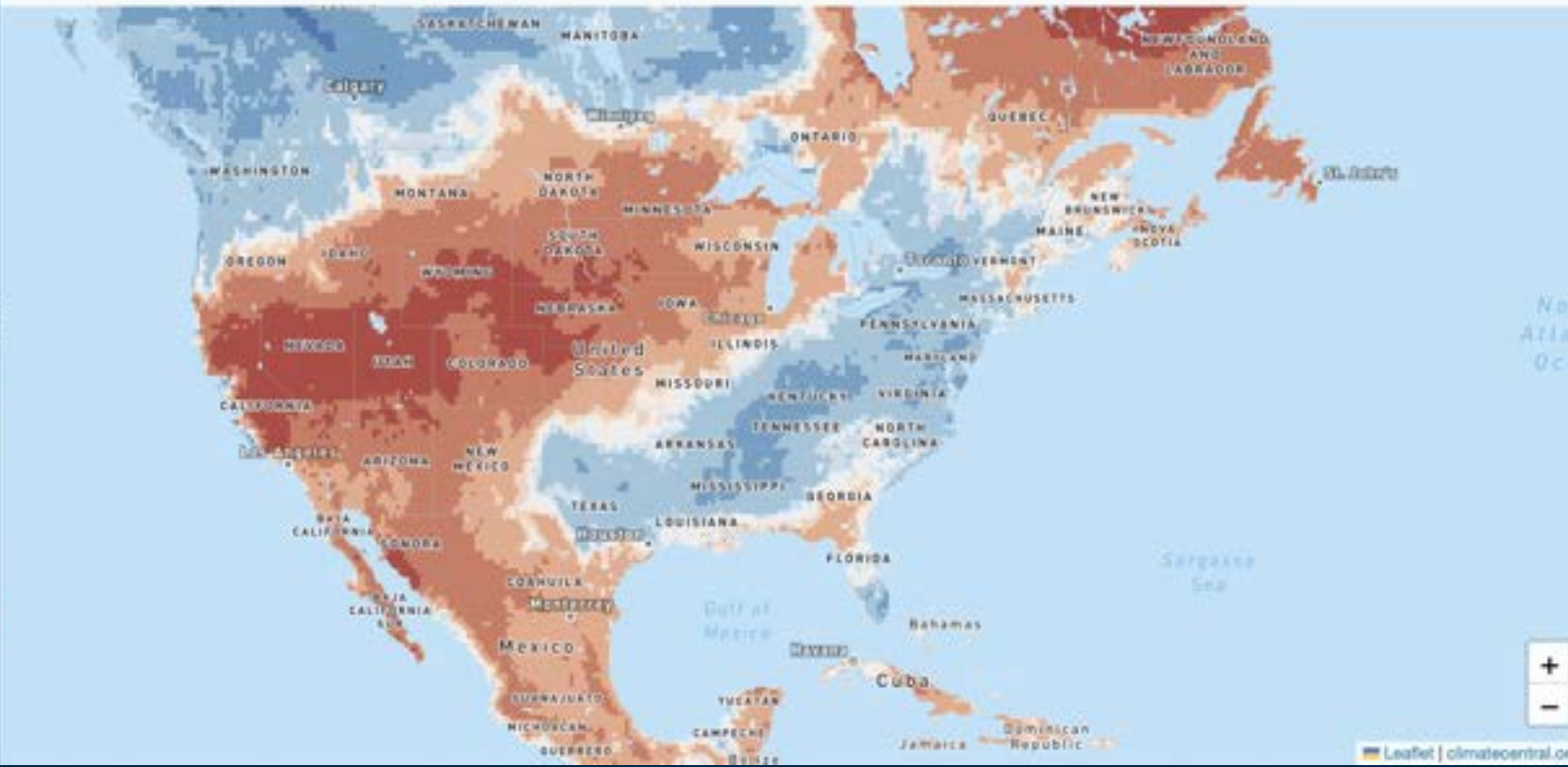
Average temperature

Maximum temperature

Map boundaries

Difference from Normal

for average temperatures, Jun 12, 2024



Climate Shift Index®
Global Map

City

Type a city name

Date

◀ Today ▶

- Single date
- Multi-day average

Units

- Celsius
- Fahrenheit
- Kelvin

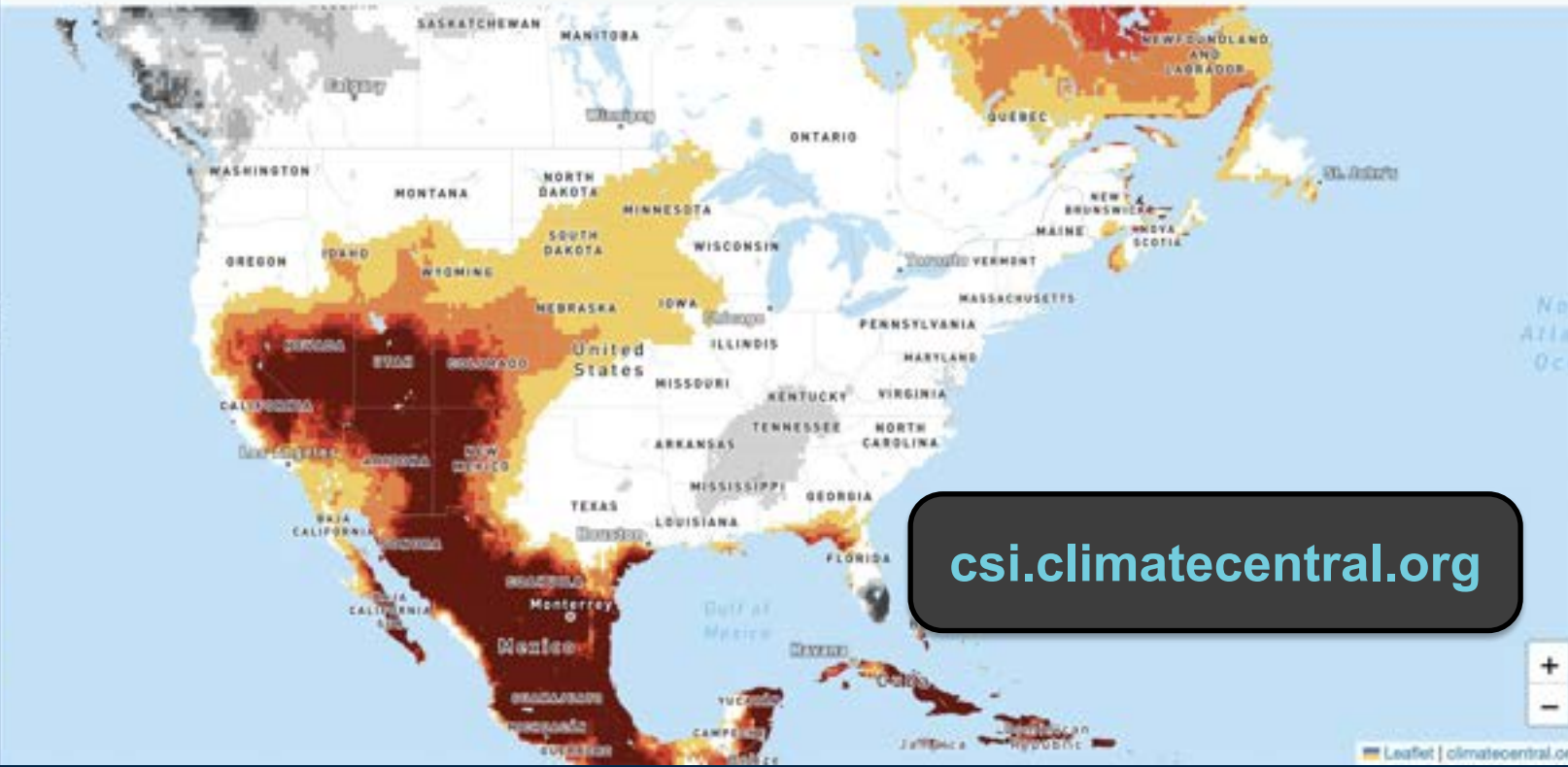
> Advanced settings

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climate data email →

Climate Shift Index [Learn more...](#)
for average temperatures, Jun 12, 2024

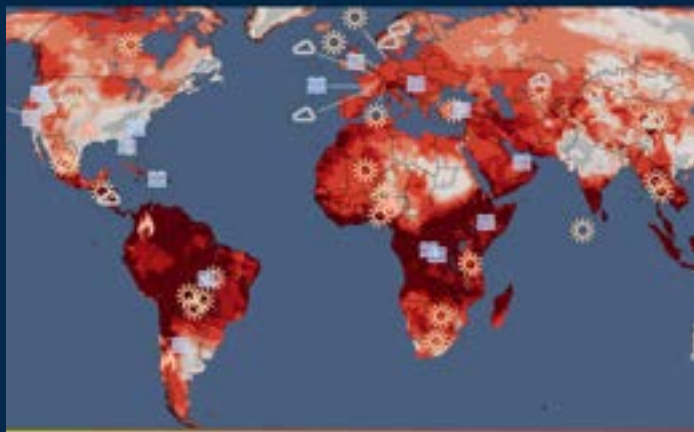


csi.climatecentral.org

Reports

Seasonal Attribution Report

An analysis of how climate change boosted temperatures worldwide between December 2023 and February 2024



March 7, 2024

CLIMATE  CENTRAL

Seasonal reports in
June, September, December

Heat Action Day report
Joint w/ World Weather
Attribution

Report on nighttime heat

Heat Alerts

June 11: Southwest
US

CLIMATE CHANGE FINGERPRINT ON HEAT

Average temperatures expected over June 11-13, 2024



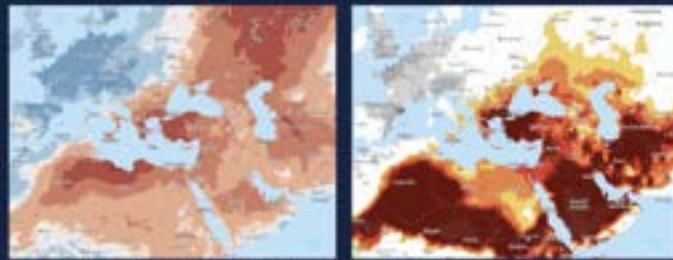
Data: Average temperature departures averaged from June 11-13, 2024.
Attribution based on ECCC's 2020 and 2022 reports. Temperature departures from 1951-2020 average.

CLIMATE CENTRAL

June 11: Eastern
Mediterranean

CLIMATE CHANGE FINGERPRINT ON HEAT

Average temperatures expected over June 11-13, 2024



Data: Average temperature departures averaged from June 11-13, 2024.
Attribution based on ECCC's 2020 and 2022 reports. Temperature departures from 1951-2020 average.

CLIMATE CENTRAL

Climate Shift Index

- CSI map: csi.climatecentral.org
- Reports +Alerts: www.climatecentral.org/climate-shift-index-alert
- WWA's Reporting Guide for journalists:
www.worldweatherattribution.org/reporting-extreme-weather-and-climate-change-a-guide-for-journalists/
- Sign up for
 - Climate Matters: www.climatecentral.org/climate-matters
 - To be added to the WWA media mailing list, please contact wwamedia@imperial.ac.uk

apershing@climatecentral.org



Town of Nantucket

Feasibility Study and Design for Flood Mitigation on Easy Street in Downtown Nantucket

July 23, 2024

Update to Nantucket Coastal Resilience Advisory Committee

Flood Risk & Alternatives Discussion



Agenda

1 Project Schedule

5 Overview of Alternatives

2 Project Area and Overview

6 Next Steps

3 Project Engagement

4 Flood Risk



Project Schedule

Task	FY2024 Months FY2025 Months																	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Task 1 - Existing Conditions and Flood Risk Assessment			 	Existing Conditions and Flood Risk Report, including all Task 1 Deliverables														
Task 2 - Alternatives Development and Pre-Permitting Feasibility Assessment							Concept Design and Feasibility Report including all Task 2 Deliverables											
Task 3 - Community and Stakeholder Engagement	Consultant team will provide support for Year 1 stakeholder engagement activities led by Town																	
Task 4 - Preliminary Design Development for Preferred Alternative & Basis of Design Report														Final Report including all Task 4 Deliverables				

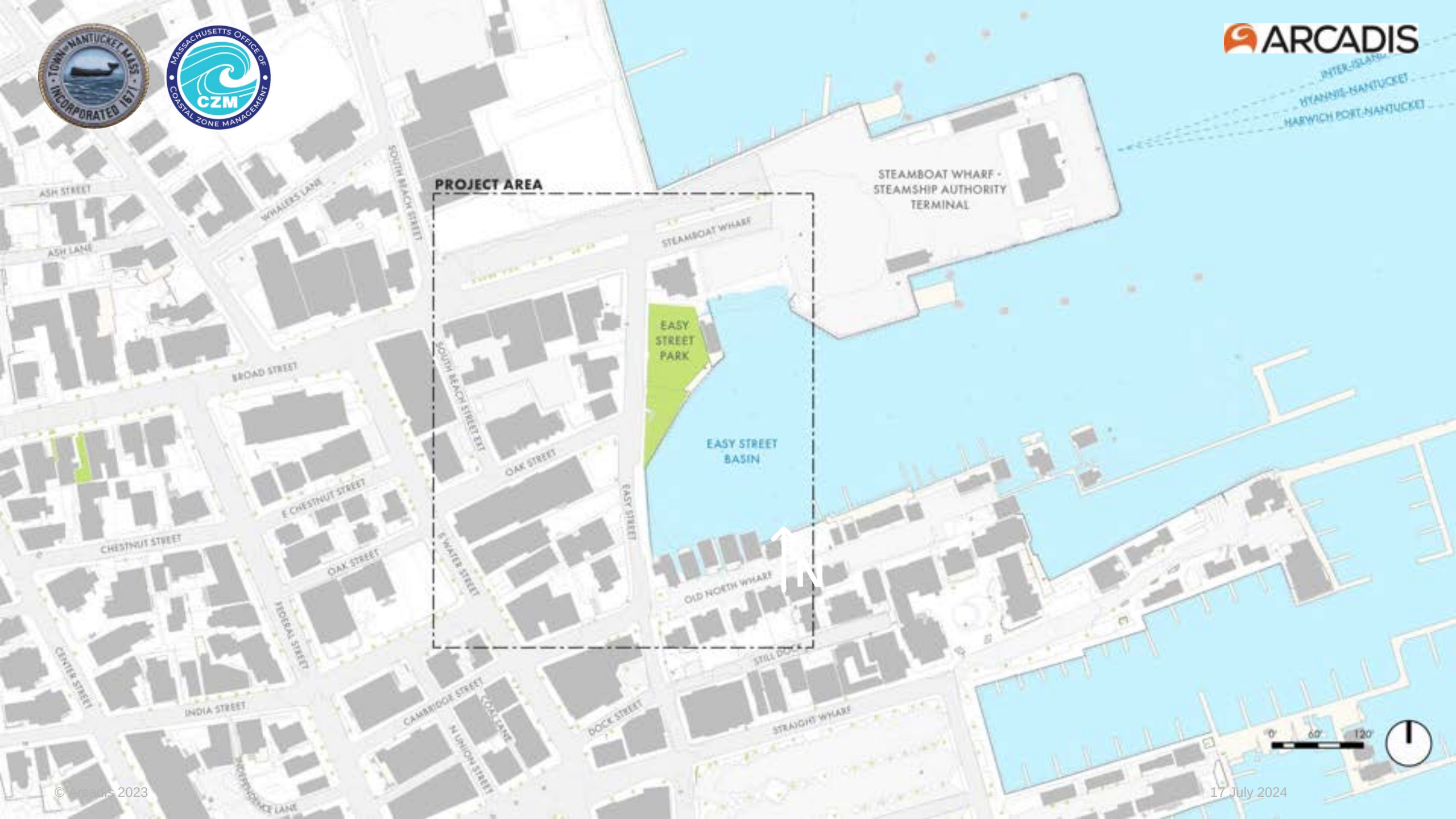
◆ Project Kickoff

● CRAC/Select Board Briefing

◻ Site Visit

★ Major Deliverable

▲ Public Meeting







Easy St Flooding
March 7, 2020
Photo by Robert Young



Project Goals



Project Outcome

- Develop feasible project to mitigate stormwater and coastal flood risk along Easy Street
 - Inclusively engage the Nantucket community and stakeholders island-wide in the design development process
 - Seek co-benefits that improve access, mobility, and the environment as part of the design development process
- 30% Design package that achieves outlined project goals

Previous and Upcoming Engagement

Coastal Resilience
Advisory
Committee
• Feb 2024

Nantucket Land
Bank
• July 2024

Town of Nantucket
Departments
• Feb – July 2024

Steamship Authority
• July 2024

MassCZM
• Feb – July 2024

Upcoming:
• Land Bank Commission
7/23
• Property Abutters 7/31
• Public Open House 8/7



What we're heard...

- Stormwater flooding issues
- Water quality and ecological restoration
- Access/egress for Steamboat Wharf
- Historical aspects and aesthetics in Downtown area
- Role of the “working waterfront”
- Co-benefits beyond flood mitigation
- Seek win-wins that align with Land Bank, Steamship Authority, and Town objectives

***Please share
other
considerations
from your
perspective?***



Existing Conditions

- **Existing Conditions & Flood Risk Report (May 2024)**
 - Site Survey by Blackwell & Associates
 - Waterfront Structures Assessment by Childs Engineering
 - Flood Risk Assessment by Woods Hole Group and Arcadis
 - Stormwater Flooding – Data collection and review ongoing

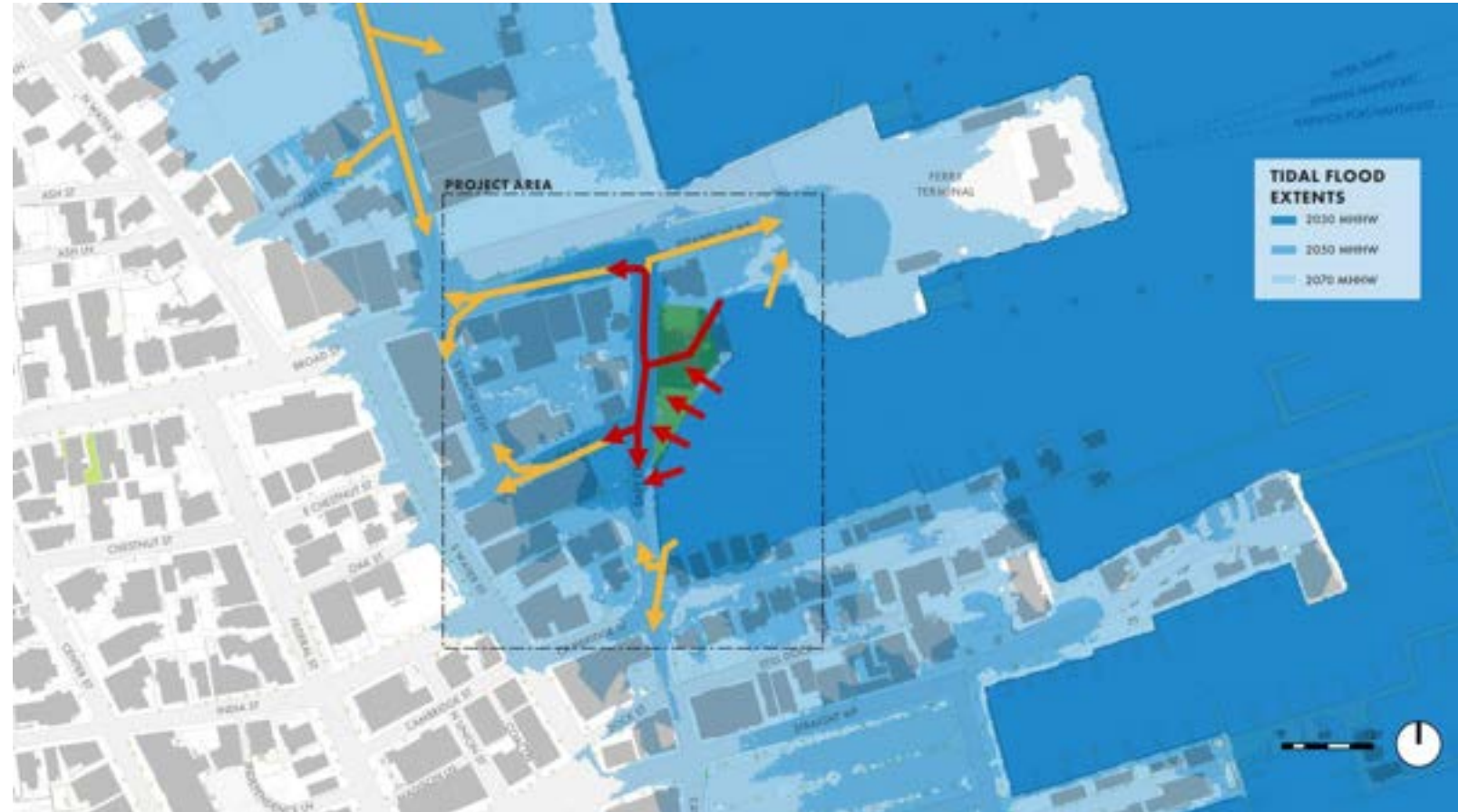




Flood Risk Assessment

- **Flood Risk Assessment:**

- High tides and coastal storms pose a risk to public roadways surrounding Steamboat Wharf, causing loss of service
- Numerous structures at risk from tidal flooding with increasing frequency through 2070
- Cumulative losses totaling \$1.2 Billion from now through 2070 due to coastal flooding
 - Physical damage to buildings
 - Economic disruption
 - Social disruption



Overland Coastal Flood Pathways
Data Sources: Town of Nantucket, MC-FRM



Stormwater Assessment

- Arcadis completed a records review of various reports, figures, and drawings from the Town of Nantucket to find out more about the existing drainage network.
- Town of Nantucket Sewer Department is currently conducting a Capacity, Management, Operations, and Maintenance (CMOM) Study with Hazen & Sawyer. Scope includes CCTV of drainage network in our project area.
- Town of Nantucket has requested the stormwater infrastructure GIS data layer from Hazen & Sawyer, who maintains the Town GIS map
- Town of Nantucket also has a study kicking off this month with Geosyntec & Horsley Whitten Group to explore nutrient loading and groundwater mapping of the Nantucket Harbor watershed



Stormwater Utilities along Easy Street

Source: Town of Nantucket



Overland Tidal Flood Extents

Data Sources: Town of Nantucket, MC-FRM, MassGIS



**STORM SURGE
EXTENTS
(100-YR)**

- 2024 100-yr
- 2030 100-yr
- 2050 100-yr
- 2070 100-yr

*Based on MC-FRM

Overland Coastal Flood Extents

Data Sources: Town of Nantucket, MC-FRM, MassGIS



Overview of Alternatives



Design Considerations

- **Design Flood Elevation:** 6.5' ft NAVD88 and 8.0' ft NAVD88 DFE used to develop concepts
 - 8.0' ft is consistent with Washington Street Resilience Project
 - Creates consistent bulkhead elevation for comprehensive protection against seepage, overtopping, and flanking from coastal flooding
 - Lower DFEs are considered with adaptability to higher DFE in the future
- **Access:**
 - Must maintain vehicular and pedestrian access on Easy Street
 - Must maintain access and egress to Steamboat Wharf
 - Seek opportunities to improve and enhance vehicular and pedestrian access to and from Steamboat Wharf
- **Feasibility:**
 - Maintain established bulkhead line (minimize in-water impacts)
 - Identify tie-ins to high ground on South and North extents of project area
 - Consider alternatives with and without property acquisition
 - Reduce flooding from coastal events and manage stormwater from rainfall in drainage area
 - Alternatives must include implementation of functioning tide gates on outfalls and stormwater management strategies (e.g., pumping, detention and conveyance improvements) to manage interior drainage

Unknowns

- **31 Easy Street Parcel**
 - Status of parcel uncertain but would be beneficial if integrated into project design
- **Steamship Authority resilience approach**
 - Ongoing coordination with SSA will be necessary



Design Flood Elevations (DFE) and Levels of Protection

Target DFE (ft, NAVD88)	Present Day	2030	2050	2070
4.5	~40% AEP (2.5-yr)	~Flooding some Spring High Tides	Flooding almost every high tide	Flooding every high tide (for approximately half the tidal cycle)
5.0	~25% AEP (4-yr)	~100% AEP (Annual Storm)	~ Spring High Tides	Flooding every high tide
5.5	~20% AEP (5-yr)	~50% AEP (2-yr)	~ Highest Annual Tide	Flooding every high tide
6.0	~10% AEP (10-yr)	~30% AEP (3.3-yr)	~100% AEP (Annual Storm)	~ Mean High Water
6.5	~6.7% AEP (15-yr)	~20% AEP (5-yr)	~30% AEP (3.3-yr)	~ Spring High Tides
7.0	~3.3% AEP (30-yr)	~15% AEP (6.7-yr)	~20% AEP (5-yr)	~ Highest Annual Tide
7.5	~2% AEP (50-yr)	~8% AEP (12.5-yr)	~10% AEP (10-yr)	~ 100% AEP (Annual Storm)
8.0	~1% AEP (100-yr)	~5% AEP (20-yr)	~8% AEP (12.5-yr)	~50% AEP (2-yr)

Levels of protection based on MC-FRM



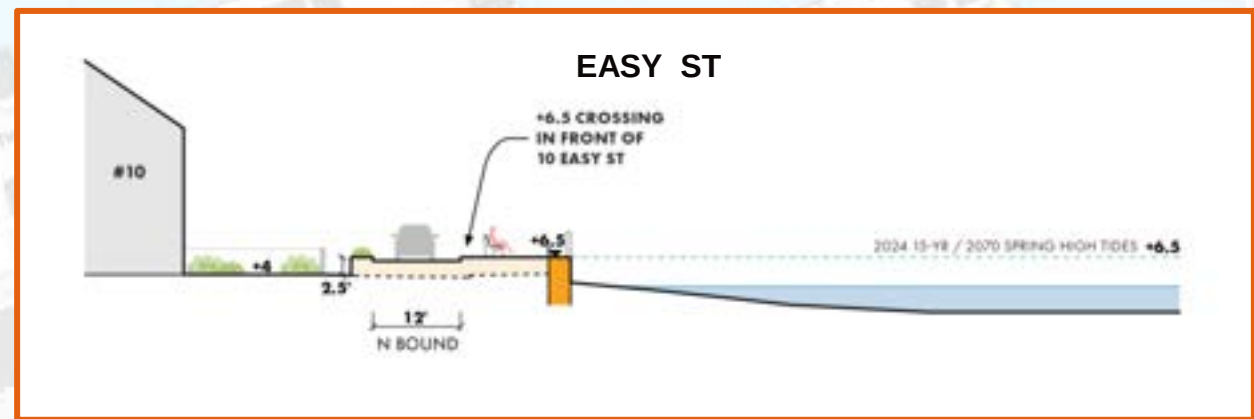
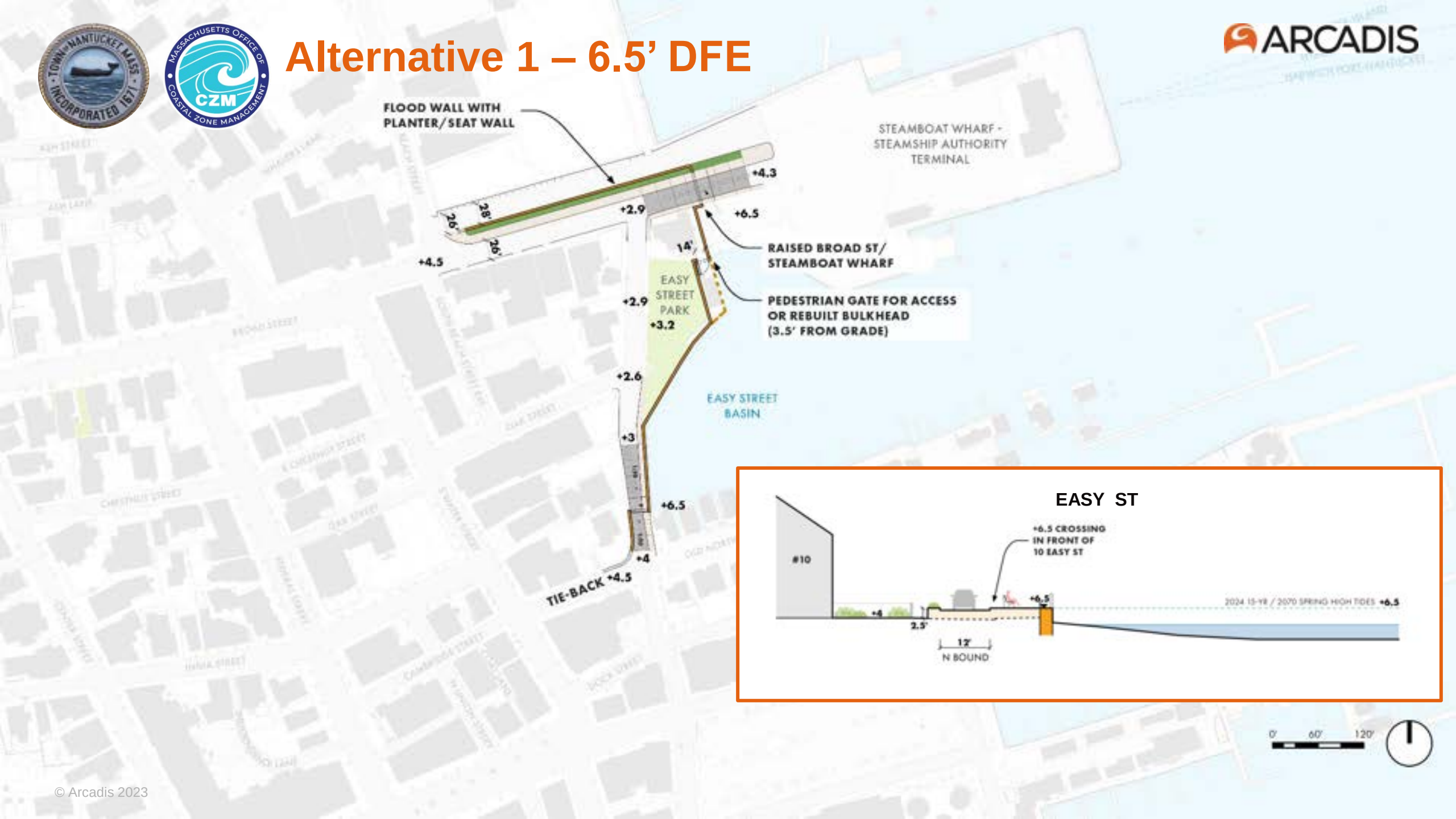
Alternatives Evaluation Matrix

Alternatives are rated for level of protection, ease of implementation, permitting requirements, cost, adaptability, integration, fit for funding, and co-benefits provided by the alternatives.

Alt	Level of Protection	Ease of Implementation	Permitting Requirements	Cost	Adaptability	Integration	Fit for Funding	Co-benefits
Alt 1	Medium	High	Medium	Low	Medium	Medium	Low	Medium
Alt 2	High	Medium	Medium	Medium	Medium	Low	Medium	Medium
Alt 3	High	Low	High	High	High	High	High	High
Alt 4	High	Low	High	High	High	High	High	High
Alt 5 - No Action	Low	NA	NA	NA	NA	NA	NA	Low

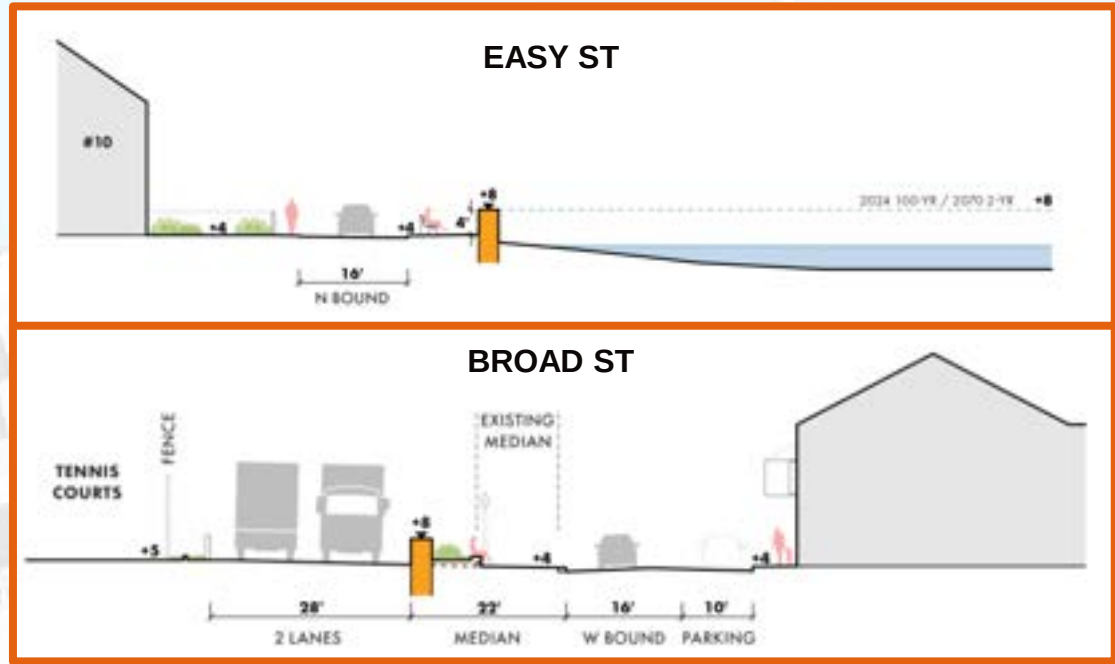
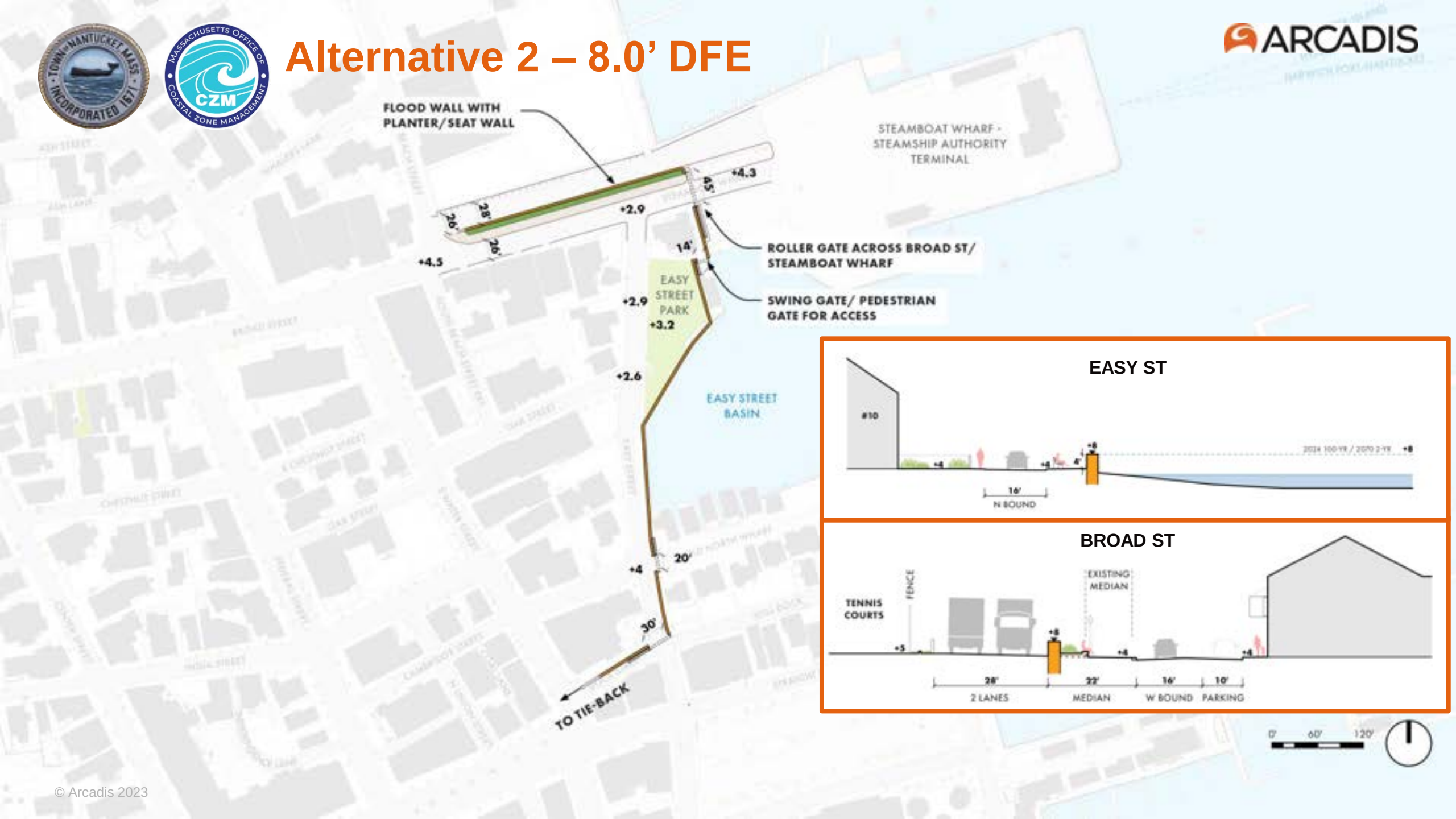


Alternative 1 – 6.5' DFE



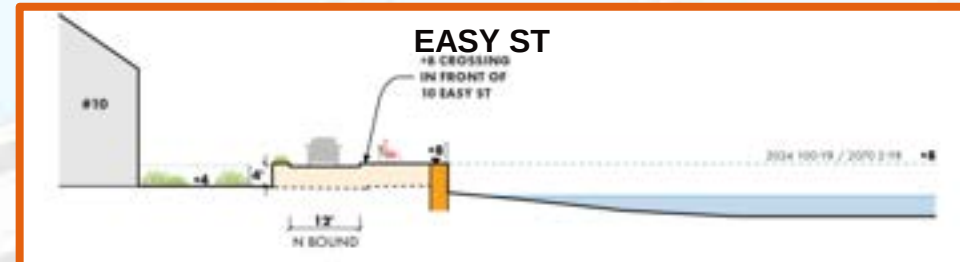


Alternative 2 – 8.0' DFE



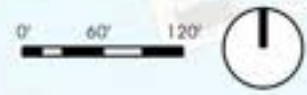
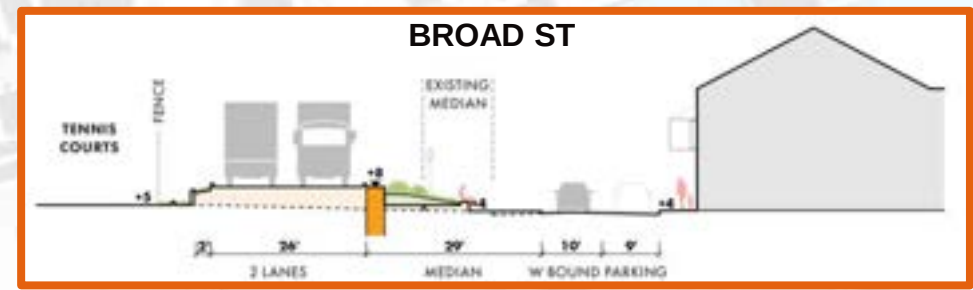
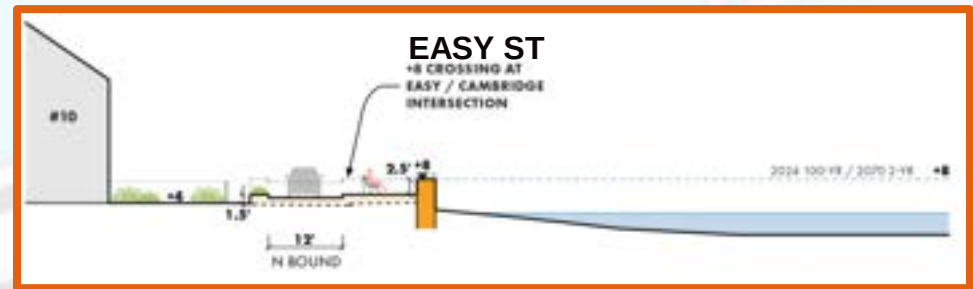


Alternative 3 – 8.0' DFE



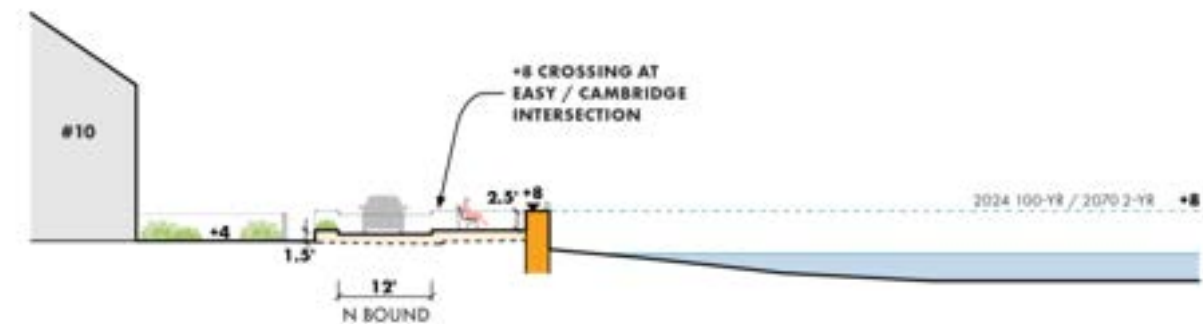
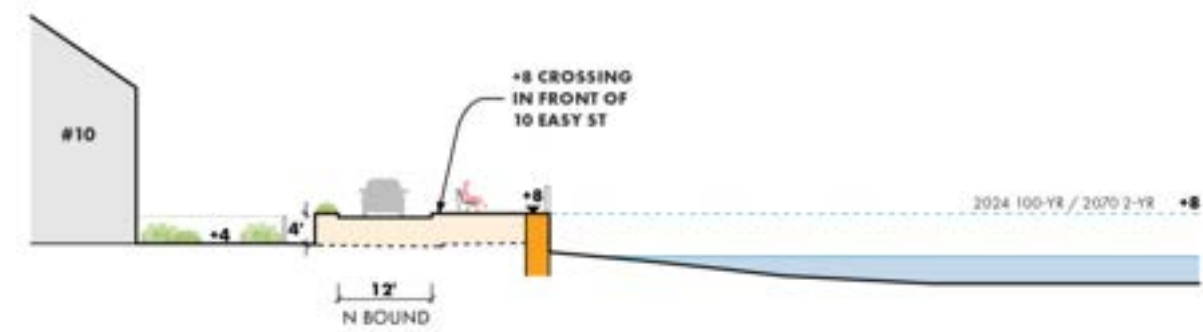
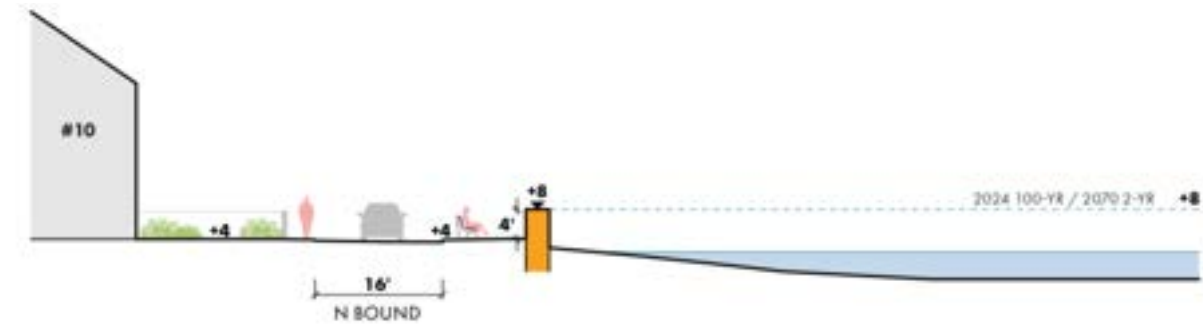
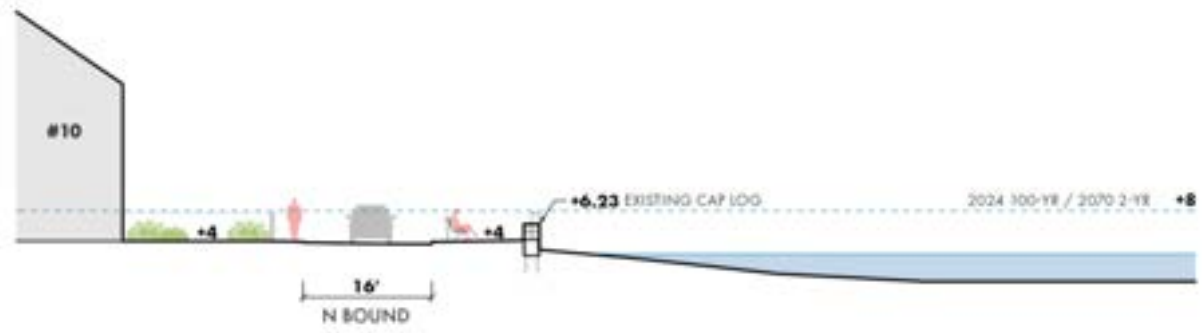


Alternative 4 – 8.0' DFE





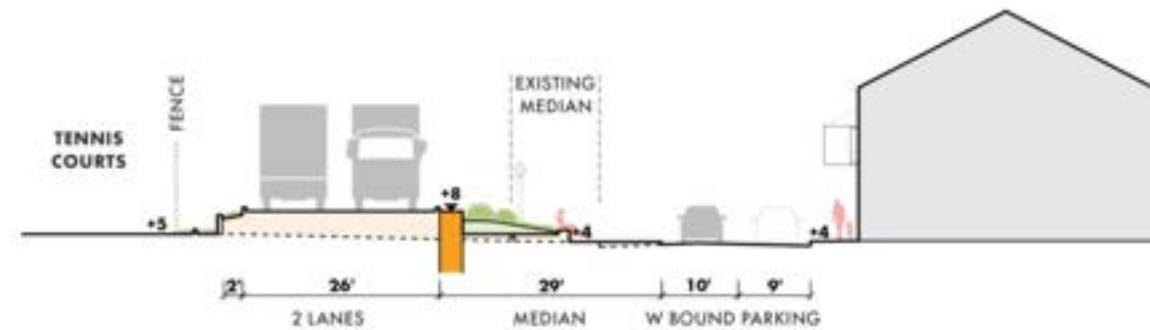
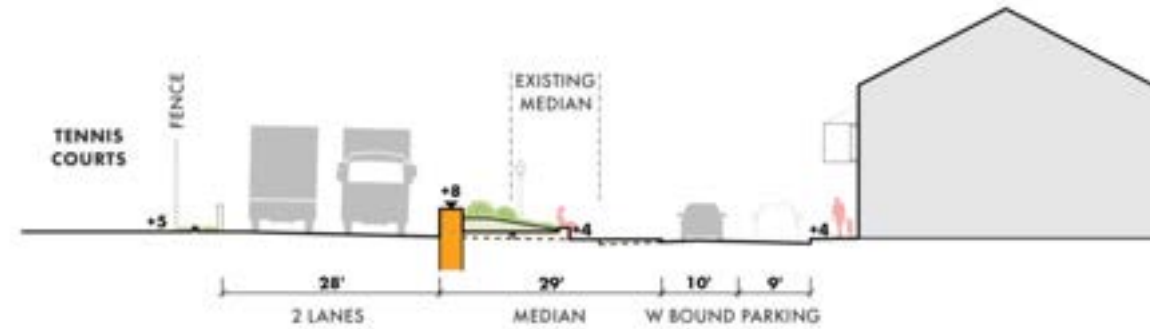
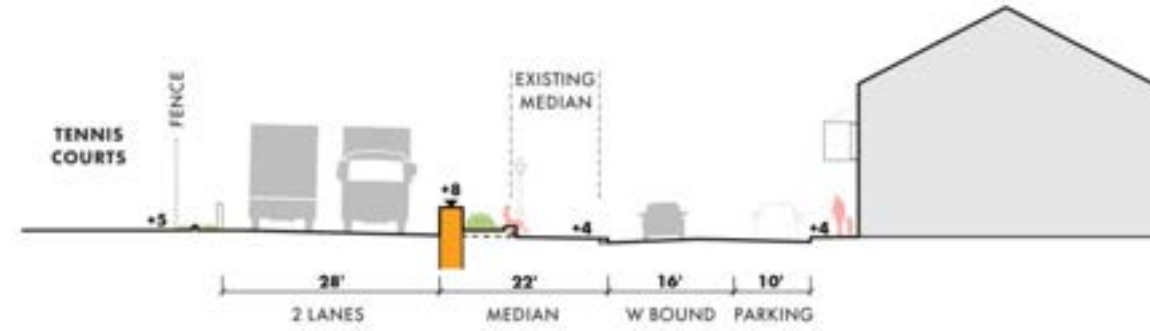
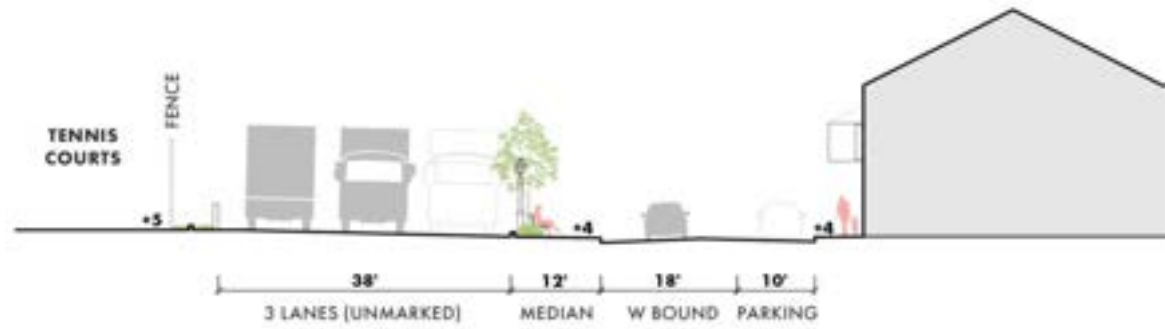
EASY STREET -
EXISTING



EASY STREET –
CONCEPT
ALTERNATIVES



BROAD STREET - EXISTING



BROAD STREET – CONCEPT ALTERNATIVES



Next Steps

- Meeting with direct property abutters
- Public Open House
 - Joint public Open House with Washington Street Flood Resilience Project on August 7
 - Two part event: morning and afternoon sessions at Whaling Museum
 - Goal is to present results of existing conditions and flood risk assessment, and collect public input on conceptual design alternatives
- Identify and further develop design for preferred alternative based on additional analysis and stakeholder input

***Please help us
promote the public
Open House on
August 7th!***

