Visualizing, Assessing, and Communicating Sea Level and Coastal Flood Risk with FloodVision®

NYC Climate Knowledge Exchange Working Group Meeting
March 7, 2024

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Director, Program on Sea Level Rise
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CLIMATE CENTRAL

About Climate Central

- A climate science research and communications NGO, founded in 2008 and based in Princeton, NJ
- Non-partisan, non-advocacy
- Localized, evidence-based information on climate science, impacts, & solutions

Risk Finder Downloads

.gov downloaders

.org downloaders

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Tools in Use

TOWN OF WARREN, R.I. Incorporated 1747

TOWN GOVERNMENT

RESIDENTS

BUSINESSES

GET TO KNOW WARREN

I WANT TO...

Search

DRAFT
Hazard Mitigation & Flood Management Plan

Section 1-Introduction DRAFT

Section 2-Planning Process DRAFT

Section 3-Community Profile DRAFT

Section 4-Risk Assessment DRAFT

Section 5-Capability Assessment DRAFT

Section 6-Mitigation Strategy DRAFT

Section 7-Plan Adoption Implementation &Maintenance DRAFT

TAKE A LOOK AT THIS!

Vulnerability Exposure Web Map: This is an excellent **PLANNING TOOL** created in conjunction with the **HM&FMP** to provide a visual representation of the potential threat to Warren from extreme storm events and sea level rise. TO VIEW CLICK BELOW:

WARREN WEB MAP

Want to Learn More?

Following are some links that will provide additional information related to the HM&FM Plan Project

- Warren Hazard Mitigation Plan 2015
- FEMA Flood Zone Interactive Map for Warren
- RI BeachSAMP and STORMTOOLS

At-Risk Populations

Those residing in close proximity to Warren's extensive coastline in the Special Flood Hazard Area (SFHA) comprised of the V and A Flood Zones are more at risk to coastal flooding.

Social vulnerability (e.g., from low income) can further compound coastal risks. As depicted in **Figure 4-17**, of the roughly 970 people who reside on land below an elevation of 5-feet, the vast majority fall into the high social vulnerability category.

Figure 4-17 Vulnerable Population Residing on Land below 5-Feet Elevation

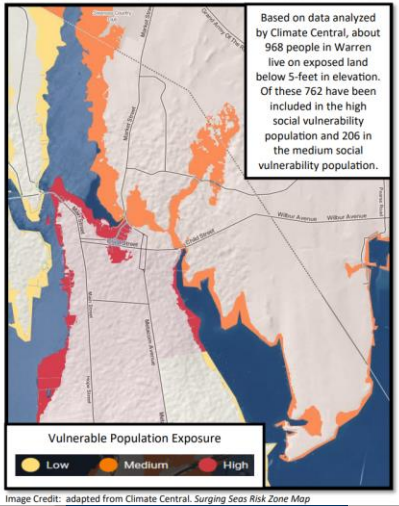

Image Credit: adapted from Climate Central. *Surging Seas Risk Zone Map*

Figure 4-18 Coastal Flood Analysis – Providence RI

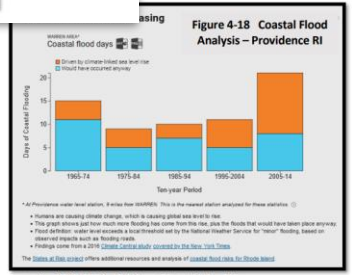

Image Credit: Climate Central. *Surging Seas Risk Zone Map*

"According to the National Climate Assessment, coastal flooding in the northeast has increased due to a rise in sea level of around one foot since 1900. And in the future, if we continue to emit greenhouse gases, global sea levels are expected to rise one to four feet by 2100. Specifically in the coastal Northeast, due to the natural sinking of land, sea levels are likely to rise even ***higher*** than the global average. A sea level rise of two feet would more than triple the frequency of coastal flooding across the Northeast, without any change in storms" (Di Liberto).

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Government Use Case Examples

Organization	Climate Central Resource	Intended Use of Download (as entered by end user)
County officials in Dept. of Planning & Zoning	Map	planning
State Lands Commission	Map	granted lands vulnerability assessment
Federal agency	Risk Finder	environmental planning & risk analysis
County/State Office of planning	Scenario 2100 data	research and long-range planning
County Utilities Authority	Map	resiliency planning
Federal agency	Map	NEPA environmental assessments
County Board of County Commissioners	Guide on using Climate Central tools within NFIP CRS	CRS planning
State Department of Conservation and Recreation	Map	relocation of facilities
City in Maryland	Risk Finder	data collection for comprehensive plan update
City in New Hampshire - Planning Department	Scenario 2100	planning & zoning
City in California	Risk Finder Fact Sheet	FEMA Grant
State Department of Transportation	Risk Finder Forecast Data	Grant application

Sea Level Rise & Social Vulnerability Workshops



Completed Workshops

Click below to learn about the workshops conducted by Climate Central & NAACP.

- Honolulu, HI,
- North Charleston, SC
- Eastern Shore, MD
- Orlando, FL
- Pensacola, FL
- Gulfport, MS
- Houston, TX
- Wilmington, NC
- Gulfport, MS

https://sealevel.climatecentral.org/responses/workshops/

SLR Program:
Empowering Resilience & Mitigation

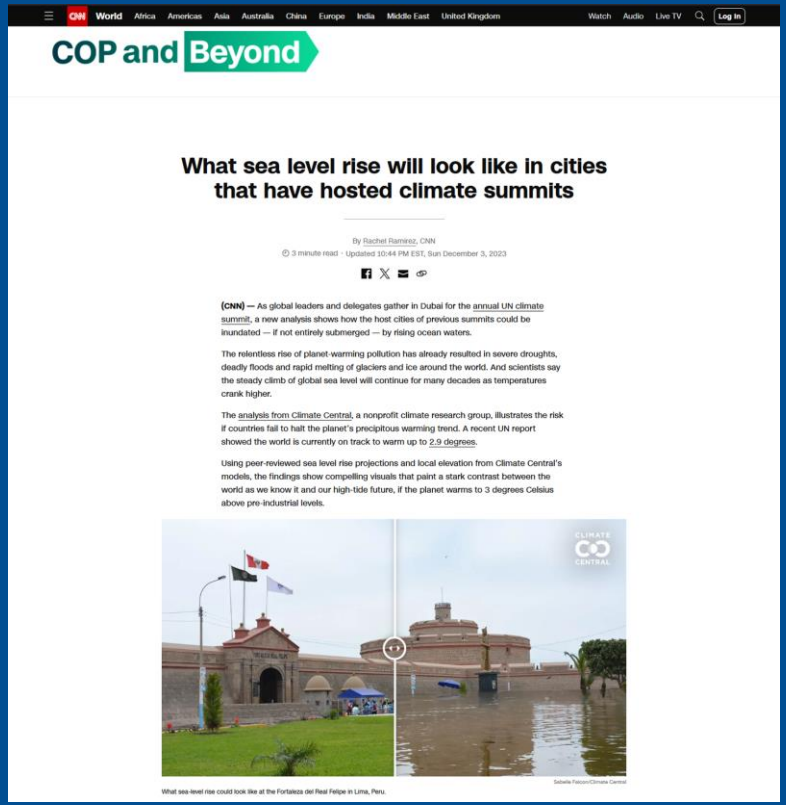
FloodVision

Edge of
America Tour

CLIMATE CENTRAL

Scaling visualizations to scale impact

FloodVision



CNN World Africa Americas Asia Australia China Europe India Middle East United Kingdom Watch Audio Live TV Log in

COP and Beyond

What sea level rise will look like in cities that have hosted climate summits

By Rachel Ramirez, CNN

3 minute read · Updated 10:44 PM EST, Sun December 3, 2023

(CNN) — As global leaders and delegates gather in Dubai for the annual UN climate summit, a new analysis shows how the host cities of previous summits could be inundated — if not entirely submerged — by rising ocean waters.

The relentless rise of planet-warming pollution has already resulted in severe droughts, deadly floods and rapid melting of glaciers and ice around the world. And scientists say the steady climb of global sea level will continue for many decades as temperatures crank higher.

The analysis from Climate Central, a nonprofit climate research group, illustrates the risk if countries fail to halt the planet's precipitous warming trend. A recent UN report showed the world is currently on track to warm up to 2.9 degrees.

Using peer-reviewed sea level rise projections and local elevation from Climate Central's models, the findings show compelling visuals that paint a stark contrast between the world as we know it and our high-tide future, if the planet warms to 3 degrees Celsius above pre-industrial levels.

What sea-level rise could look like at the Fortaleza del Real Felipe in Lima, Peru.

Sabella Falcon/Climate Central

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954 331 1776


OR LEASE


Andrews Av
SIMULATION

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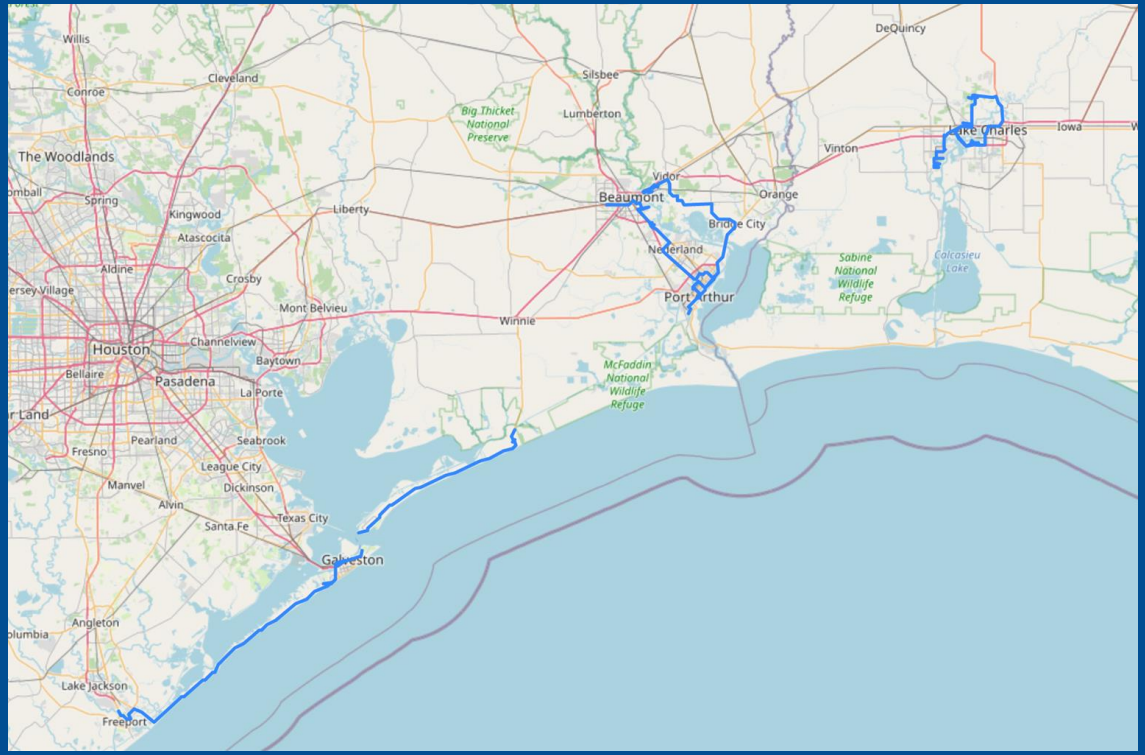
FloodVision®

What we learned in Texas



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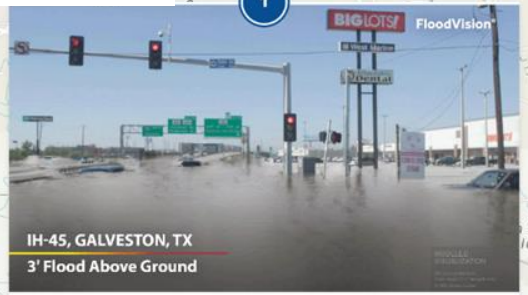
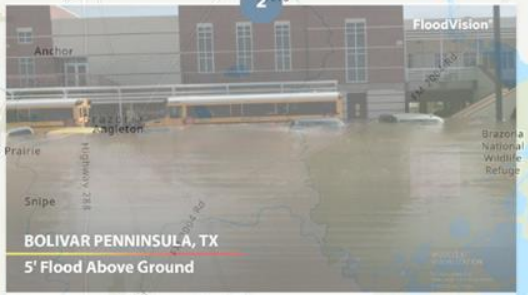


IH-45 Evacuation Route

Click image to enlarge



Elementary - Middle School

Click image to enlarge

01 / 08

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MODELED
VISUALIZATION
NOAA 2022 Intermediate-High Sea Level Rise
Scenario for 2050
Water Height: 1' 8" above MHHW
© 2023 Climate Central


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MODELED
VISUALIZATION
NOAA 2022 Intermediate-High Sea Level Rise
Scenario for 2050 + annual flood
Water Height: 3' 1" above MHHW
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CLIMATE CENTRAL
FloodVision®
MODELED
VISUALIZATION
NOAA 2022 Intermediate-High Sea Level Rise
Scenario for 2050 + 10% annual chance flood
Water Height: 4' 5" above MHHW
© 2023 Climate Central

FloodVision®

Major Project for 2024: Edge of America Tour

State	Total (Miles)	Driving Days (Est)
Maine	545.7	7
New Hampshire	23.0	0.5
Massachusetts	451.8	6
Rhode Island	176.0	2.5
Connecticut	234.5	3
New York	499.4	7
New Jersey	312.5	4
Delaware	183.9	2.5
Maryland (East)	60.1	1
Maryland (West)	232.3	3
Virginia	288.1	3.5
North Carolina	422.0	5
South Carolina	447.8	5.5
Georgia	238.0	3
Florida (East)	681.1	8.5
Florida (West)	950.2	12
Alabama	154.3	2
Mississippi	108.3	1,5
Louisiana	411.2	5
Texas	654.5	8
Total	**7074.7**	**89**

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FloodVision®

Edge of America Tour

2nd Vehicle

Ford F-150 Lightning - Fully Electric

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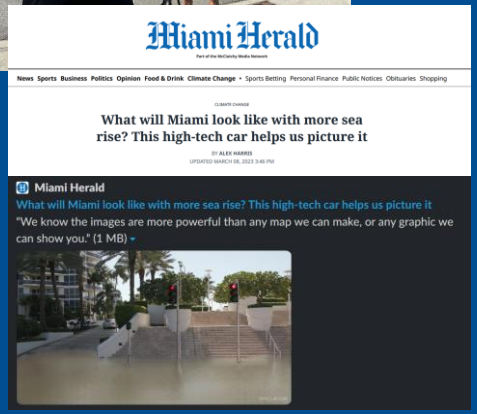
Expanding impact face to face

FloodVision®

Edge of America Tour



Media

Government Officials

Community Engagement

CLIMATE CENTRAL

Upcoming FloodVision Trip - NYC Area

Are you interested in having Flood Vision visit locations important to you? We're planning a trip to the New York City area.

Contact us to share your suggestions and learn more:

Dan Rizza
Director, Program on Sea Level Rise
drizza@climatecentral.org

BetaNYC

floodgen

Flood advocacy tool using AI generated imagery

Climate Knowledge Exchange, NYU Tandon | March 7, 2024
BetaNYC Civic Innovation Lab

Agenda

01 BetaNYC

Introduction to BetaNYC, our team, and the Civic Innovation Lab

02 floodgen

Flood advocacy tool using AI generated imagery

03 Next Steps

Connect with communities and partners to collaborate on flood preparedness advocacy

We are BetaNYC!

5 Full Time Staff

6 Associates

\+ Civic Innovation Fellows


Gabby


Audrey


Naeema


Ashley


Noel


Dimitri


Hailee


Lun


Jazzy


Erik


Kate

01

Intro to BetaNYC

βetaNYC

Our mission is to make it easier for all New Yorkers to access information and to use open data to improve their communities.

Our journey of civic tech, open data and community organizing in NYC

2008 2009 2010 2011 2012 2013 2014 2015 2016

Open NY

Meetup

Community & public programs

Annual Civic Tech Conference

BetaNYC

People's Roadmap

CUNY Service Corps

FUND FOR THE CITY OF NEW YORK

Civic Innovation Fellowship

Introduction open data

a workshop on open data literacy

NYC SCHOOL OF DATA

CODE for AMERICA BRIGADE

NYC Open Data & Tools

2017 2018 2019 2020 2021 2022 2023 2024

OPEN DATA WEEK 2022

Powered By NYC OpenData

NYC OpenData Ambassadors

Research and Data Assistance Requests (RADAR)

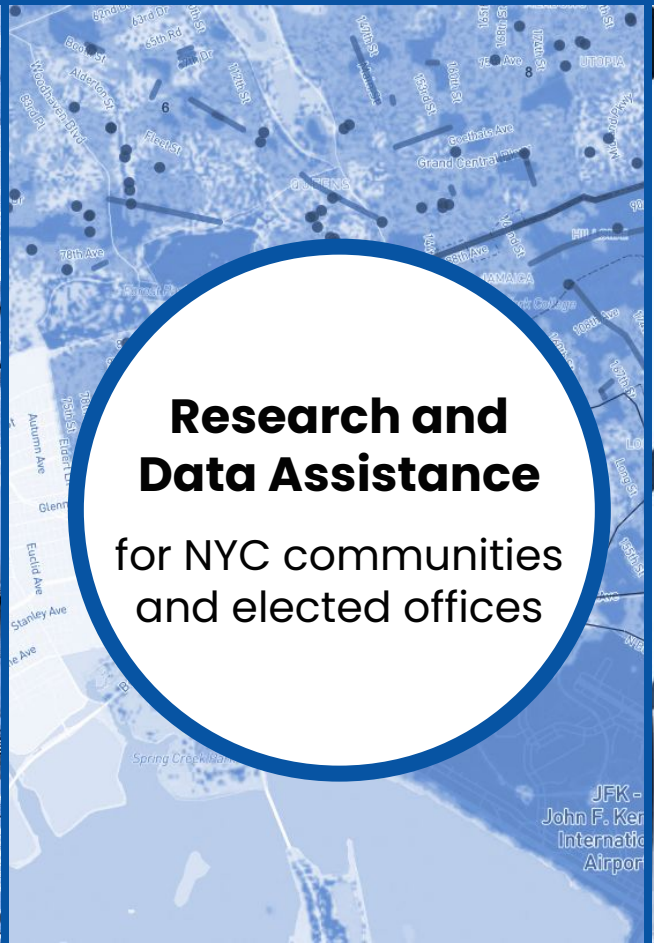
RADAR

We serve New Yorkers!

βetaNYC

Fellowships and Apprenticeships

for NYC students



Research and Data Assistance

for NYC communities and elected offices

Data Literacy Programming

for the public

βetaNYC

Civic Innovation Fellowship

Training CUNY students in civics, open data analytics and mapping equity projects

2023 -2024

2015

2016

2017

2018

2019

2020

2021

2022

Summer 2022

2022

βetaNYC

Civic Data Literacy Programs for the Public

Trainings, Professional Development Opportunities, Civic Engagement Events and Organizing

Take a Class

Become an Ambassador

NYC OpenData Ambassadors

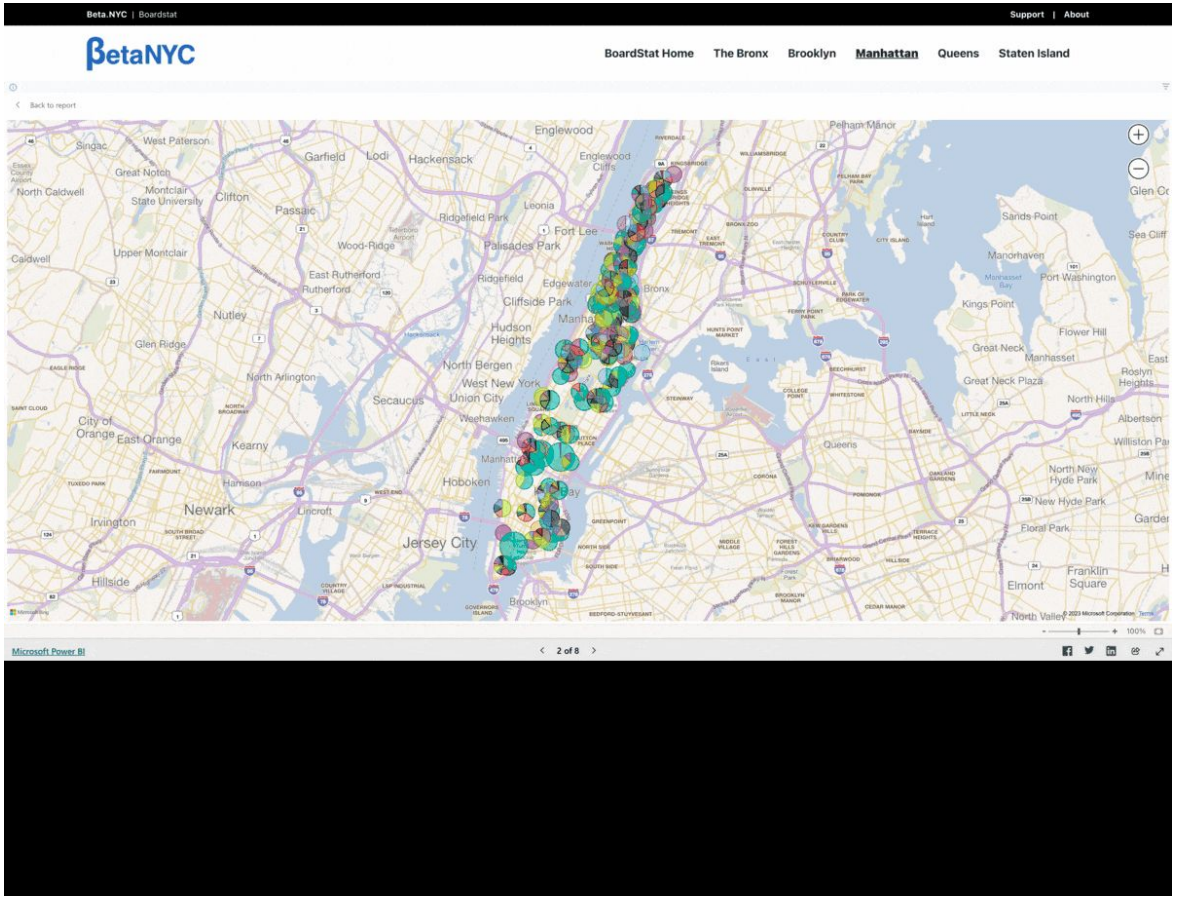
Civic tech community conference

NYC SCHOOL OF DATA 2023

βetaNYC

Civic Innovation Lab and RADAR

Research, tools and data services for New York City organizations and offices + Associates Program for students



BoardStat, Boundaries Map, Community Board Appointment Demographic Analysis, Digitizing Applications, Database, & Virtual Meeting Support; Crossing Guard Vacancies, Get Local! East Village Map,
Hurricane Ida and Storm Related 311 Complaints, Manhattan Flood Map, Playgrounds Map, Religious Facilities Task Force Project, State Liquor Authority Map, Tenants Map, Traffic Crashes on Open Streets

02

floodgen

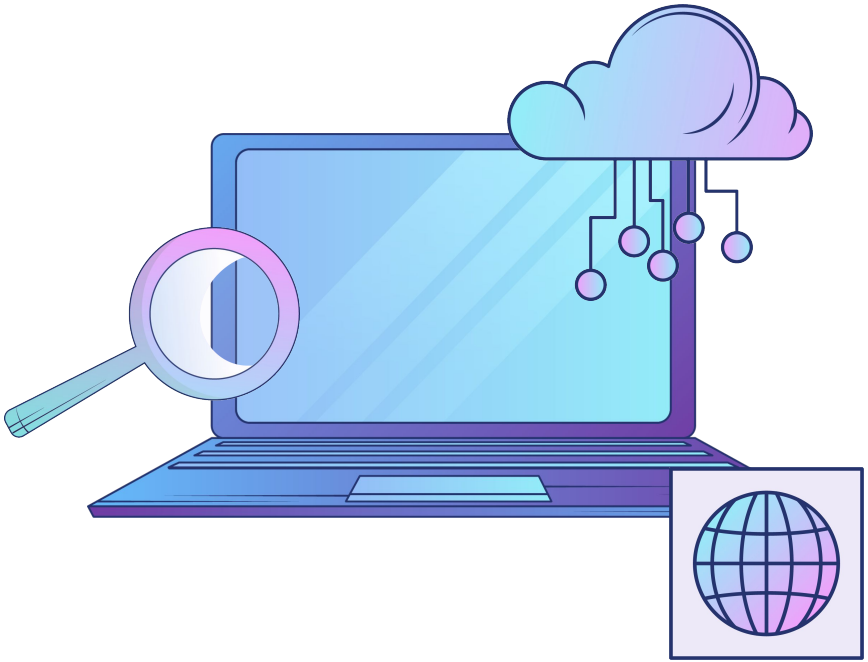
Flood advocacy tool using AI generated imagery

Project overview

01 Intro to floodgen

02 Prototype

03 Generative AI behind floodgen



Sources: Rebuild by Design. AP Photo.

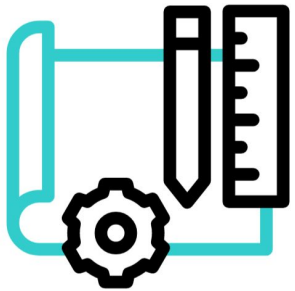

floodgen
Maps of predicted flooding are helpful planning tools, but aerial views distance viewers from its potential impact.
Source: FEMA. PFIRMs, 2015.

floodgen

If we show the reality of predicted flooding through photorealistic imagery, could people be more prepared?


floodgen
Street view
AI generated
fg

floodgen Prototype



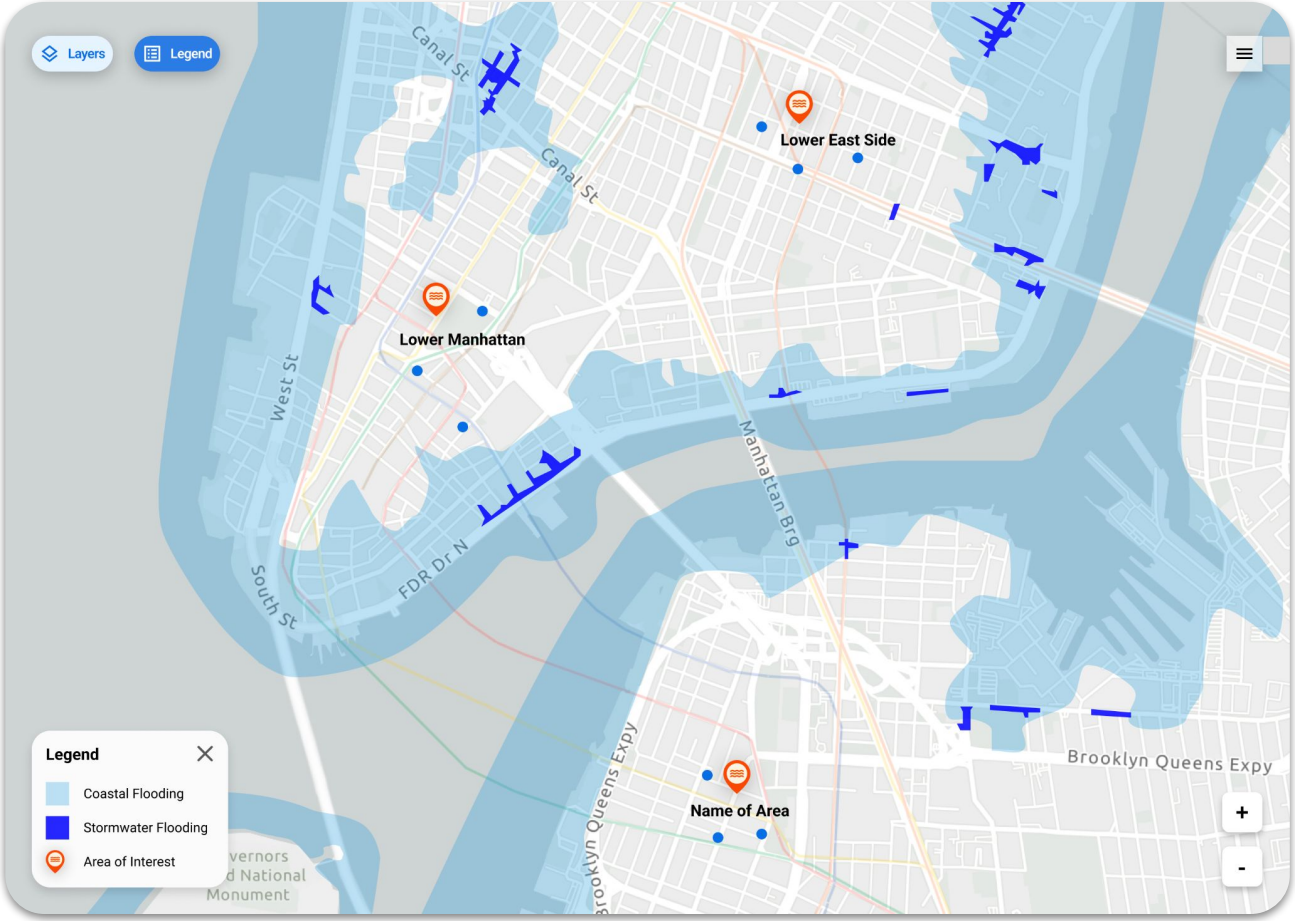
Objectives

Contextualized map

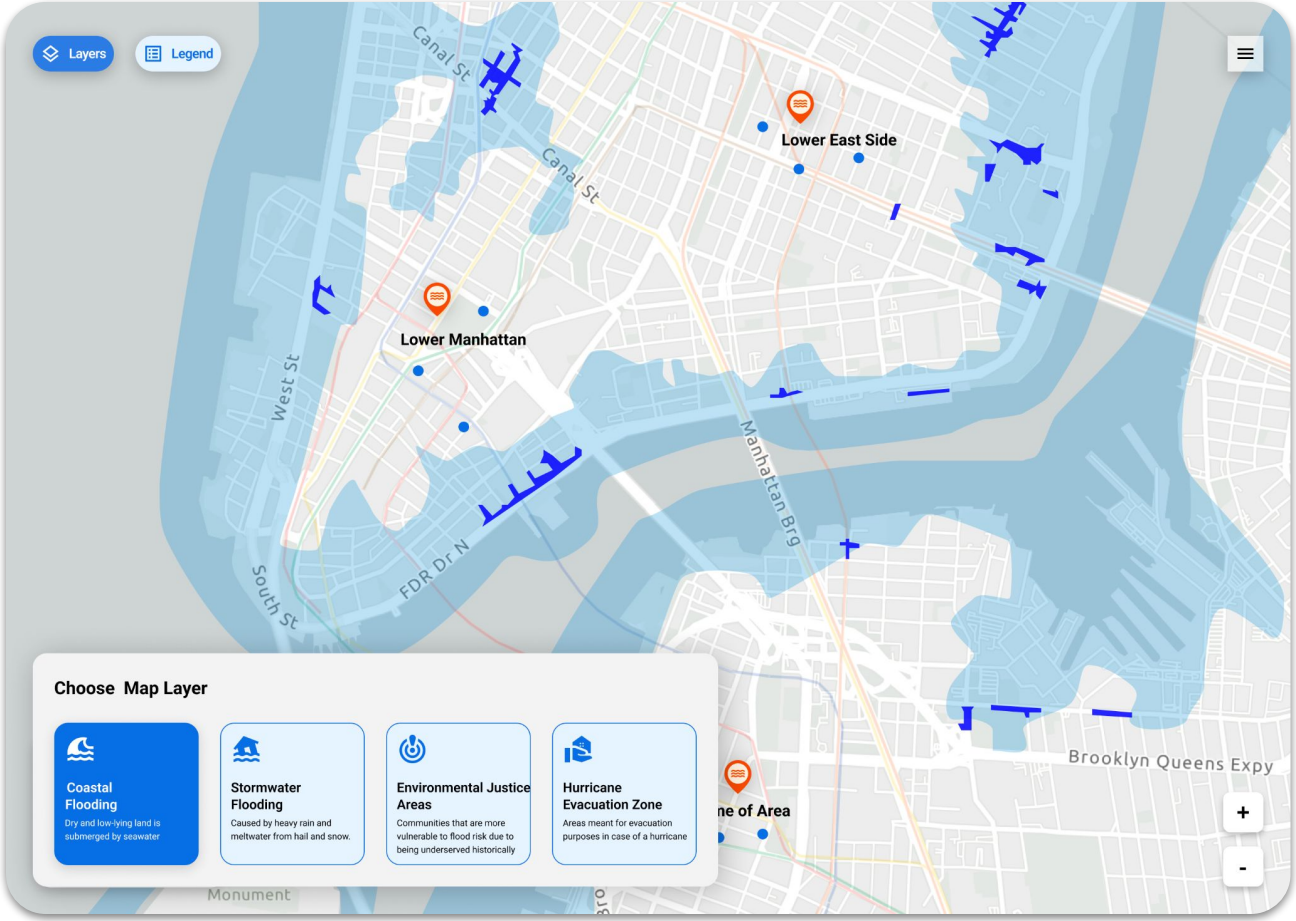
- Select a point location for street views and generate a flood image
- Reference predicted flood risk hazard, vulnerability, and exposure
- Explore case study locations based on flood risk and advocacy framing

Flood imagery

- Use generative AI to visualize photorealistic images of predicted flooding conditions
- Frame advocacy and clearly identify the images as AI generated to mitigate misuse of the imagery and misinformation



1. Explore locations through the map:
   - Predicted flooding risk
   - Case study sites

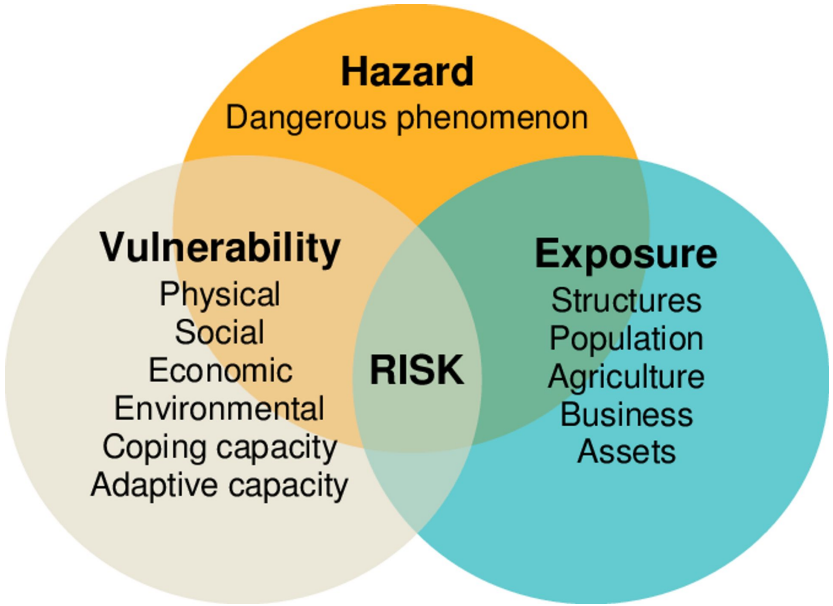


2. Toggle flood risk context layers

Flood risk framework

Analysis framework

- Vulnerability
- Hazard
- Exposure



de Brito, Mariana & Evers, Mariele & Höllermann, Britta. 2017

Flood risk map layers

Coastal Flooding

[**hazard**] Federal Emergency Management Agency (FEMA), Preliminary Flood Insurance Rate Maps (PFIRMs). Shows areas vulnerable to flooding from 1% annual chance storm (100-year floodplain), and 0.2% annual chance floodplain (500-year floodplain).

Stormwater Flooding

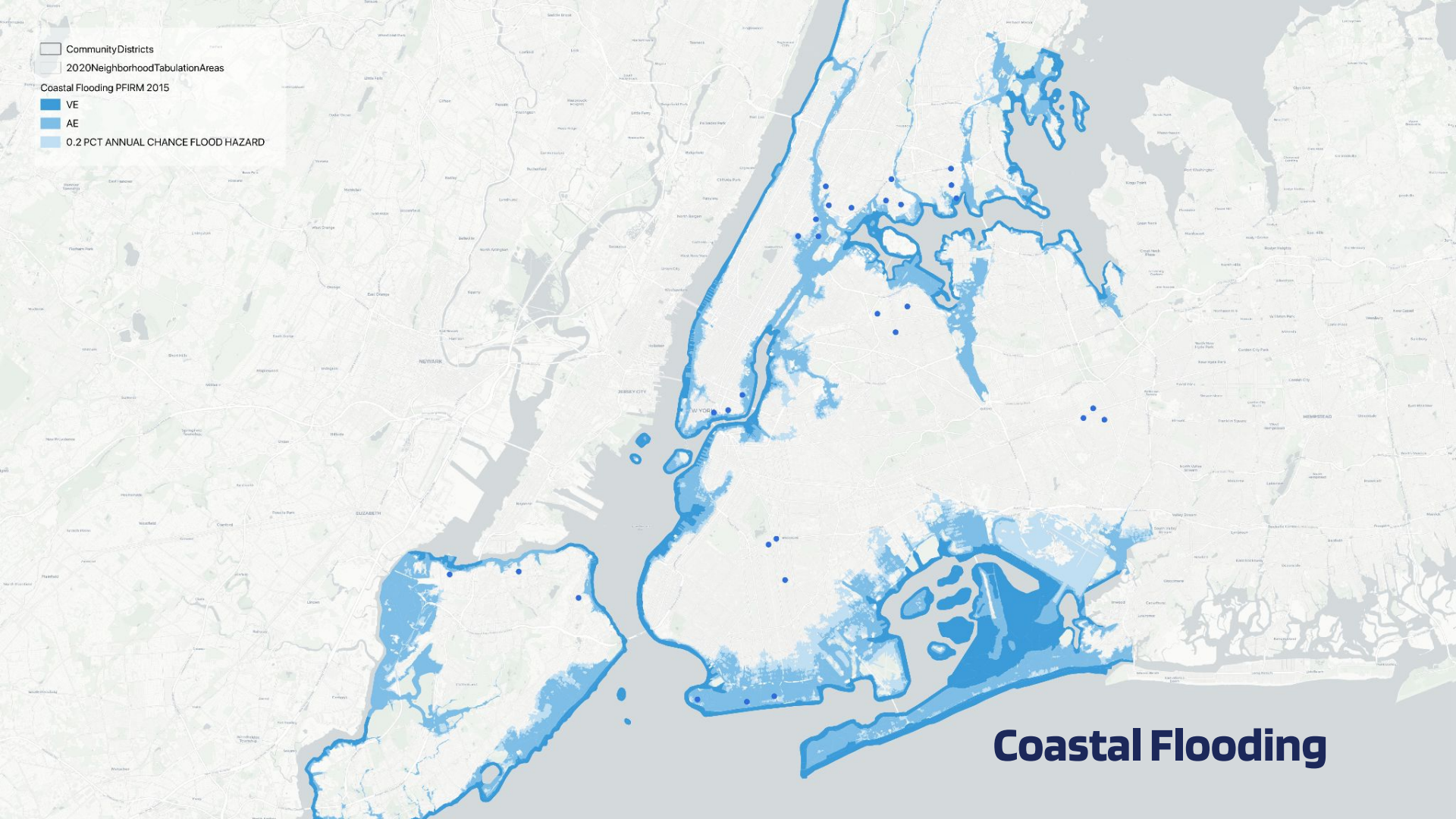
[**hazard**] Department of Environmental Protection, Moderate Flood with 2050 Sea Level Rise. Areas are categorized into (3) flooding categories: nuisance flooding, deep and contiguous flooding, and future high tides.

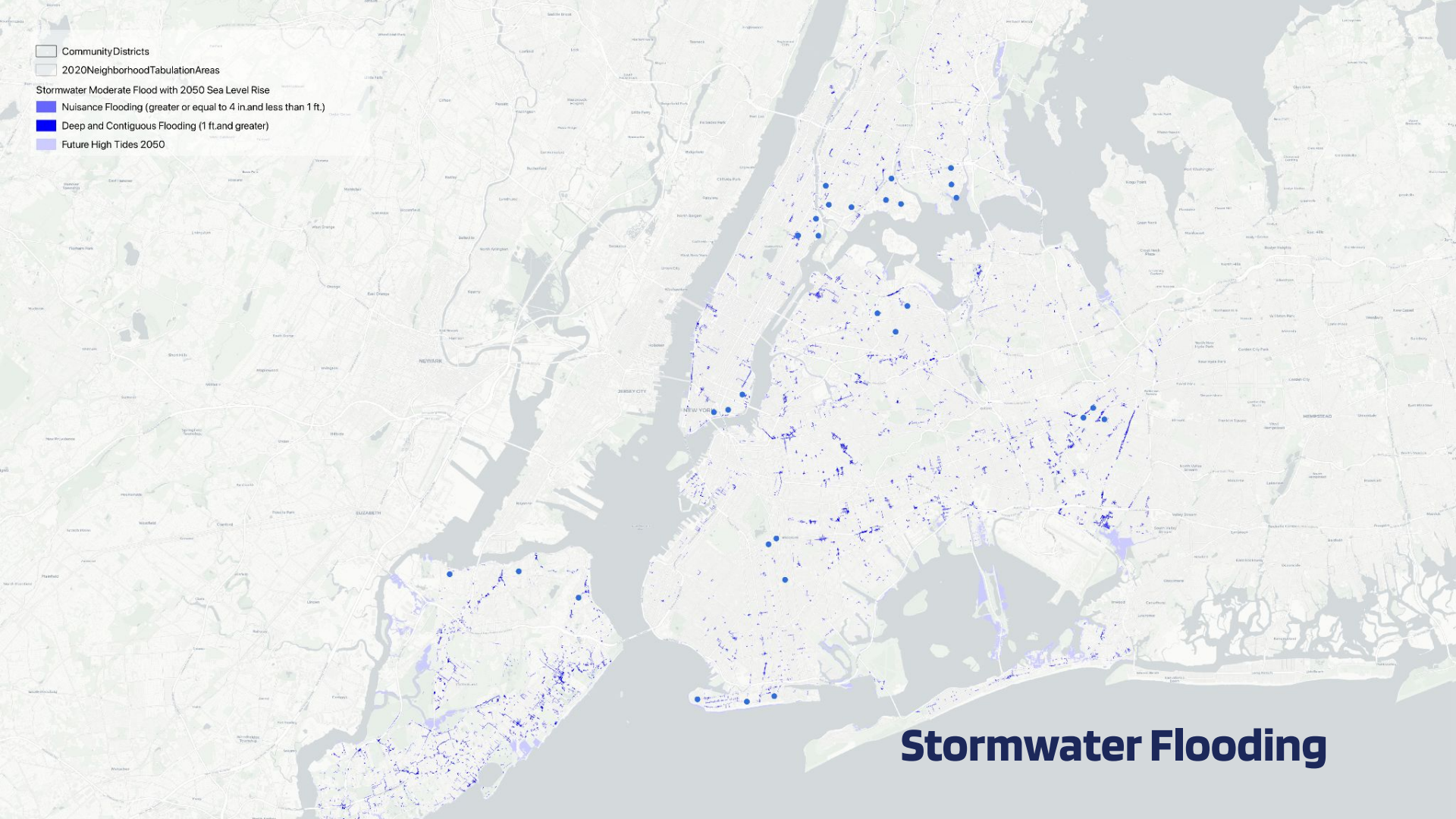
Environmental Justice Areas

[**vulnerability**] Mayor's Office of Climate and Environmental Justice (MOCEJ). Environmental justice areas are defined as low-income community or a minority community located in a census tract.

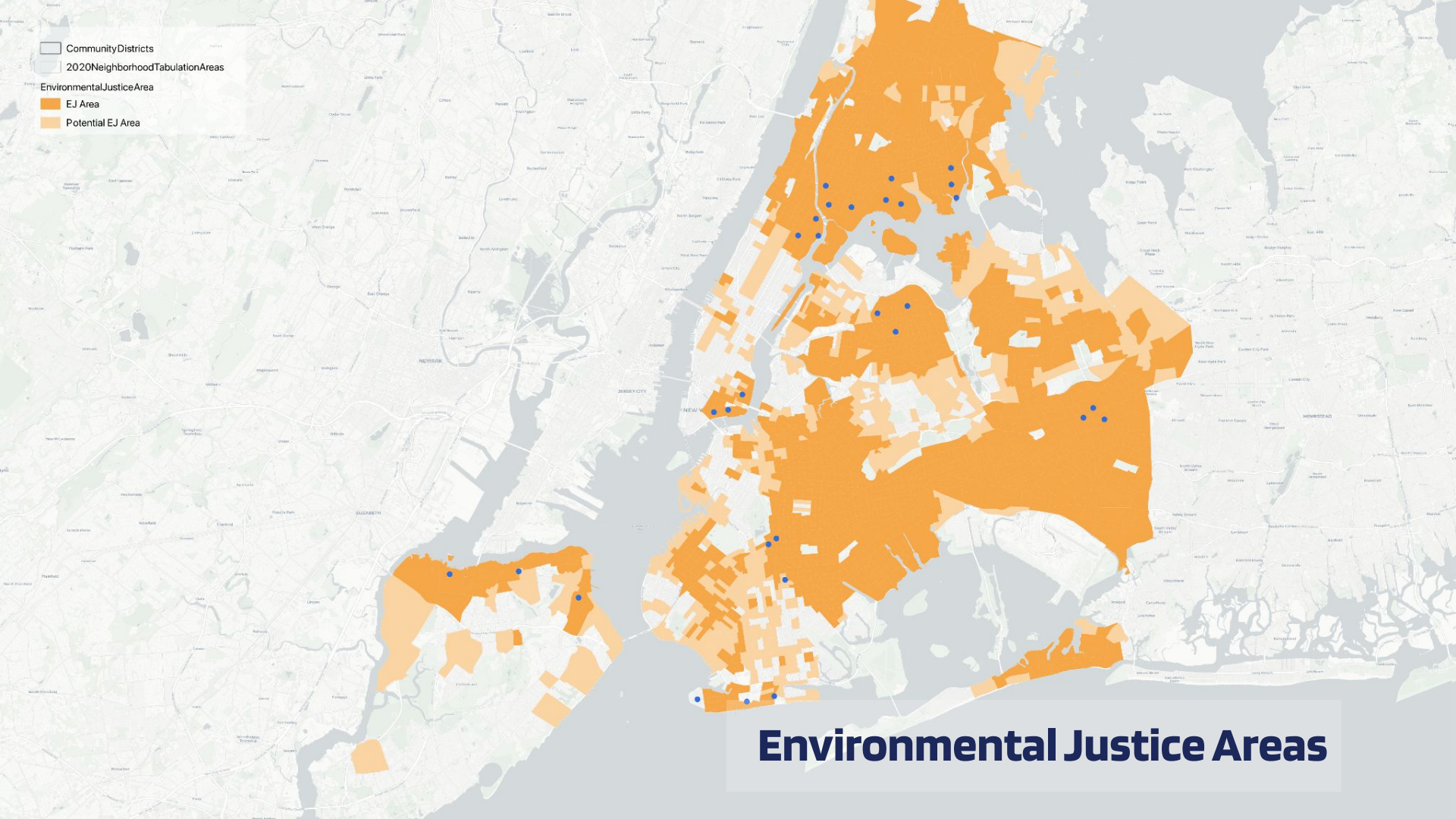
Hurricane Evacuation Zones

[**vulnerability**] New York City Emergency Management (NYCEM). Areas represent varying threat levels of coastal flooding resulting from storm surge.

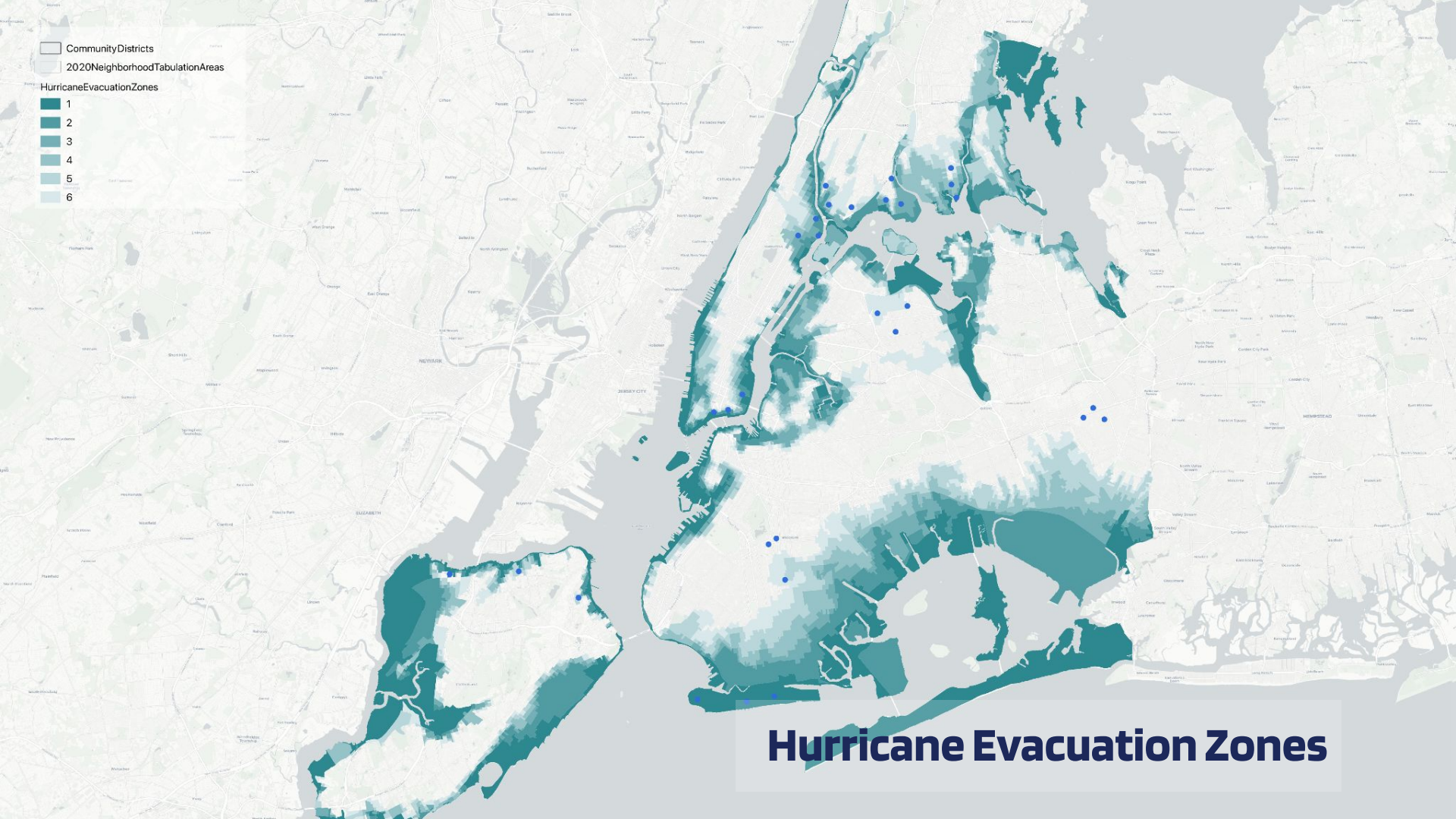

CommunityDistricts
2020NeighborhoodTabulationAreas
Coastal Flooding PFIRM 2015
VE
AE
0.2 PCT ANNUAL CHANCE FLOOD HAZARD
NEWARK
JERSEY CITY
ELIZABETH
HEMPSTEAD
Coastal Flooding



Stormwater Flooding



Environmental Justice Areas


CommunityDistricts
2020NeighborhoodTabulationAreas
HurricaneEvacuationZones
1
2
3
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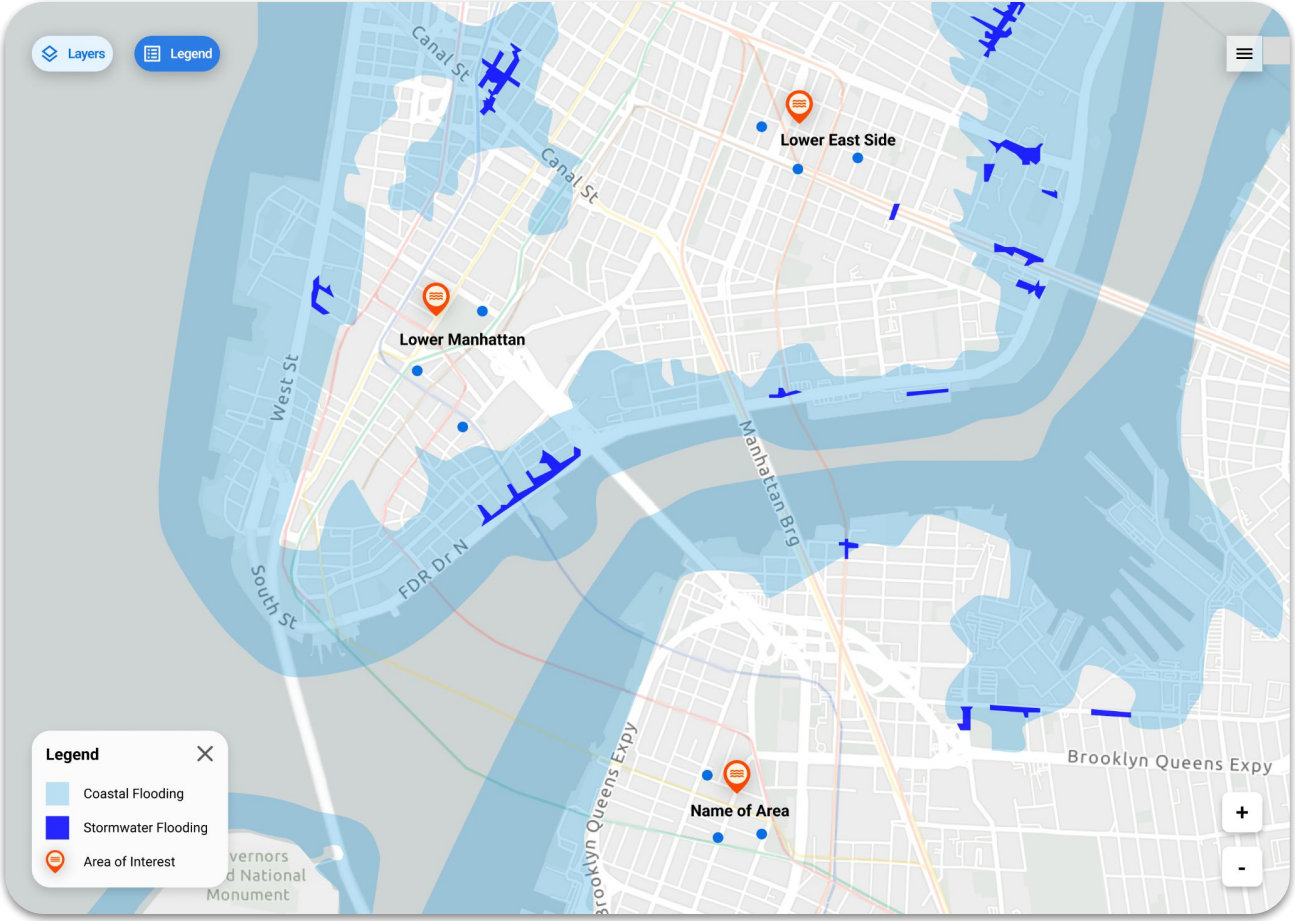
6
Hurricane Evacuation Zones



1. Explore locations through the map:
   - Predicted flooding risk
   - Case study sites

Community engagement strategy

01 

Awareness for new communities

Communities that have not yet had real experiences with flooding, but may be prone to flooding

Goal: create more awareness of flooding potential

02 

Evidence for resilience services

Communities that have experienced repeated flooding, but have not yet received services for resilient projects

Goal: generate more evidence to continue advocacy

03 

Response to advocacy

Municipal government agents, decision makers, and people responding to advocacy efforts

Goal: align priorities, share intention to support advocacy efforts and decision making

Case Study Sites

Bronx
- Hunts Point
- Mott Haven
- Castle Hill

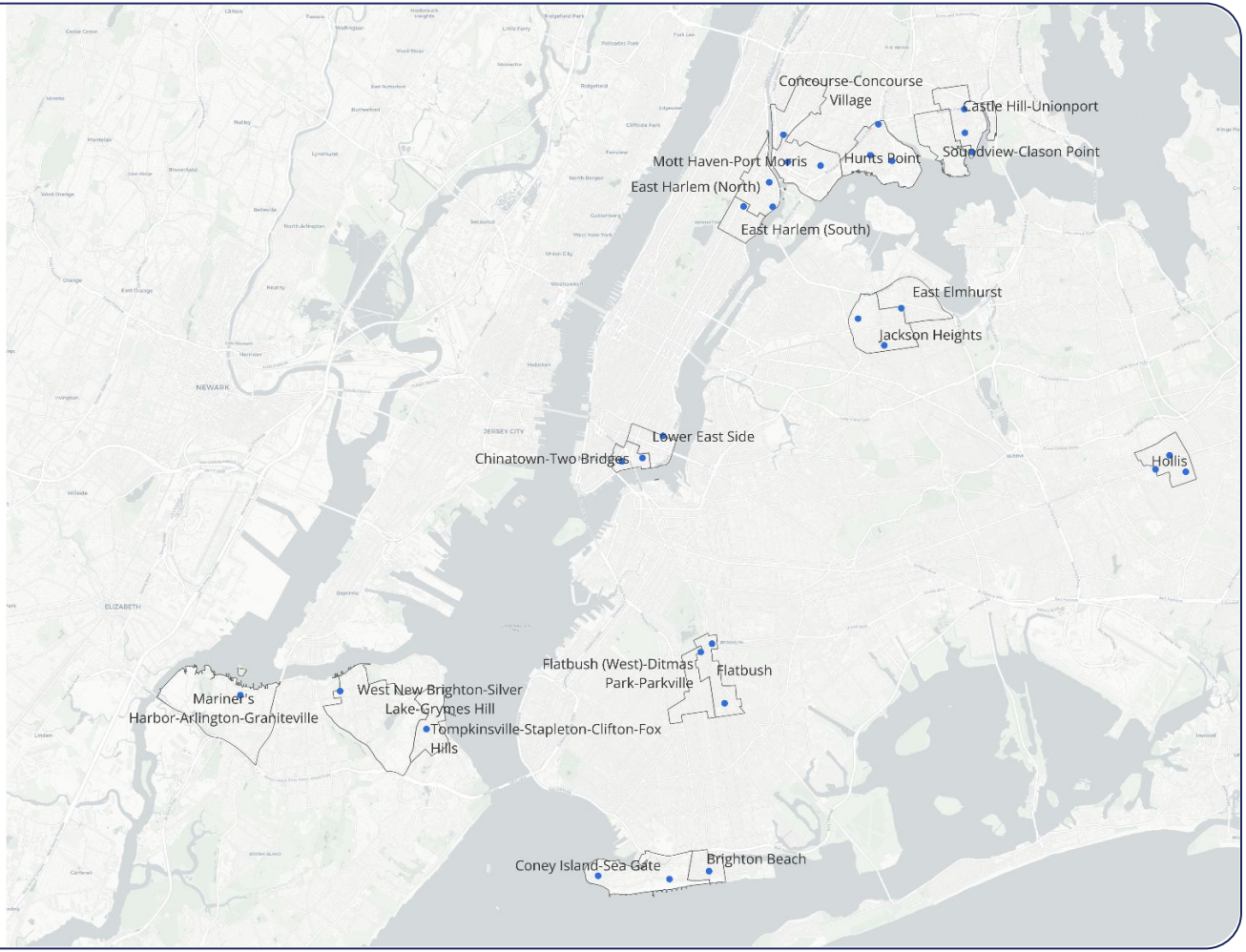
Brooklyn
- Coney Island
- Flatbush

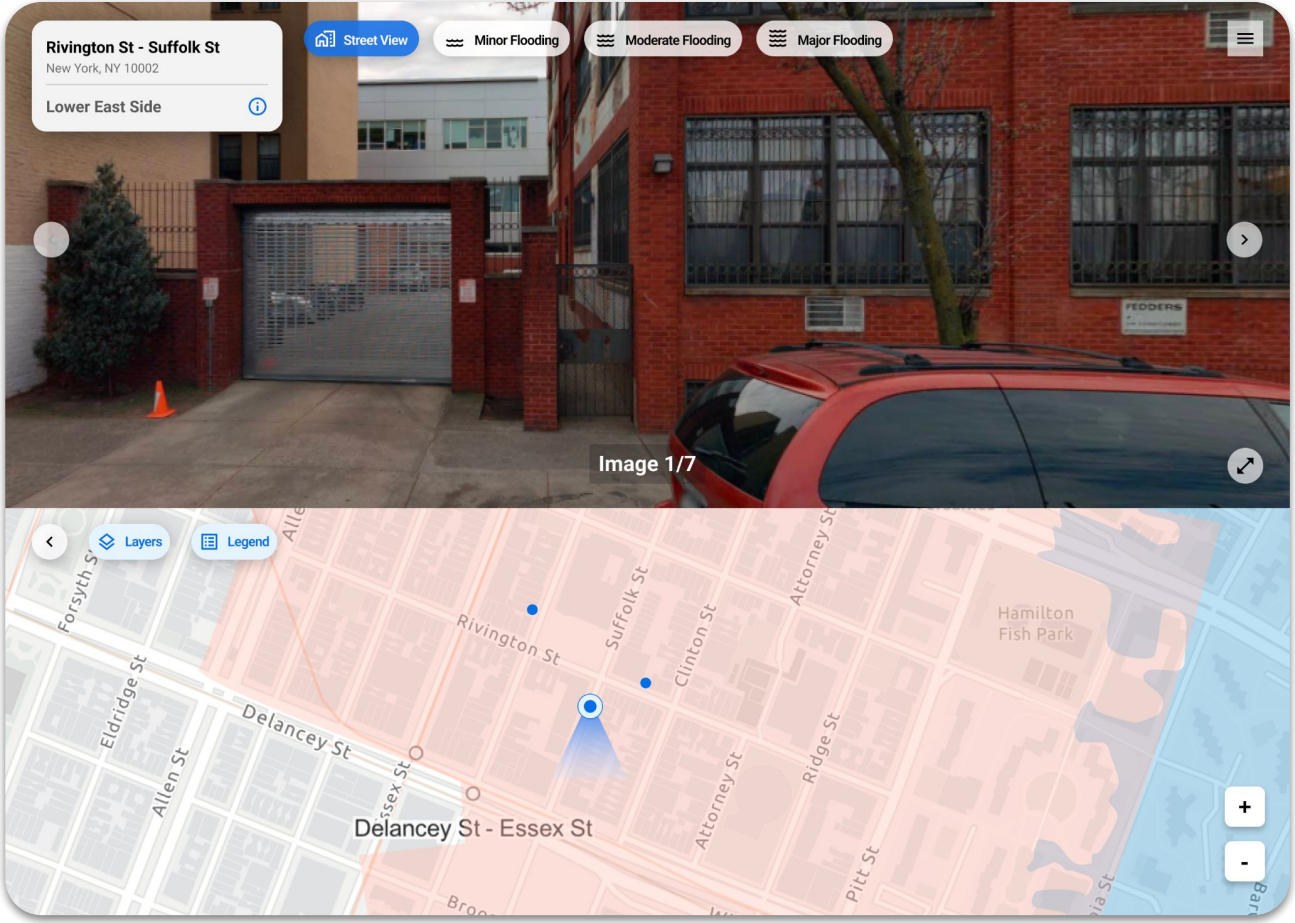
Manhattan
- East Harlem
- Lower East Side

Queens
- Hollis
- Jackson Heights

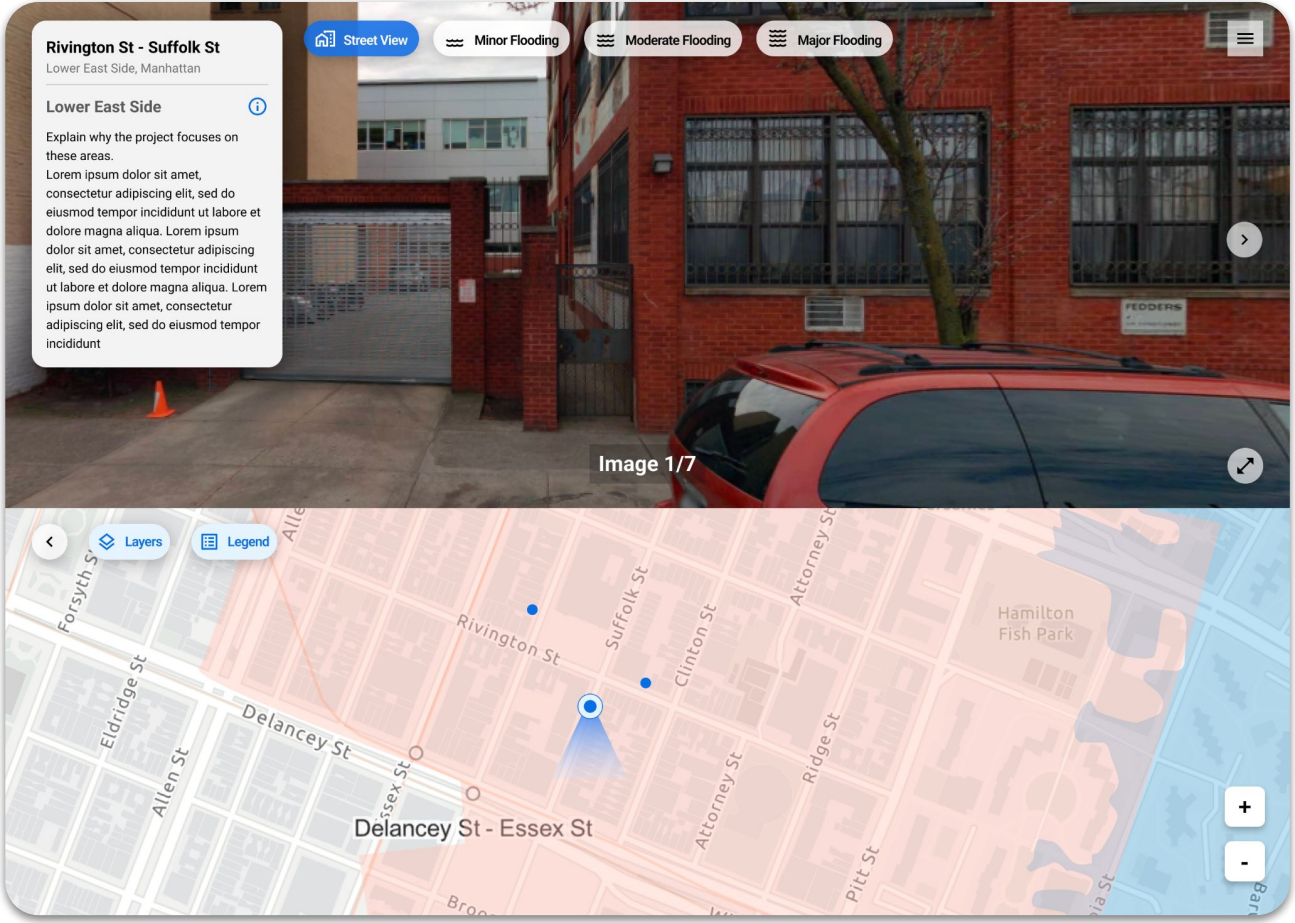
Staten Island
- North Shore

[**exposure**]

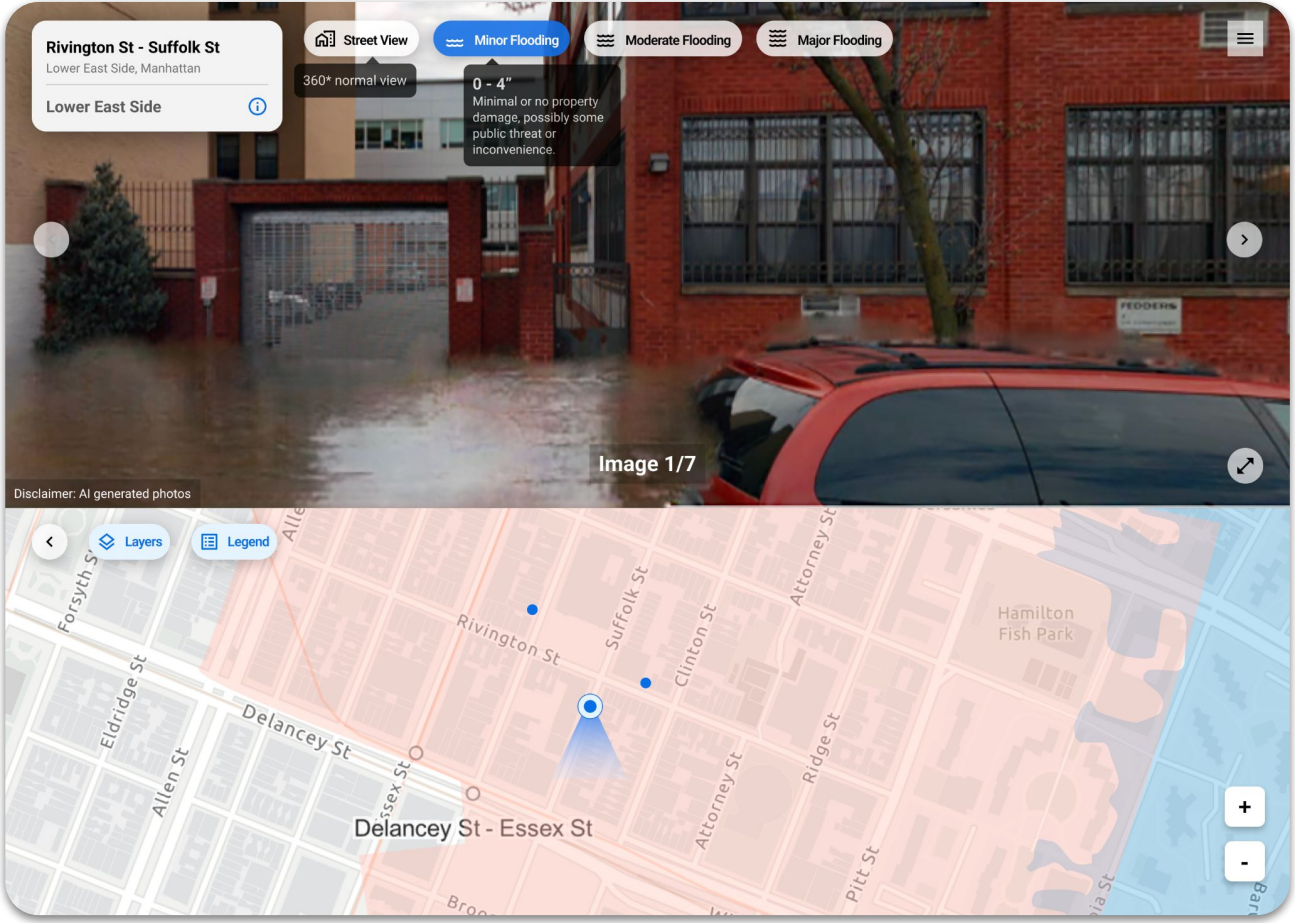




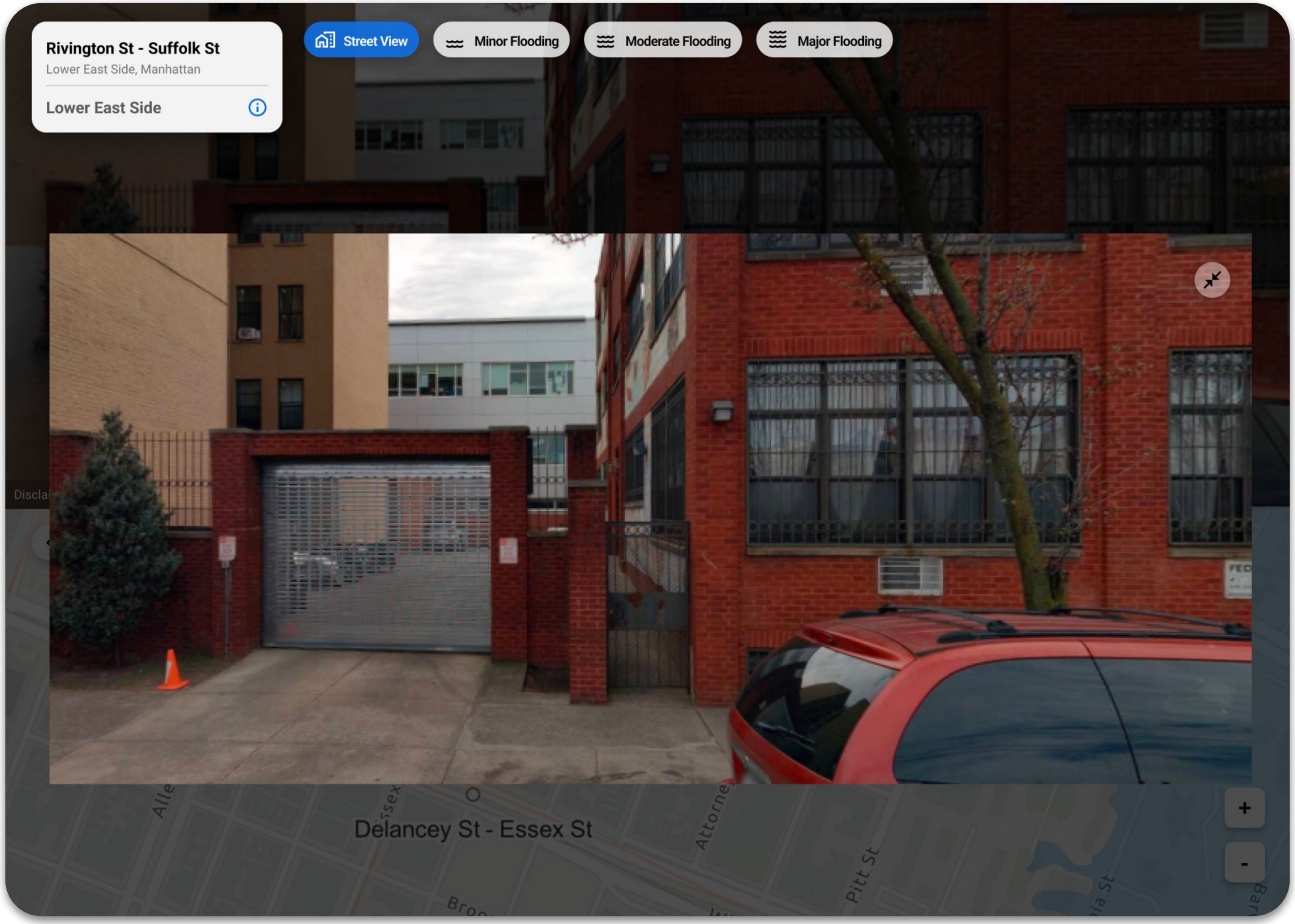
3. Explore 360° street view with map location context



4. Place description of case studies, nearby points of interest

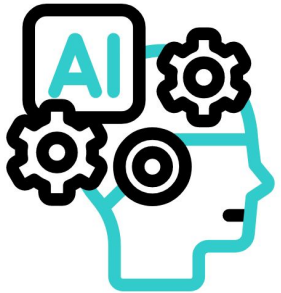


5. Explore AI generated flood images at each selected site:
   - 360° street view
   - Flood levels:
     - Minor (0-4")
     - Moderate (4-12")
     - Major (=> 12")



5. Explore AI generated flood images at each selected site

How does floodgen work?



Generative AI

Generating imagery with flooded street view

Before flooding (photograph)

After flooding (photograph)

Source: Buzzfeed

Generating imagery with flooded street view

Before flooding (photograph)

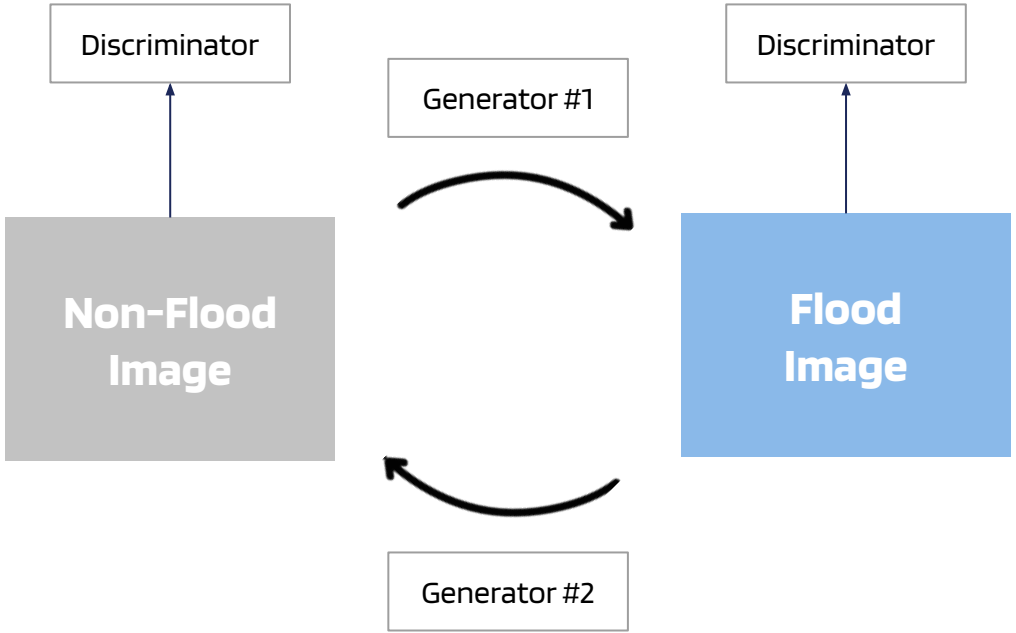
After flooding (photograph)

Source: Buzzfeed

CycleGAN

Image-to-image translation model

- Two AI models (generator 1 & 2)
- **Generator**: creates transformed flood images
- **Discriminator**: critic that tries to distinguish between real and generated images
- Generator tries to outwit the discriminator by creating more realistic images



Climate-GAN

Street view image

AI generated image with Climate-GAN

Source: Images Generated by Climate-GAN Model; Schmidt et al., 2021

Flood height manipulation

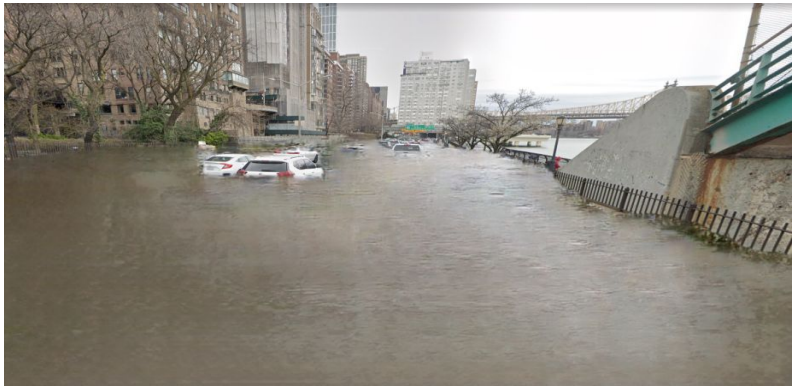
Control flood level in generated images

- Compare mask height above ground level from **LIDAR data** with a specific flood threshold
- Two methods of comparison:
  - Visual comparison
  - Superimposed mask over the flood images

Source: geocoder.nyc/streetview

AI generated flood imagery

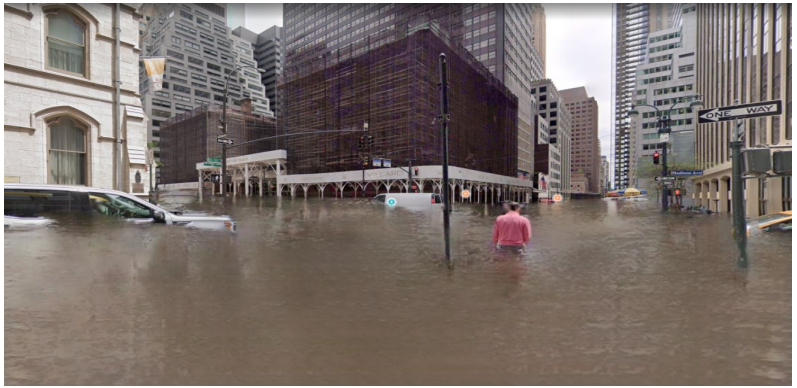
Input non-flooded image



Output flooded image

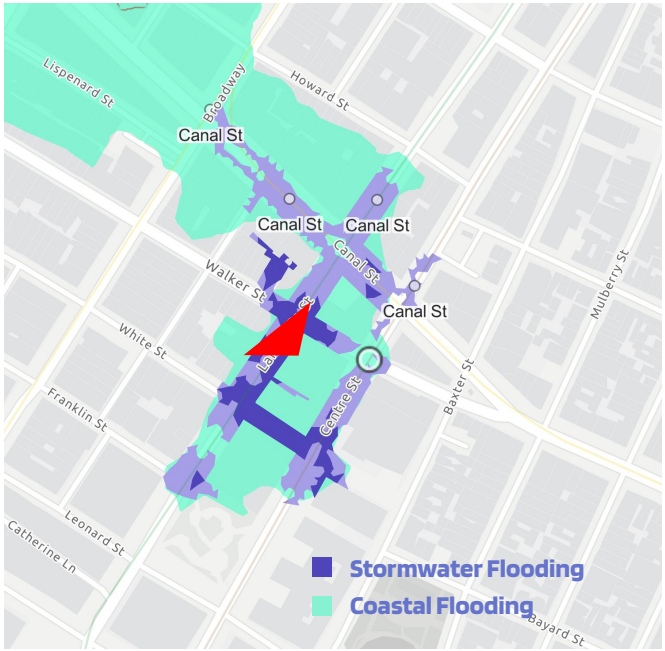
AI generated flood imagery

Input non-flooded image



Output flooded image

Project objectives



Flood data from point location

Street view image
(no flooding)

Minor flooding
(0 – <4")

Moderate flooding
(4 – <12")

Major flooding
(>=12")

Street view imagery

03

Next steps

March 16–24, 2024

↳ open-data.nyc

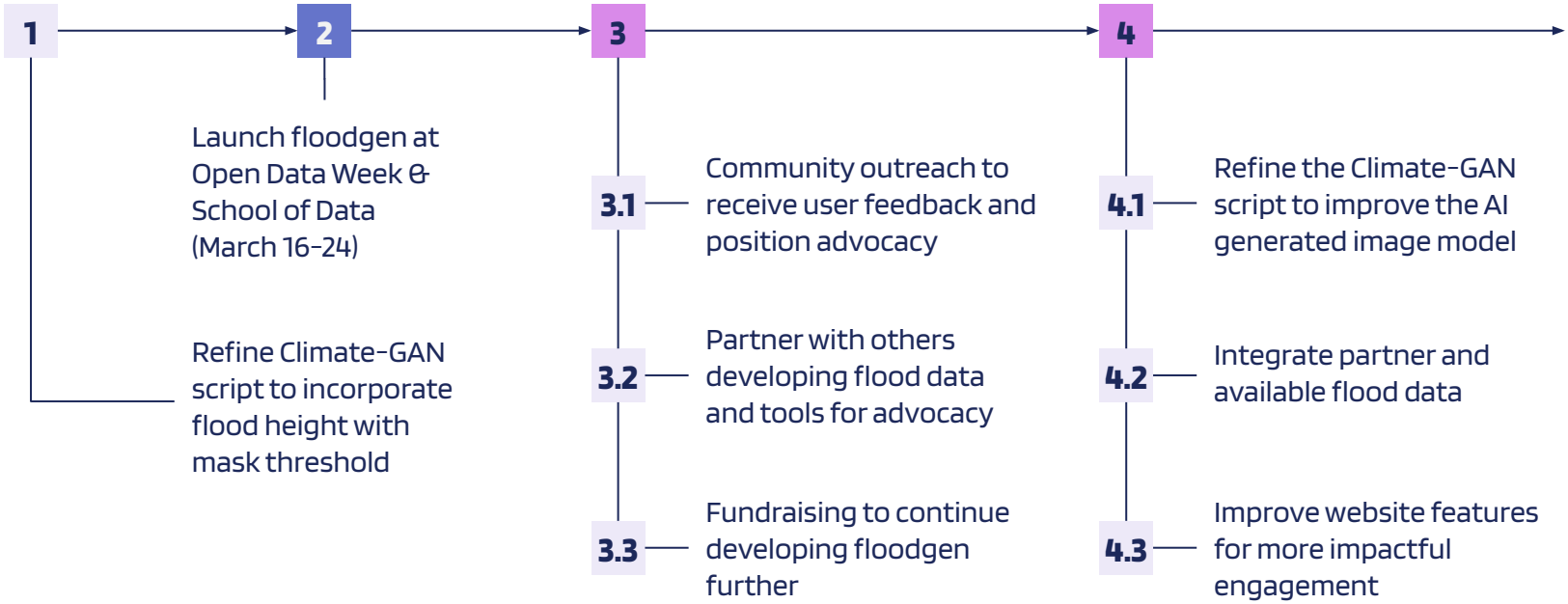
NYC SCHOOL OF DATA 2024

Saturday, March 23

BetaNYC Lab RADARs @ 3:45pm

↳ schoolofdata.nyc

Next steps & project timeline



Community engagement strategy

01 

Awareness for new communities

Communities that have not yet had real experiences with flooding, but may be prone to flooding

Goal: create more awareness of flooding potential

02 

Evidence for resilience services

Communities that have experienced repeated flooding, but have not yet received services for resilient projects

Goal: generate more evidence to continue advocacy

03 

Response to advocacy

Municipal government agents, decision makers, and people responding to advocacy efforts

Goal: align priorities, share intention to support advocacy efforts and decision making

Feedback valued!

How do you think floodgen & AI generated imagery can be most impactful to people?

BetaNYC

floodgen

Flood advocacy tool using AI generated imagery

BetaNYC Civic Innovation Lab

Ashley Louie (Director), Erik Brown, Zhi He, Hao Lun Hung, Audrey Leung, Hailee Luong, Vaishali Talwar

Introducing NYC Neighborhood Flood Reports

Incorporating public feedback into flood visualization tools

Sea Grant NEW YORK

FLOODNET.NYC
NYC.GOV + NYU.EDU + CUNY.EDU

Hannah Eisler Burnett
heb84@cornell.edu

Sara Eichner
eichnersara@gmail.com

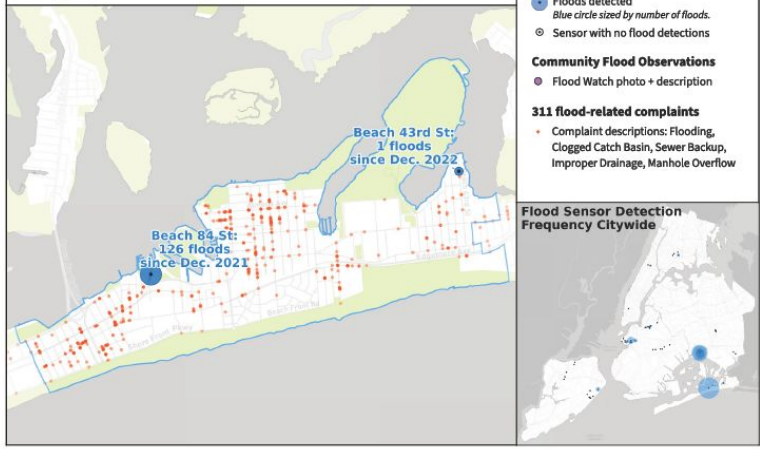
NYC Neighborhood Flood Reports: What are they?

- ***Printable neighborhood-level summary flood reports*** were originally requested by community stakeholders in Howard Beach, Queens
- These reports leverage data visualization strategies and quantitative data to underpin community experiences

Local flood report for

Arverne-Edgemere

Neighborhood Flood Data



Flood Sensor locations

- Floods detected
  Blue circle sized by number of floods.
- Sensor with no flood detections

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- Flood Watch photo + description

311 flood-related complaints

- Complaint descriptions: Flooding, Clogged Catch Basin, Sewer Backup, Improper Drainage, Manhole Overflow

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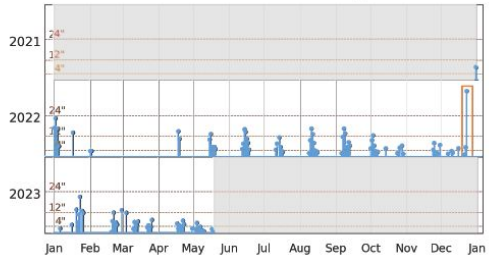
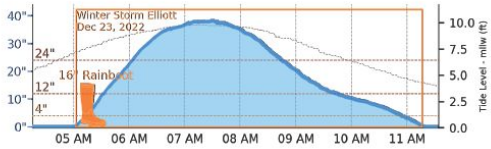
Published with Data Through May 2023

Beach 84 St: flood detections + depths





About this Report

The maps and charts in this report show the severity, frequency, and location of street-level flood events from 2020 to 2023. This report was generated using data from FloodNet sensors, 311 reports, and photos of floods submitted to the Community Flood Watch Project. It will be updated again in March 2024.

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Sea Grant NEW YORK

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History of neighborhood flood detections + 311 flood complaints

12/10/2021 - 05/19/2023

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Number detected per month
13 Floods
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No data

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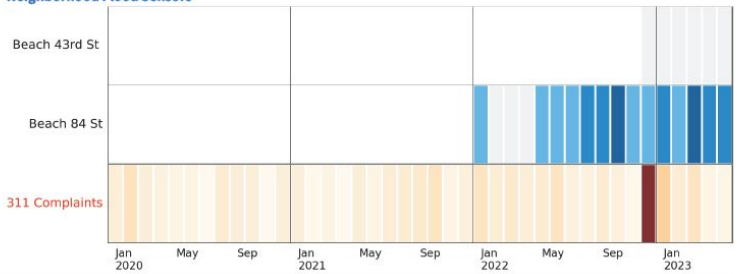
311 data available at
https://opendata.cityofnewyork.us/
95
63
31
0

Neighborhood Flood Sensors



**Flood sensor data does not reflect indoor flooding and basement flooding, and only reflects floods in locations where sensors are located*

Data Sources

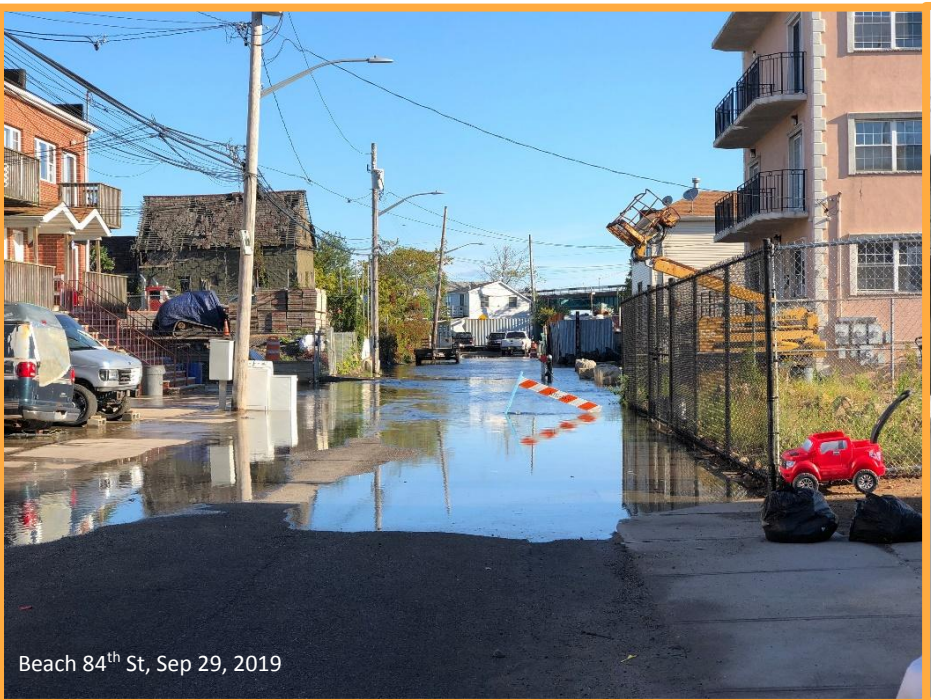
1. Community flood observations (photos)
2. 311 reports
3. FloodNet sensor data

Documenting local flooding since 2018:

Jamaica Bay Community Flood Watch Project

SCIENCE+ RESILIENCE INSTITUTE JAMAICA BAY · NYC

Sea Grant NEW YORK

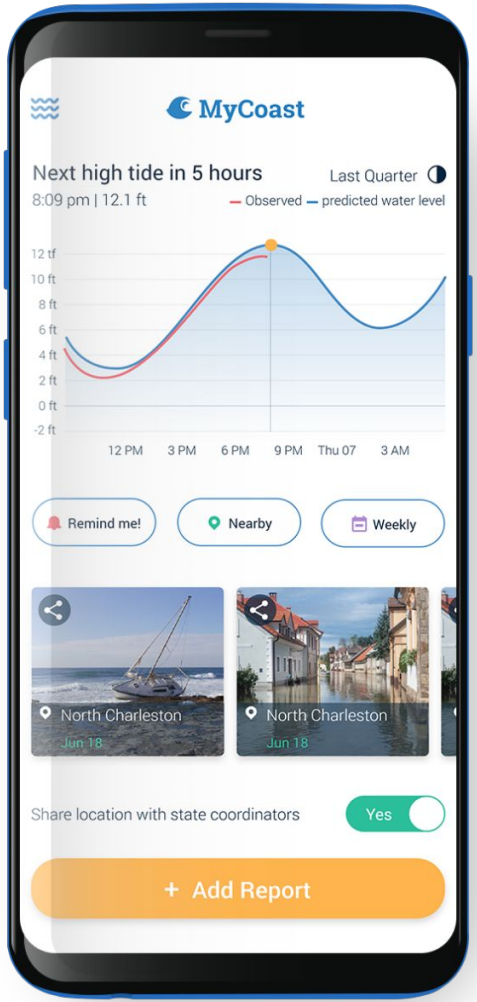

Beach 84th St, Sep 29, 2019


Davenport Court, Sept 10th, 2018


Beach 78th St, Oct 27, 2018

Neptune Ave, Sept 2, 2019

The Community Flood Watch Project aims to document what causes flooding in Jamaica Bay, where it occurs, what it looks like, and how it’s changing.



Submit your **photos**

Context about weather, tide, and more is automatically added.

Residents and coastal leaders use this information to **make decisions**

www.mycoast.org/ny/flood-watch

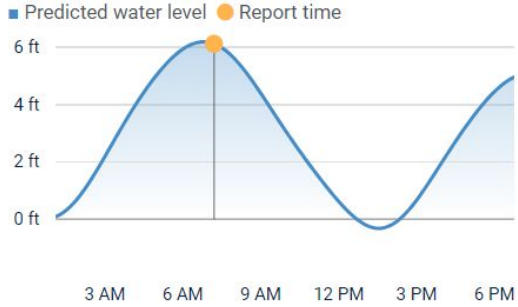
01/10/2024 | 7:08 am

Tidal Overview

0 hours 20 minutes after high tide

Data from NORTH CHANNEL BRIDGE, GRASSY BAY (1 miles away)

High Tide (Predicted): 6:48 am, 6.2'



(Click here for full tide details from NOAA Tides & Currents)

Weather Overview

First Neighborhood Flood Report Prototype

- Data sources
  - Community flood observations (photos)
  - 311 reports
  - Flood risk projections
- Stakeholder feedback from Flood Watch participants in Howard Beach & others

Exploratory local reports meant to showcase archive of community reporting and put it to use

Flood Watch Report for Old Howard Beach

09/03/2021

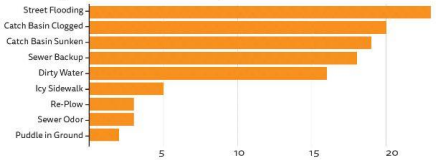
311 Reporting Summary

Since 2017, 201 flood related complaint have been submitted. Out of these requests 200 of them were closed. Most of the enteries were closed within the first 4 hour of reporting.

Complatins were filed to the floowing agnecies:

DEP : 191 Complaints
DOHMH: 2 Complaints
DSNY: 8 Complaints

Number of 311 Calls in the last 5 years
Since 2017, filtered to Flood rlated topics.



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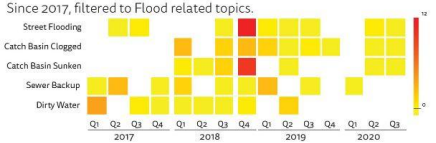
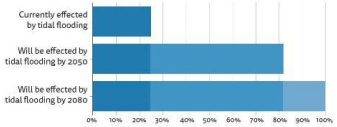


Majority of the households in the selected area are under the imidiate risk of tidal and stormwater flooding. The area was within the inunduation zone of the superstorm Sandy.

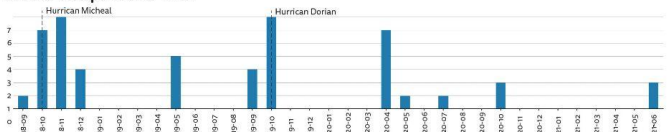
This region frequently receives 311 complaints, regarding street flooding.

There are 43 **Flood Watch** records in this area.

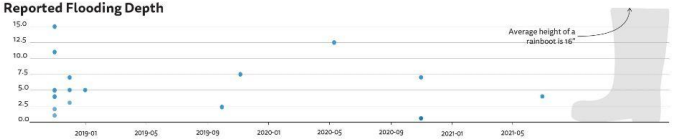
Percentage of Lots
based on Future Mean Monthly High Water projections by NPCC



Number of Reports Over Time



Reported Flooding Depth



09/10/2018
Daytime flooding
3" depth

09/11/2018
Daytime flooding
6" depth

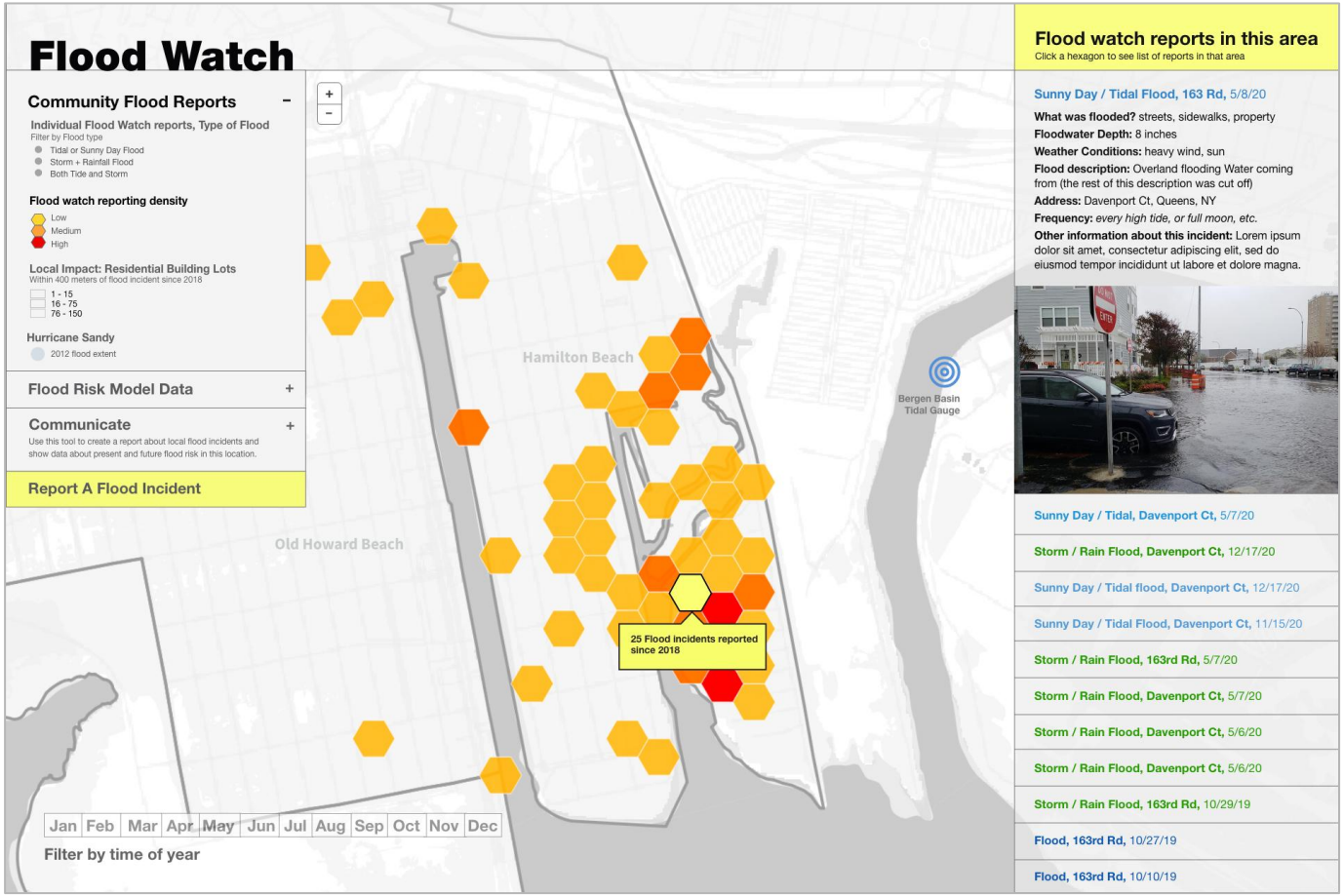
10/05/2018
Stormwater surge
1" depth

01/11/2018
Daytime flooding
6" depth

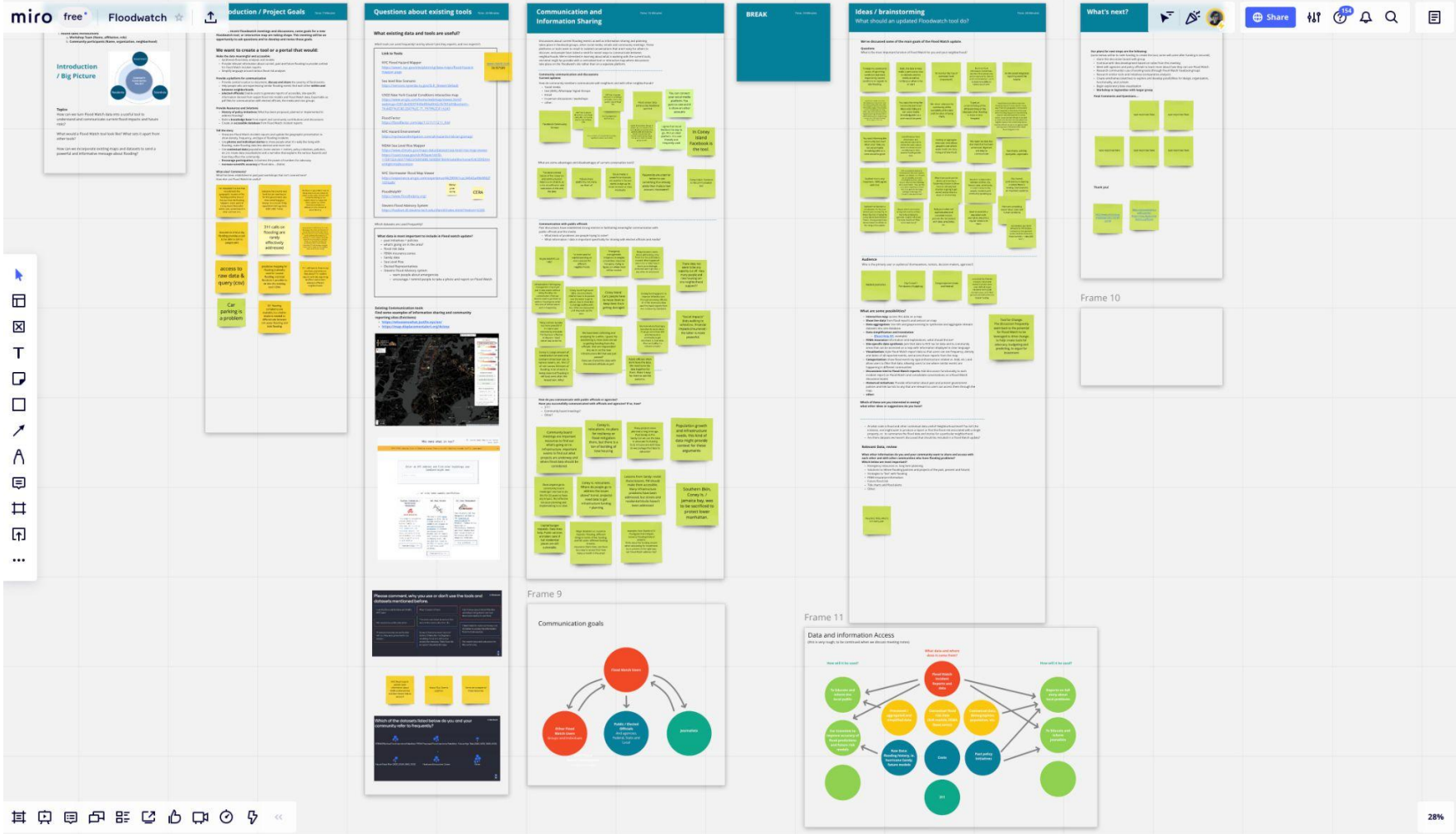
09/02/2019
Daytime flooding
4" depth

09/10/2020
Daytime flooding
5" depth

Exploratory data visualization of Flood Watch data



Community meetings with Howard Beach Flood Watch group 2021


miro
free
Floodwatch
Share
Introduction / Big Picture
Questions about existing tools
What existing data and tools are useful?
Communication and Information Sharing
BREAK
Ideas / brainstorming
What should an updated Floodwatch tool do?
What's next?
Frame 10
Frame 9
Frame 11
Communication goals
Data and information Access
28%

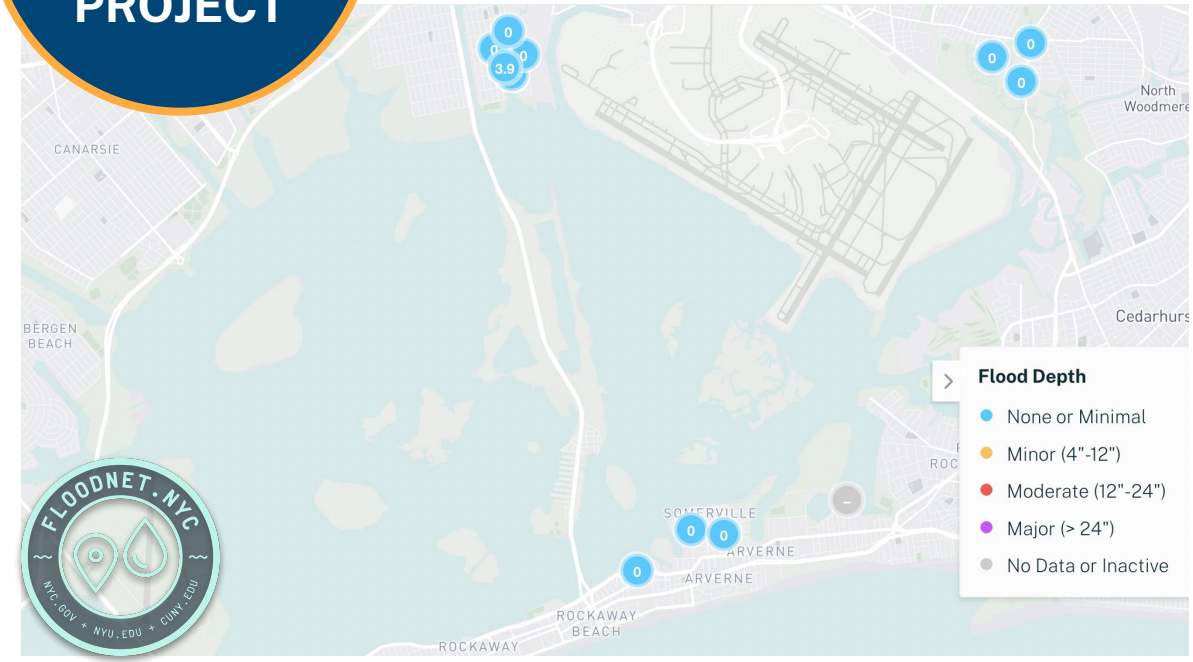
Second Neighborhood Flood Report Prototypes

- Data sources
  - Community flood observations (photos)
  - 311 reports
  - FloodNet Sensor Data
- Stakeholder feedback from residents across NYC

A Brief Highlight of FloodNet Data Dashboard

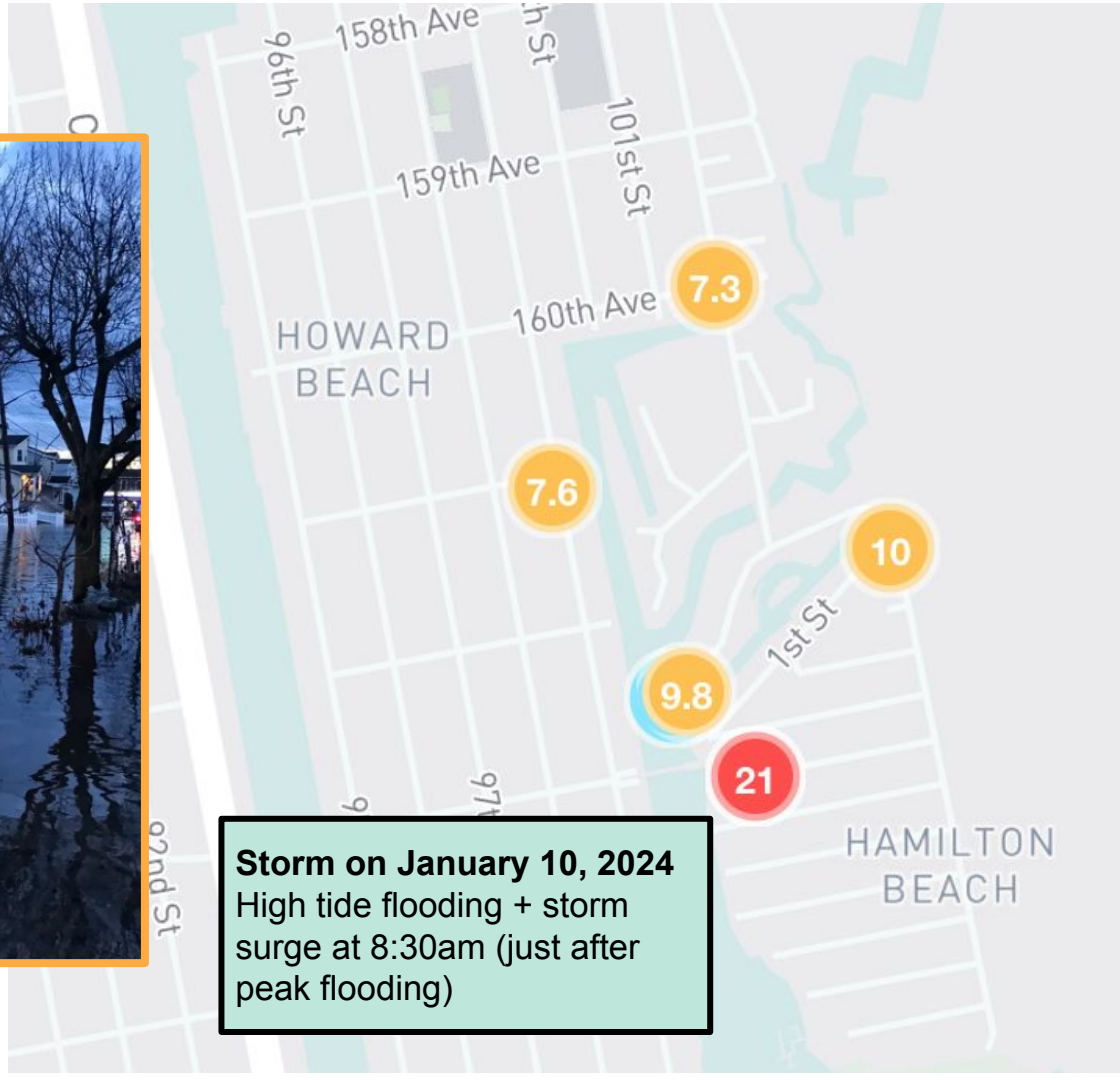
FLOOD WATCH PARTNER PROJECT

FloodNet: Real-time urban flood monitoring across New York City

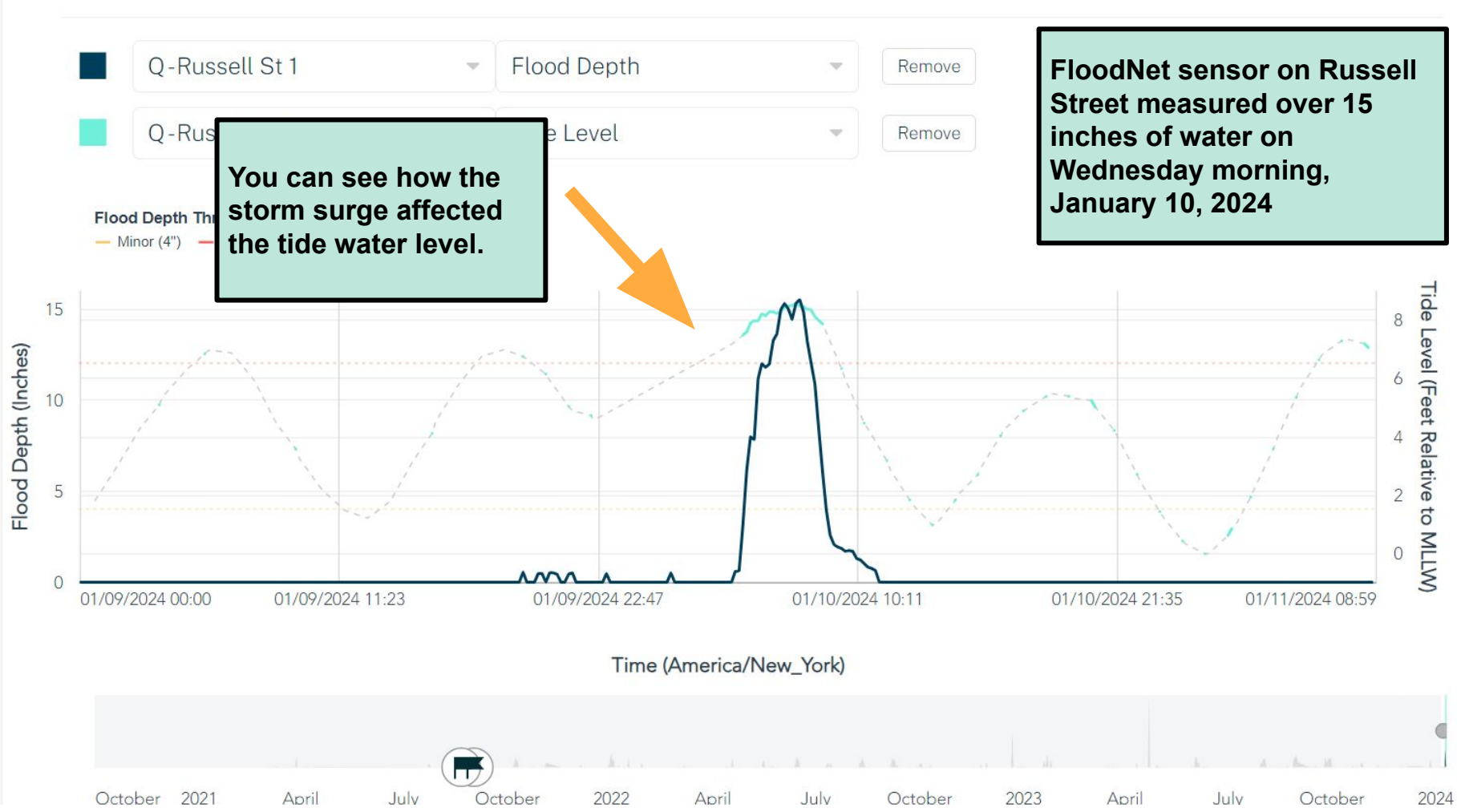


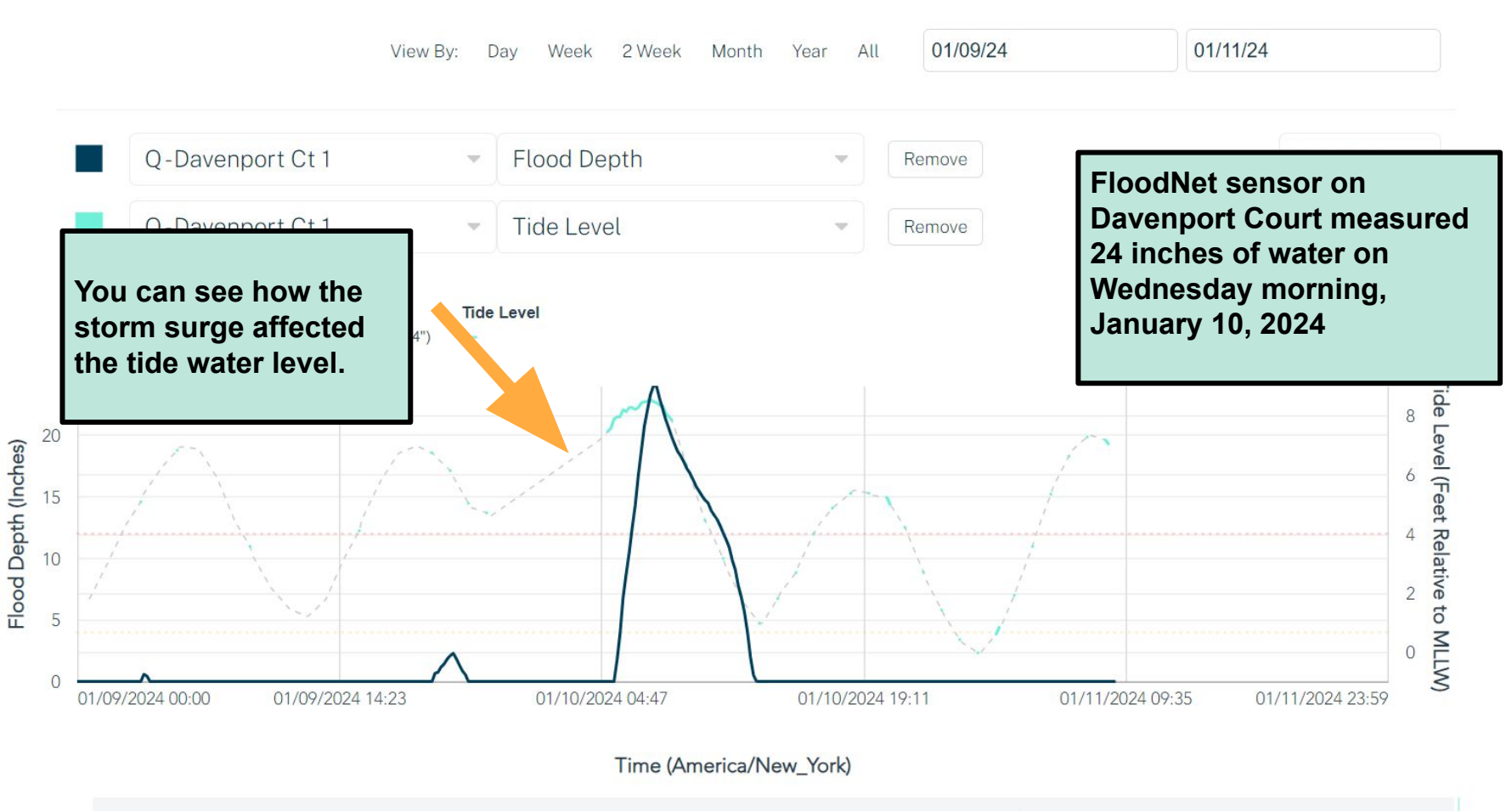
More info:
www.floodnet.nyc

Data Dashboard



Storm on January 10, 2024
High tide flooding + storm surge at 8:30am (just after peak flooding)


Q-Russell St 1
Flood Depth
Remove
Q-Rus
e Level
Remove
You can see how the storm surge affected the tide water level.
FloodNet sensor on Russell Street measured over 15 inches of water on Wednesday morning, January 10, 2024
Minor (4")
Flood Depth (Inches)
Tide Level (Feet Relative to MLLW)
15
10
5
0
8
6
4
2
0
01/09/2024 00:00
01/09/2024 11:23
01/09/2024 22:47
01/10/2024 10:11
01/10/2024 21:35
01/11/2024 08:59
Time (America/New_York)
October
2021
April
July
October
2022
April
July
October
2023
April
July
October
2024

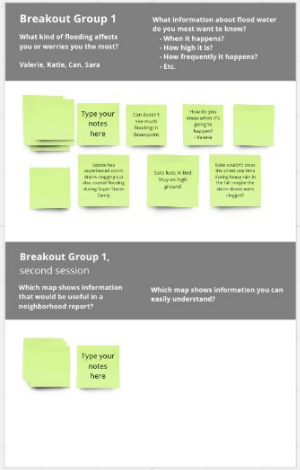

View By: Day Week 2 Week Month Year All
01/09/24
01/11/24
Q-Davenport Ct 1
Flood Depth
Remove
Tide Level
Remove
You can see how the storm surge affected the tide water level.
FloodNet sensor on Davenport Court measured 24 inches of water on Wednesday morning, January 10, 2024
Tide Level
Flood Depth (Inches)
0
5
10
15
20
Tide Level (Feet Relative to MLLW)
0
2
4
6
8
01/09/2024 00:00
01/09/2024 14:23
01/10/2024 04:47
01/10/2024 19:11
01/11/2024 09:35
01/11/2024 23:59
Time (America/New_York)

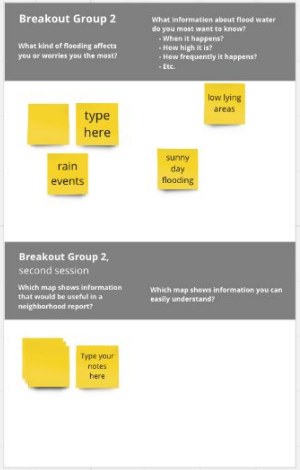

Q-Beach 84 St
Flood Depth
Remove
Time Series
Q-Beach 84 St
Tide Level
In an expanded data view, you can see how high tides cause chronic flooding
Save As
Flood Depth Threshold (Inches)
Minor (4")
Moderate (12")
Major (24")
Tide Level
Flood Depth (Inches)
Tide Level (Feet Relative to MLLW)
12/11/2023 11:25
12/19/2023 00:58
12/26/2023 14:32
01/03/2024 04:05
01/10/2024 17:39
01/18/2024 07:12
01/25/2024 20:46
Time (America/New_York)

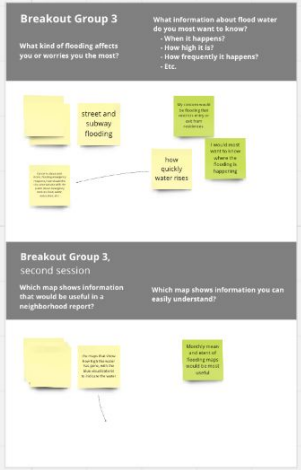
How can these data sources be brought together in order to serve communities across NYC?

Focus Groups

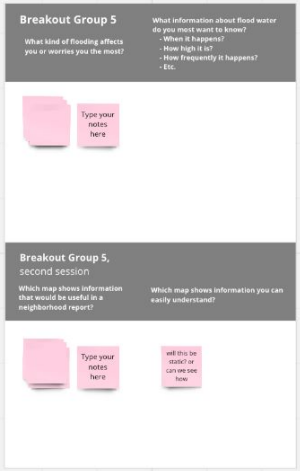
46	Total participants at virtual and in person meetings
36	Total participants at virtual meetings
23	Average attendance per meeting
3	Average number of meetings attended by each participant
21	Number of participants who attended 3 or more meetings
7	Number of participants who attended every meeting
9	Number of one on one meetings with participants (May - August, 2023)







Group notes: meeting 2



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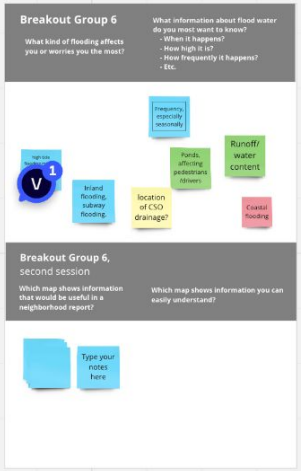

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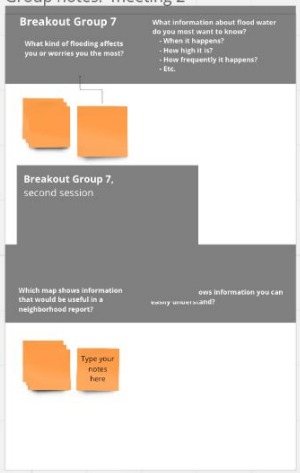
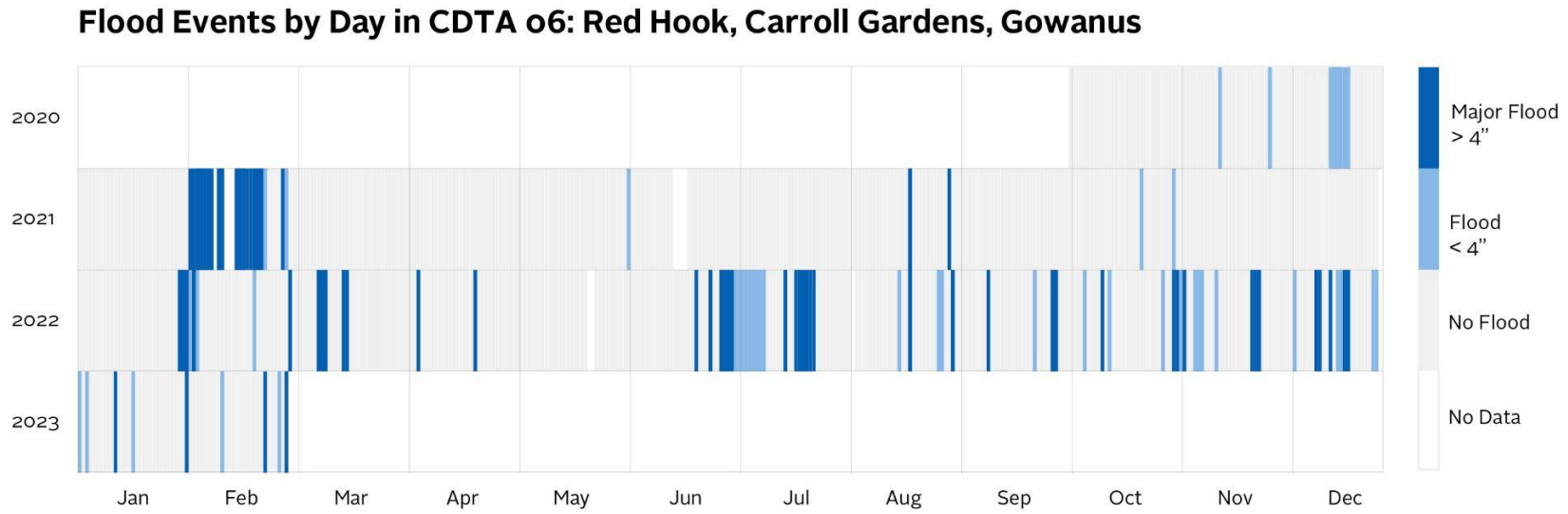


Guiding Questions

1. Resident use cases for flood data (quantitative)
    a. What would motivate you to seek out this data?
    b. Would you share this data?
    c. How would you share it?
2. Resident use cases for photographs of flooding (qualitative)
    a. What would motivate you to seek out this data?
    b. Would you share this data?
    c. How would you share it?
3. How to integrate these two data sources (quantitative and qualitative)?
4. **Resident use-cases for summary reports of neighborhood flooding that integrate these two data sources?**
5. Resident use cases for an interactive web tool that integrates these two data sources?
6. How do residents access neighborhood-level information right now, and how do they share it?

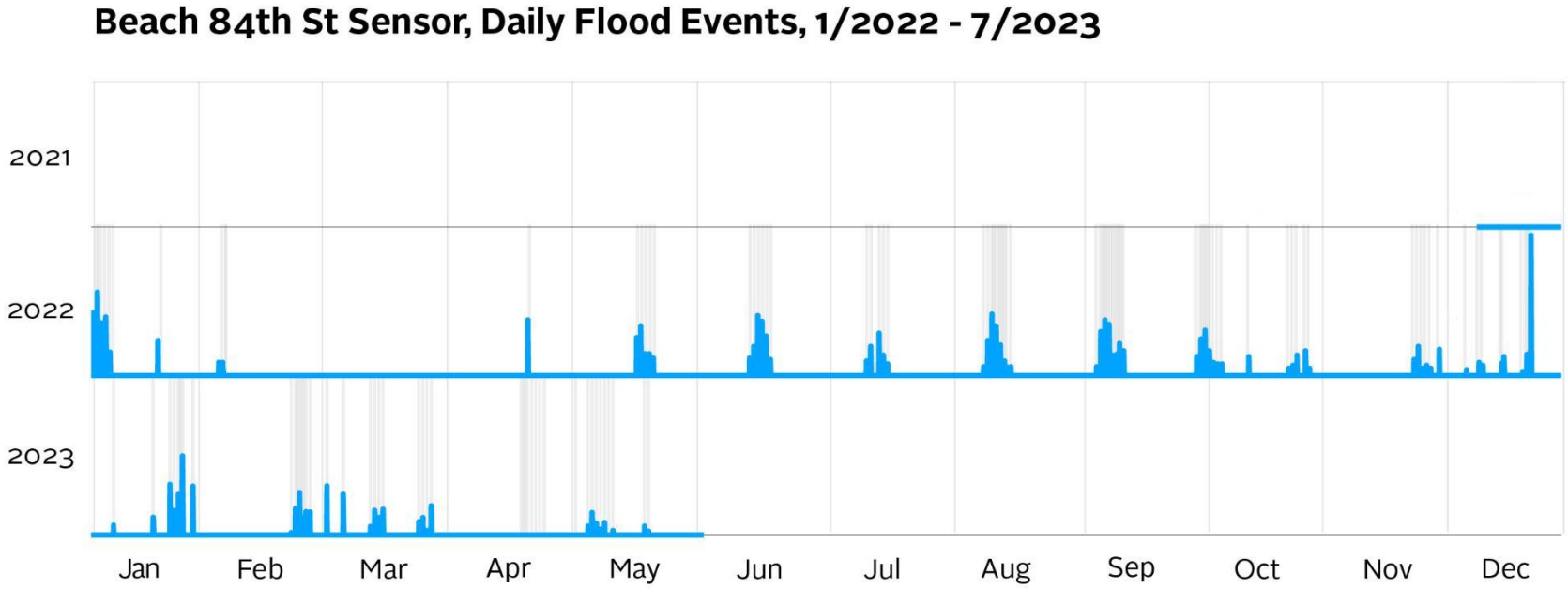
Neighborhood Flood Report Use-Cases

1. Sharing information about neighborhood flood impacts with residents and CBOs
    a. via community hubs
2. Education about *why*, *where,* and *when* floods occur
3. Sharing summary information about flooding with elected officials, journalists
4. Education about flood preparedness
5. Useful for community organizing - staying in touch with local people and issues, up to date on elected officials info, etc.



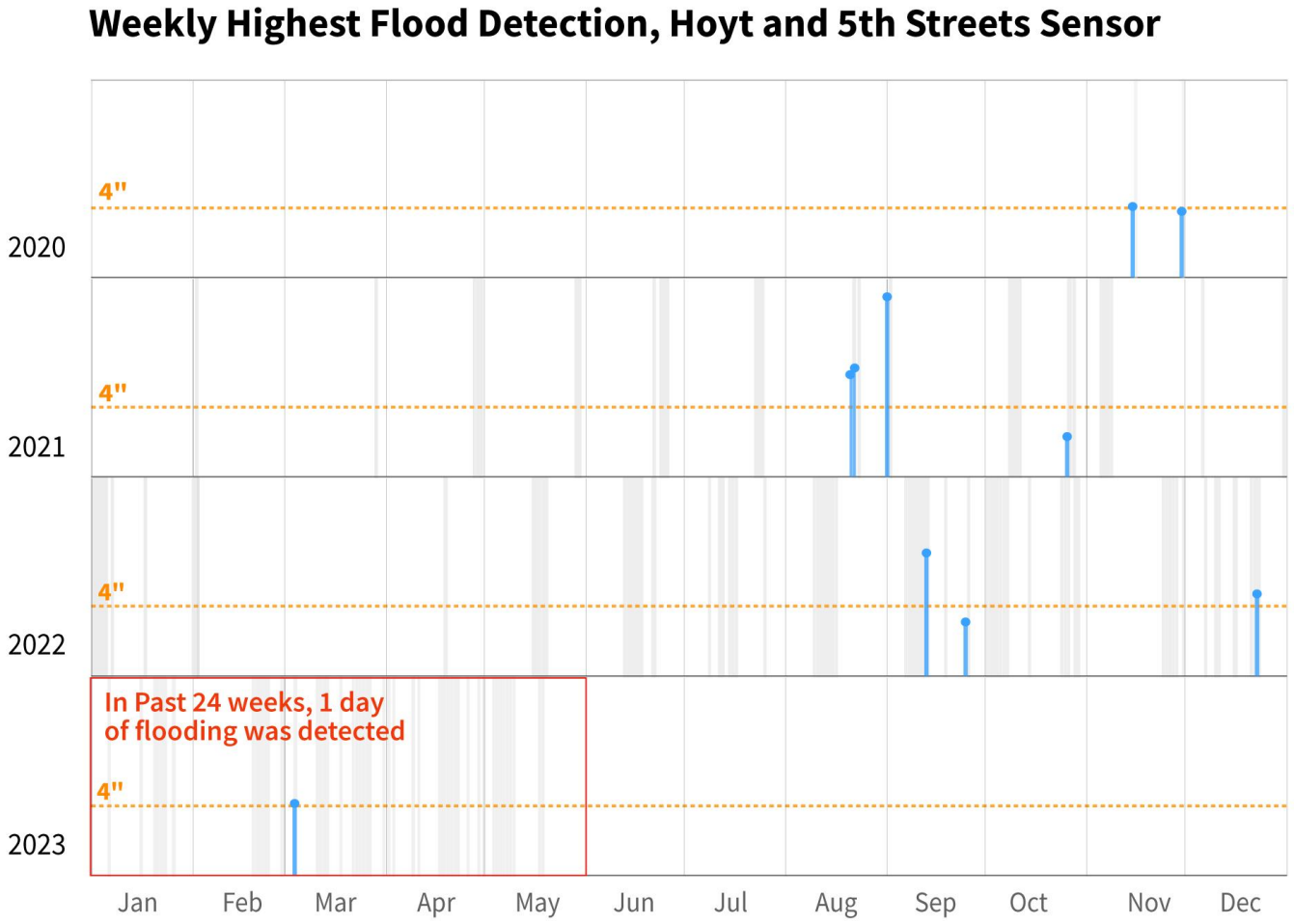
We made a lot of maps and flood charts

but rejected many approaches, sometimes because the data was misleading (showing false flood detections), or in this case because users found a less abstract representation of flooding easier to understand.



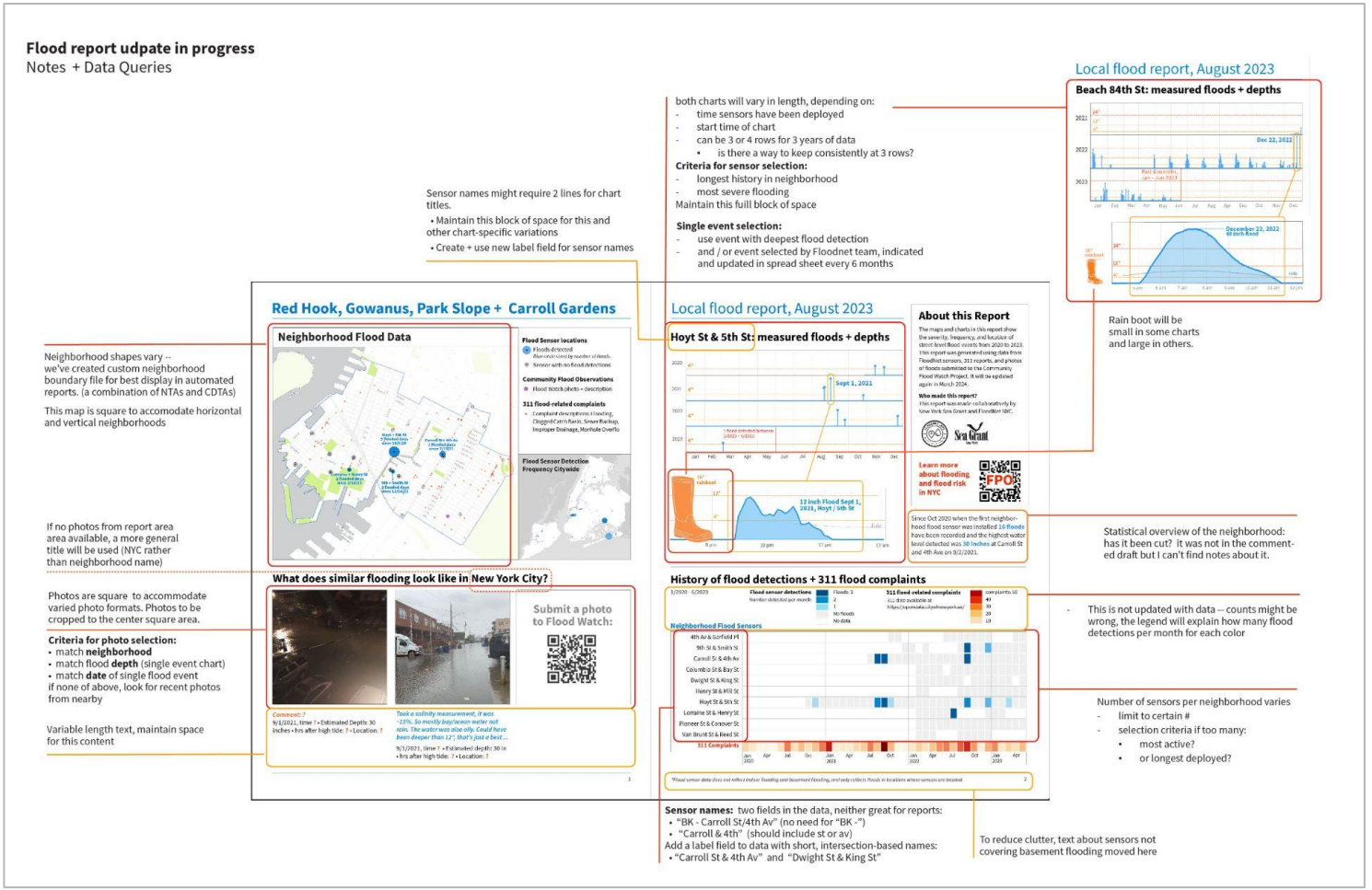
We kept the year over year representation; (looking towards the future when the sensor network has a longer history) to make it easier to see any seasonal patterns in flood activity.

There is a wide variation in the amount of data from neighborhood to neighborhood

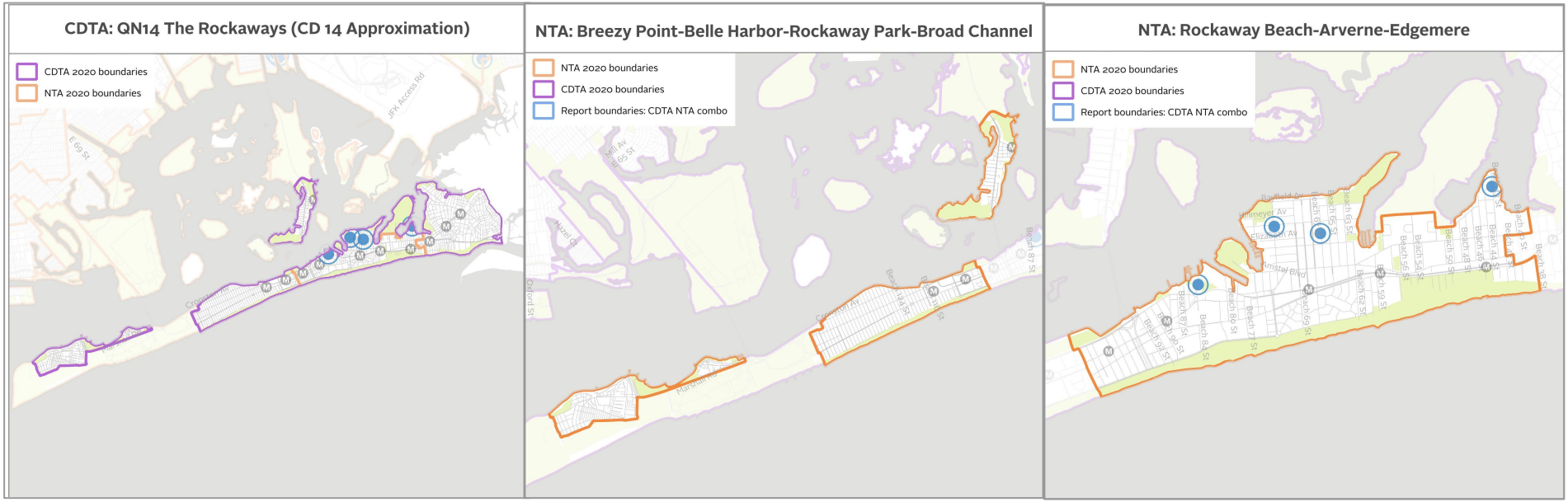


Annotated local report in progress

tracking variables to accommodate across reports for diverse geographies and flood circumstances

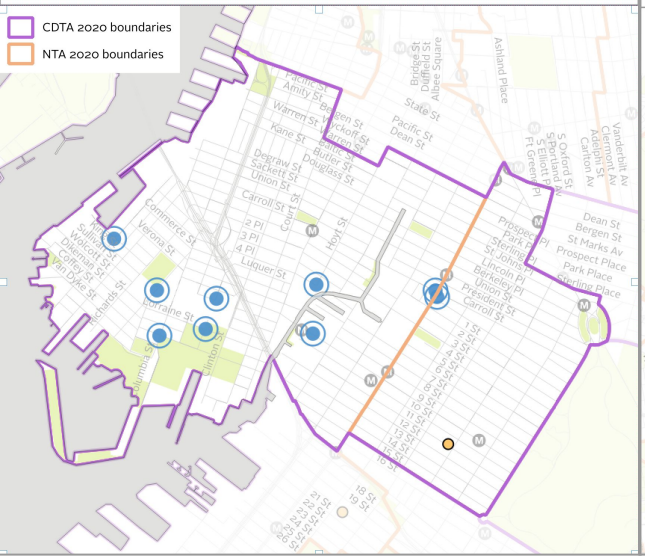


Geographic variations

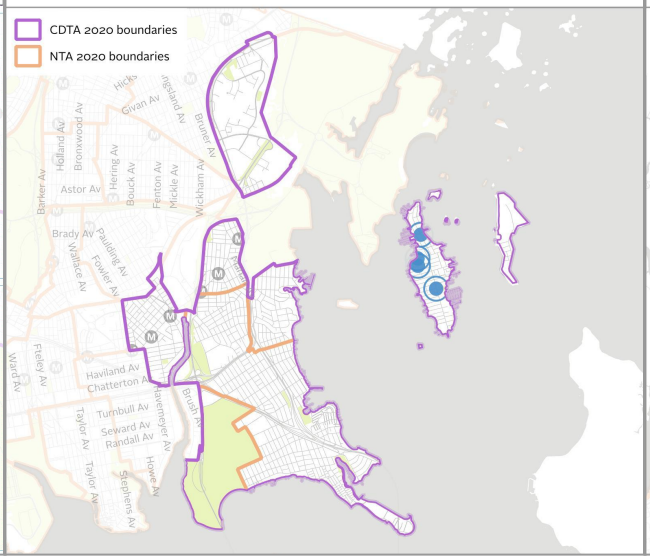


Neighborhood size + data variation impact legibility of neighborhood maps

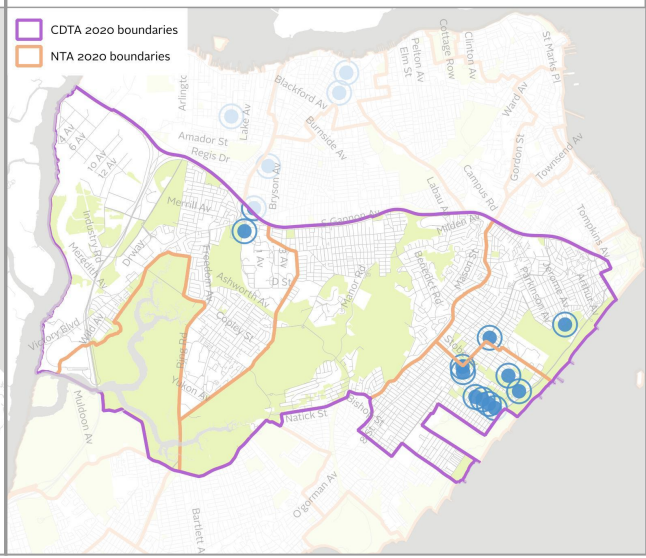
CDTA: BK06 Park Slope-Carroll Gardens (CD 6 Approximation)



CDTA: BX10 Co-op City-Throgs Neck (CD 10 Approximation)



CDTA: SI02 Mid-Island (CD 2 Approximation)

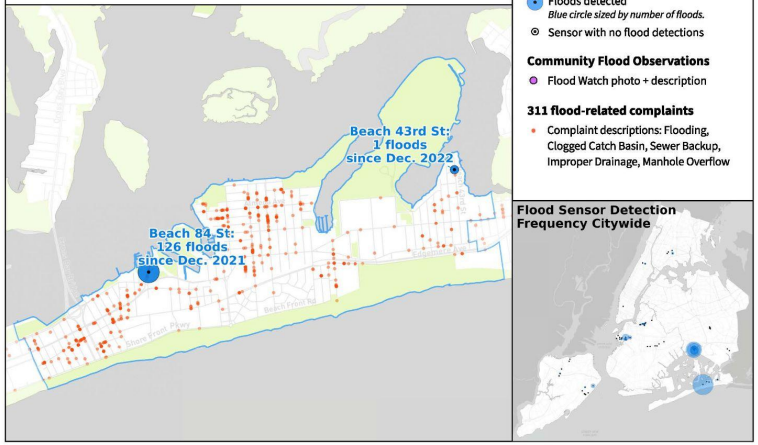


Final NYC Neighborhood Flood Reports

Local flood report for

Arverne-Edgemere

Neighborhood Flood Data



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Flood Sensor Detection Frequency Citywide

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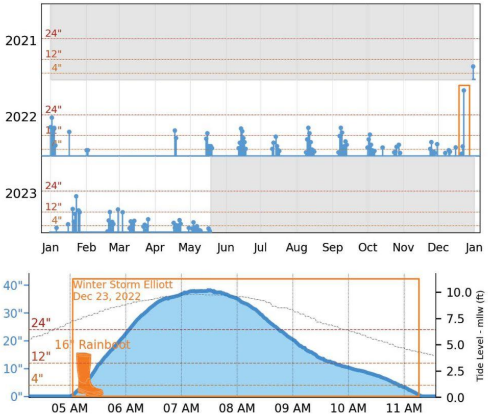

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Sea Grant NEW YORK

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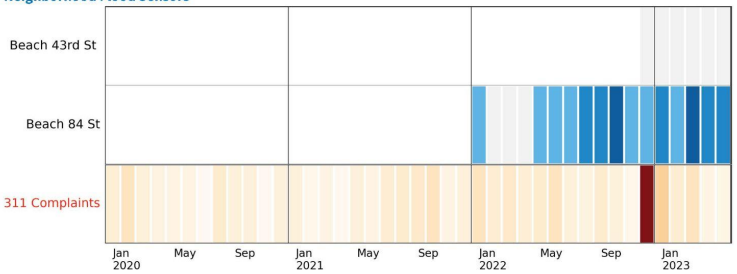
31
0

Neighborhood Flood Sensors

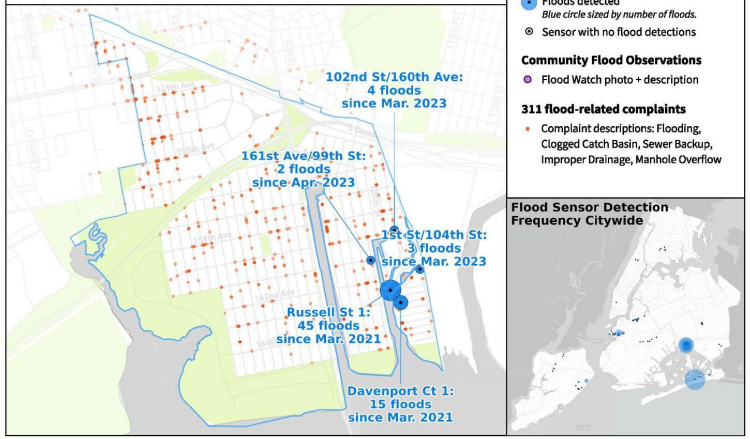


**Flood sensor data does not reflect indoor flooding and basement flooding, and only reflects floods in locations where sensors are located*

Local flood report for

Howard Beach-Lindenwood

Neighborhood Flood Data



Flood Sensor locations

- Floods detected
  Blue circle sized by number of floods.
- Sensor with no flood detections

Community Flood Observations

- Flood Watch photo + description

311 flood-related complaints

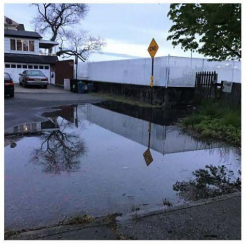
- Complaint descriptions: Flooding, Clogged Catch Basin, Sewer Backup, Improper Drainage, Manhole Overflow

Flood Sensor Detection Frequency Citywide

What does similar flooding look like in New York City?

Dec 23, 2022 ● 164th Ave, Howard Beach, 11414

Community Flood Watch Project



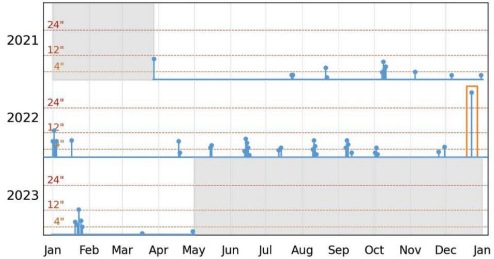
May 07, 2020 ● 160th Ave, Howard Beach, 11414

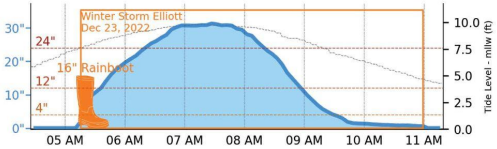
tide water coming to the street from storm drain that has duckbill

Submit a photo of flooding in your neighborhood

Published with Data Through May 2023

Russell St 1: flood detections + depths





About this Report

The maps and charts in this report show the severity, frequency, and location of street-level flood events from 2020 to 2023. This report was generated using data from FloodNet sensors, 311 reports, and photos of floods submitted to the Community Flood Watch Project. It will be updated again in March 2024.

Who made this report?
This report was made collaboratively by New York Sea Grant and FloodNet NYC.

Sea Grant NEW YORK

Learn more about flooding and flood risk in NYC

Since Mar. 2021 when the first neighborhood flood sensor was installed **77 floods** have been recorded, and the highest water level detected was **31 inches** at Russell St 1 on 12/23/2022.

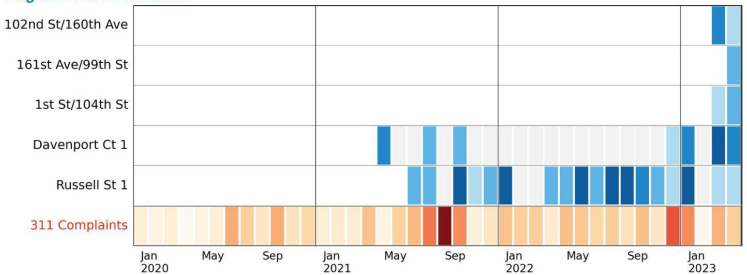
History of neighborhood flood detections + 311 flood complaints

03/04/2021 - 05/01/2023

Flood sensor detections
Number detected per month
5 Floods
2 Floods
No floods
No data

311 flood-related complaints
311 data available at
https://opendata.cityofnewyork.us/
52
34
17
0

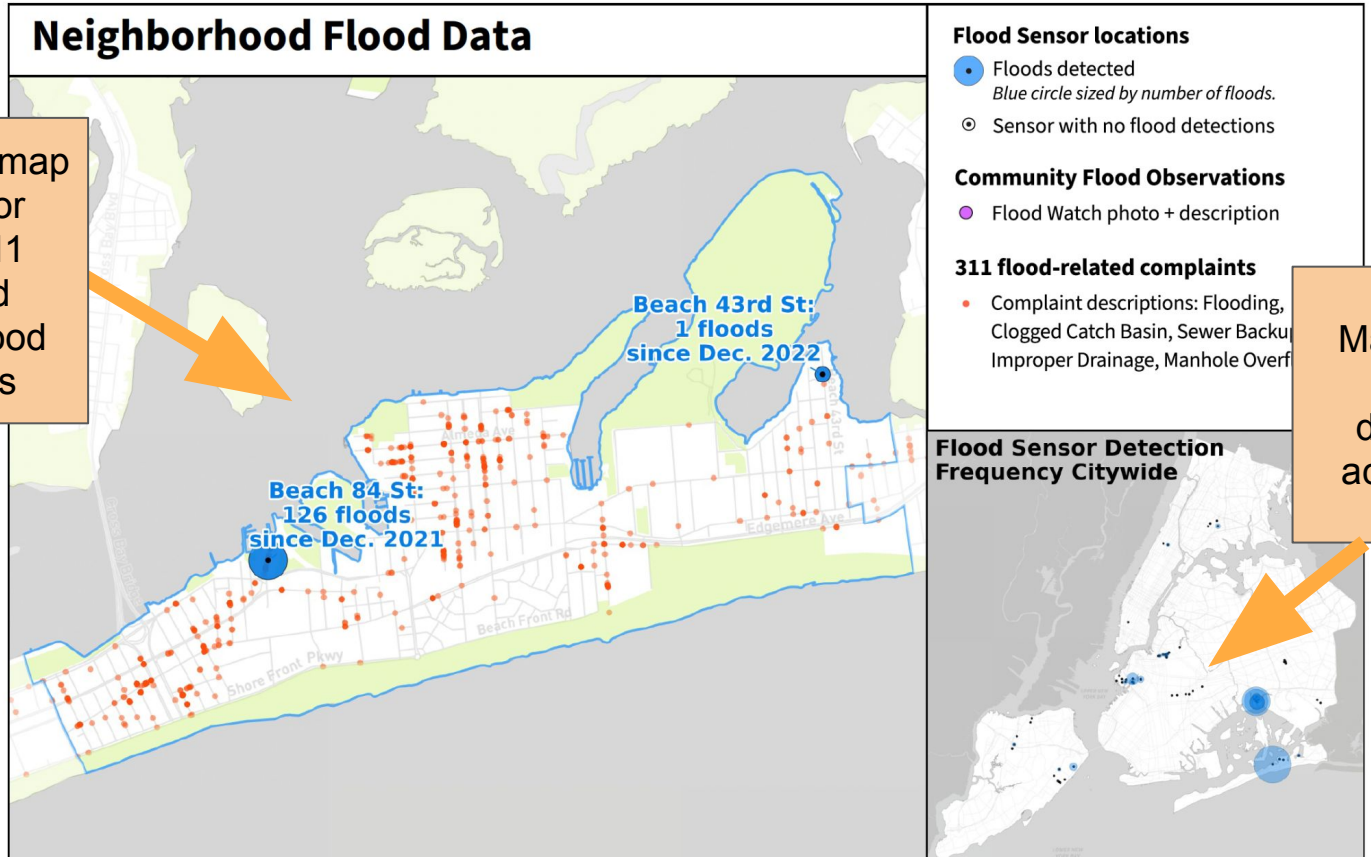
Neighborhood Flood Sensors



**Flood sensor data does not reflect indoor flooding and basement flooding, and only reflects floods in locations where sensors are located*

Local flood report for

Arverne-Edgemere



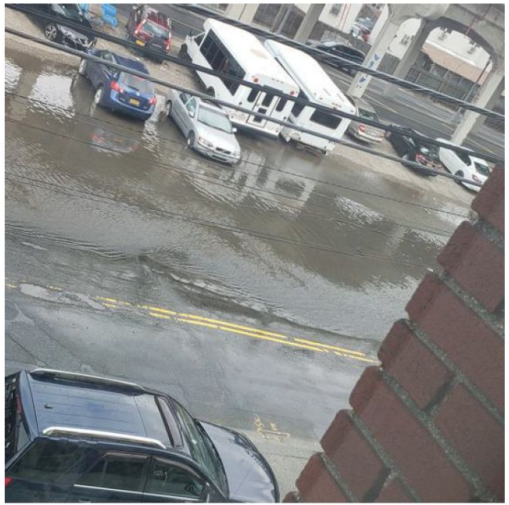
Neighborhood map shows sensor locations, 311 reports, and community flood observations

Map of flood sensor detections across NYC

What does similar flooding look like in New York City?

Dec 23, 2022 ● Bch 87th St, Far Rockaway, 11693

via NYC Community Flood Watch



Nov 27, 2018 ● Rockaway Beach Blvd, Arverne, 11692

Roadway/ Street, Sidewalk, Parking Lot, Non-Res Building, Open Space, Storm Drains, Stairways, Illegal Driving due to excess flood

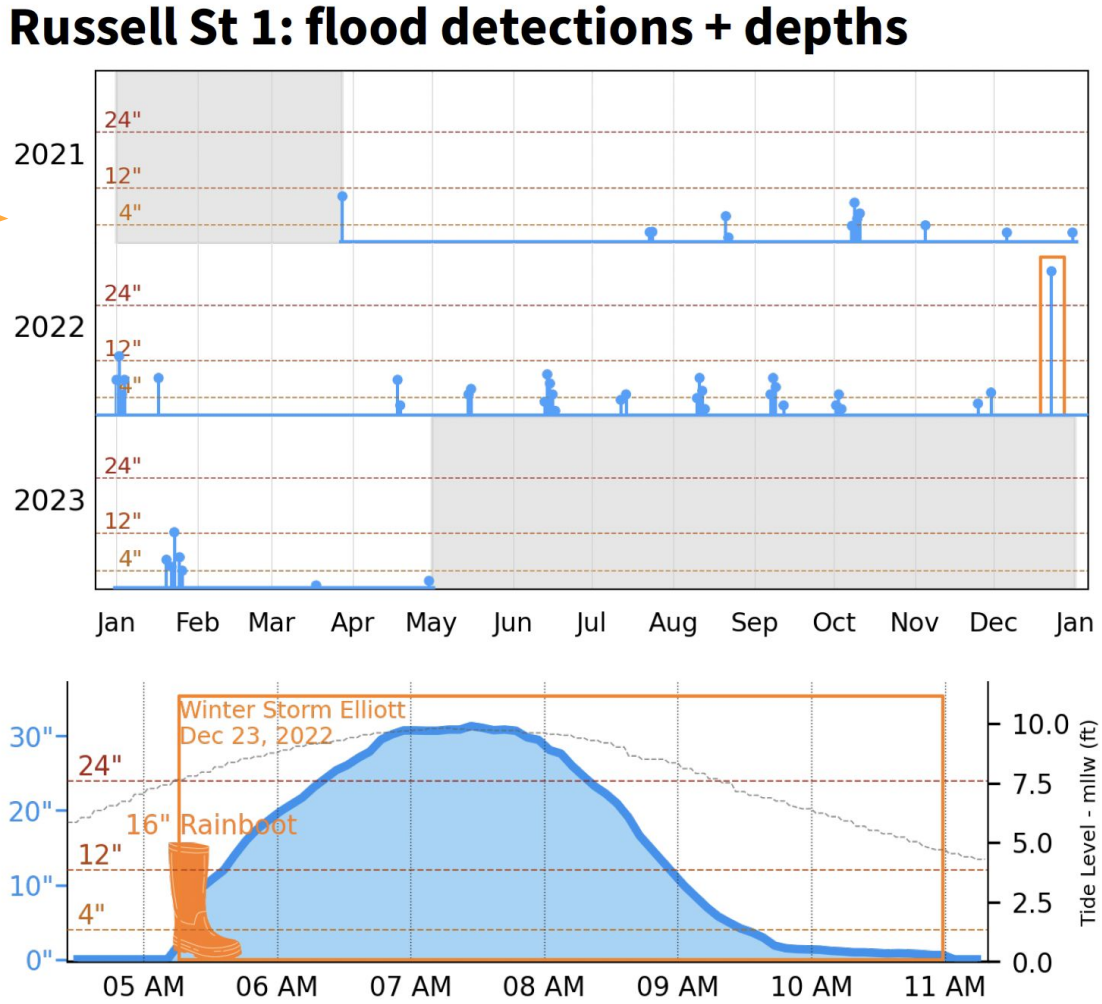
Submit a
of flooding in your
neighborhood

Call to action asking for photo submissions

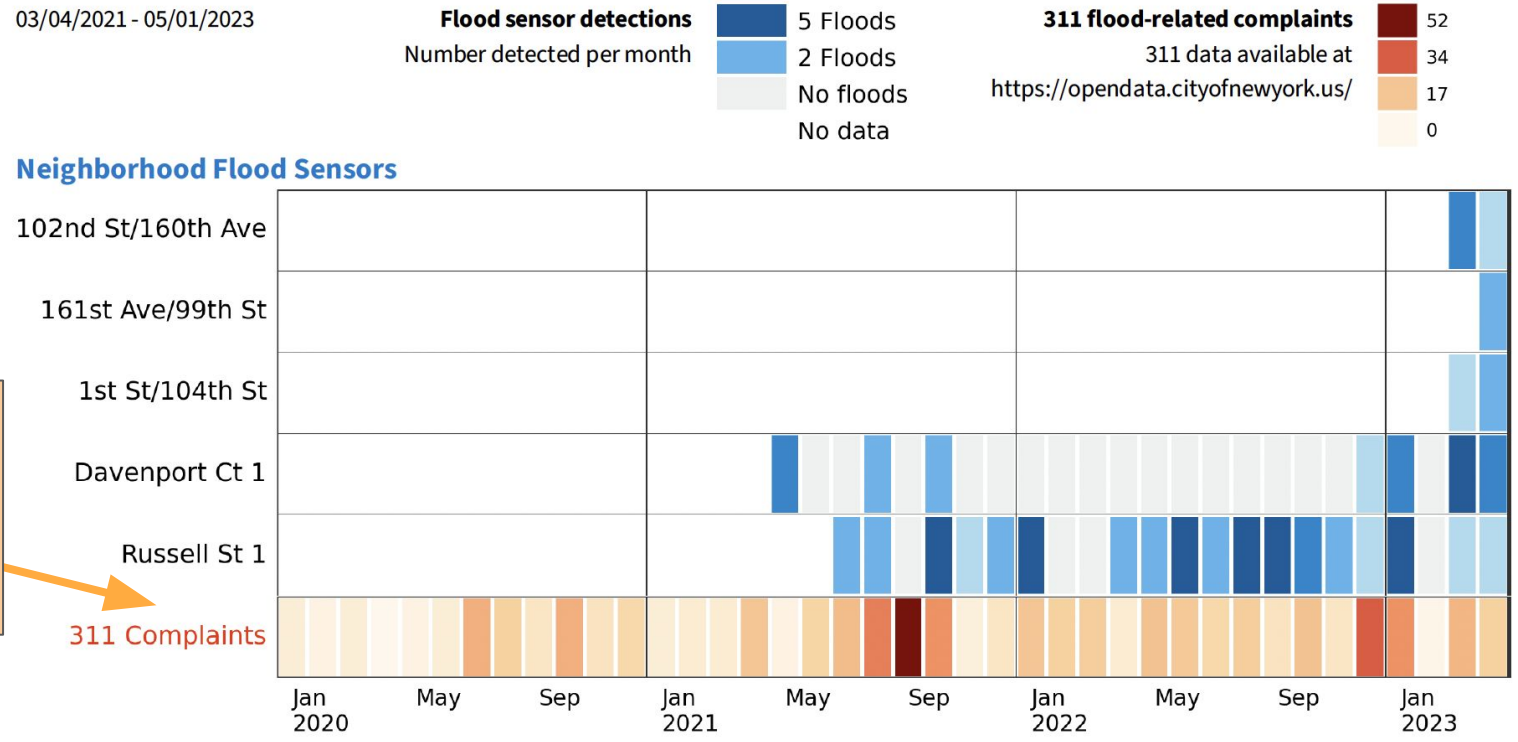
Local photos of flooding from the Community Flood Watch Project

Data detail from highlighted sensor

Data detail from a specific flood event



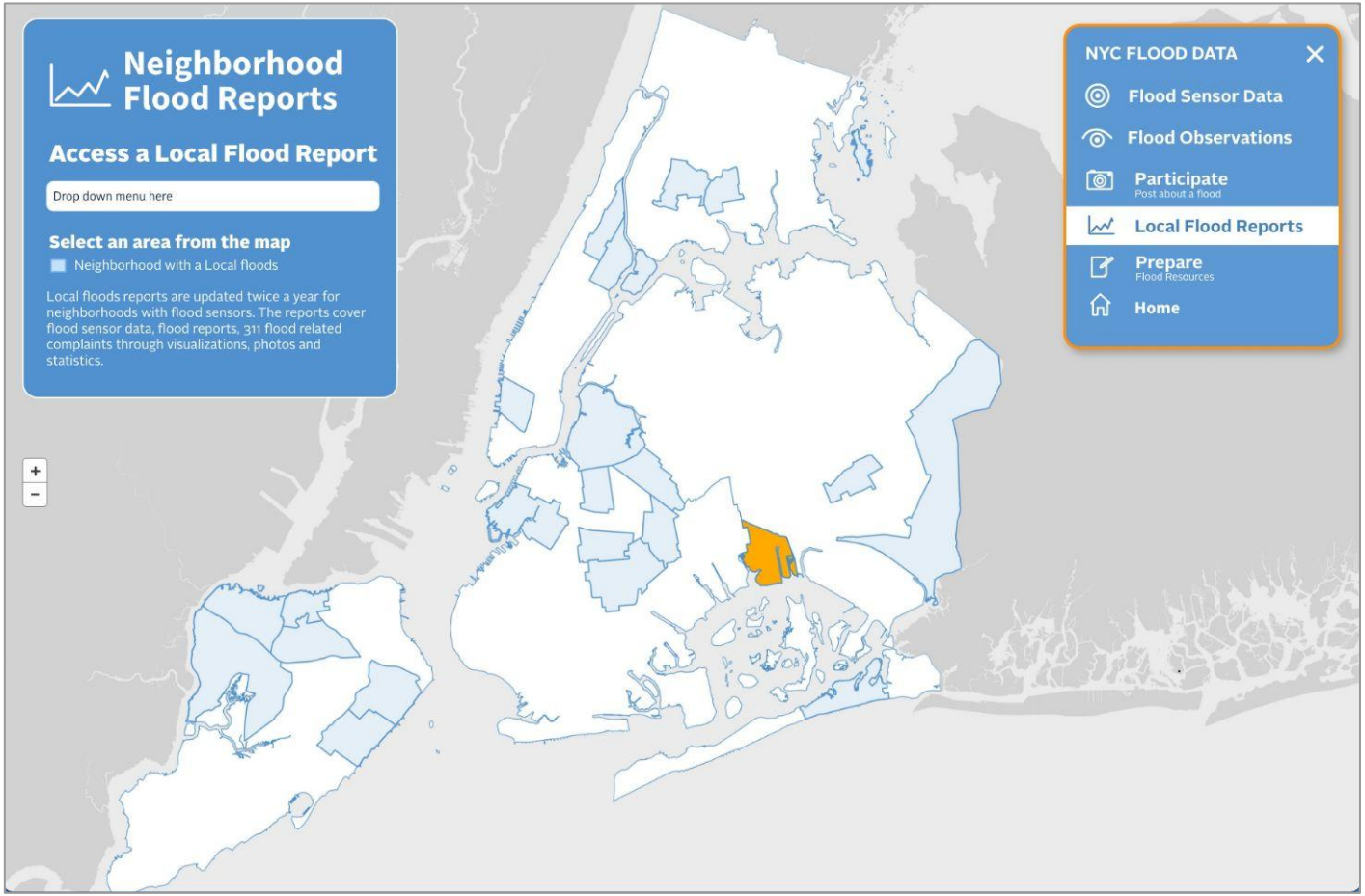
History of neighborhood flood detections + 311 flood complaints



Data from every neighborhood sensor alongside 311 complaints

Future Directions

Working towards making the local reports live and accessible



Website Development informed by the focus group

User journey 1

User:
A resident of a flood prone area is frustrated with the problems associated with regular flooding in their neighborhood. they feel it isn't covered in the news and that elected officials are ignoring the problem. They want to find solutions and take action.

Expectations:
- to find historical data about flooding in the area that demonstrates the problem
- accessible information to support arguments for addressing local flood problems

1

Discovers FloodNet / Flood Watch (HOW?)
- finds the web site
- site Invites user in to explore data
- user enters + explores site

Where can I find information about flooding in my neighborhood?

2

- Finds neighborhood
- explores sensor and flood post data viz and can see patterns of tidal flooding in past + higher rates of flooding in some seasons
- explores flood post photos
- sees other components of site

How do I tell the story to someone who can help?

3

- finds local reports
- downloads pdf
- shares with community members
- shares with council member listed on site within neighborhood map view
- shares with media outlet listed on site
- community members go to web site
- discussion continues in community and local knowledge re. living with flooding or preparing is shared

I've got a tool to communicate with, how can I get it to people who can help?

4

signs up to follow neighborhood social media account
- sees posts of high tide warnings
- sees flood post of community member
- sees post about recent flood detected by a local sensor
- user joins the social media account
- begins to discuss and share tips about things like where to park a car when high tide flooding is predicted

I can share stories, local knowledge and learn from others here, as well as see quantifiable flood data about my area.

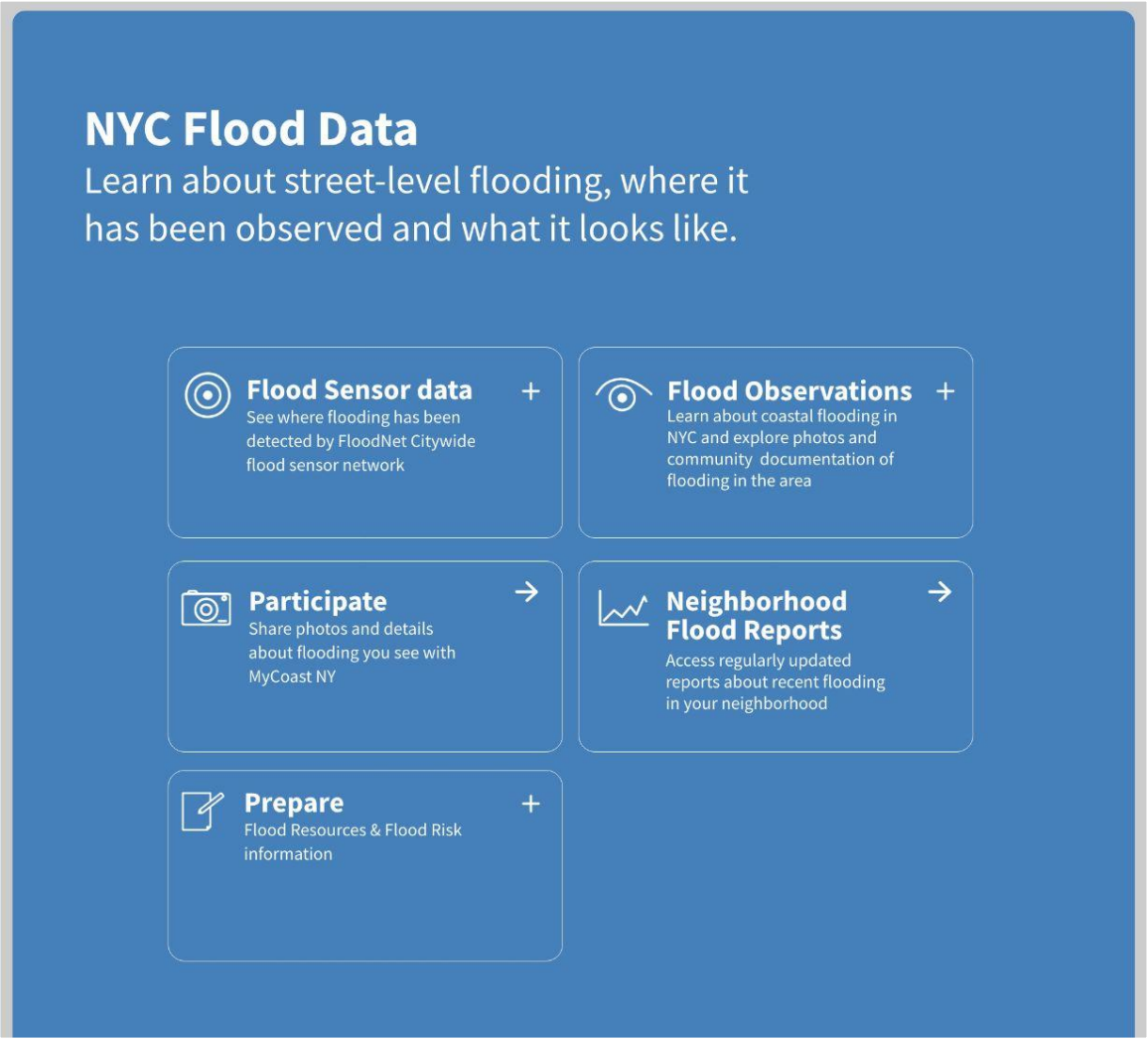
I'll join my neighborhood account and become an active member of this community.

Opportunities
Show all sensor and flood postings in one space / map
- allow people to focus on fine grained data on a neighborhood level
- organize content according to neighborhoods for everything, gearing it towards hyper local reports + council districts, also provides a way to organize social media accounts that are hyper local, and a way to segment data to help it load fast and be lightweight
- social media and local reports + flood posts all have potential to drive user and community engagement

Tool requirements:
- new design, integrated and consolidated data views
- social media account maintenance
- discussion moderation?
- local report updates
- neighborhood-specific media or gov. outlets for disseminating local reports

Questions:
- can similar level of engagement be achieved through flood postings alone?
- what options are there for discussion and engagement?

Website Development



Thank you!

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FLOODNET.NYC NYC.GOV + NYU.EDU + CUNY.EDU

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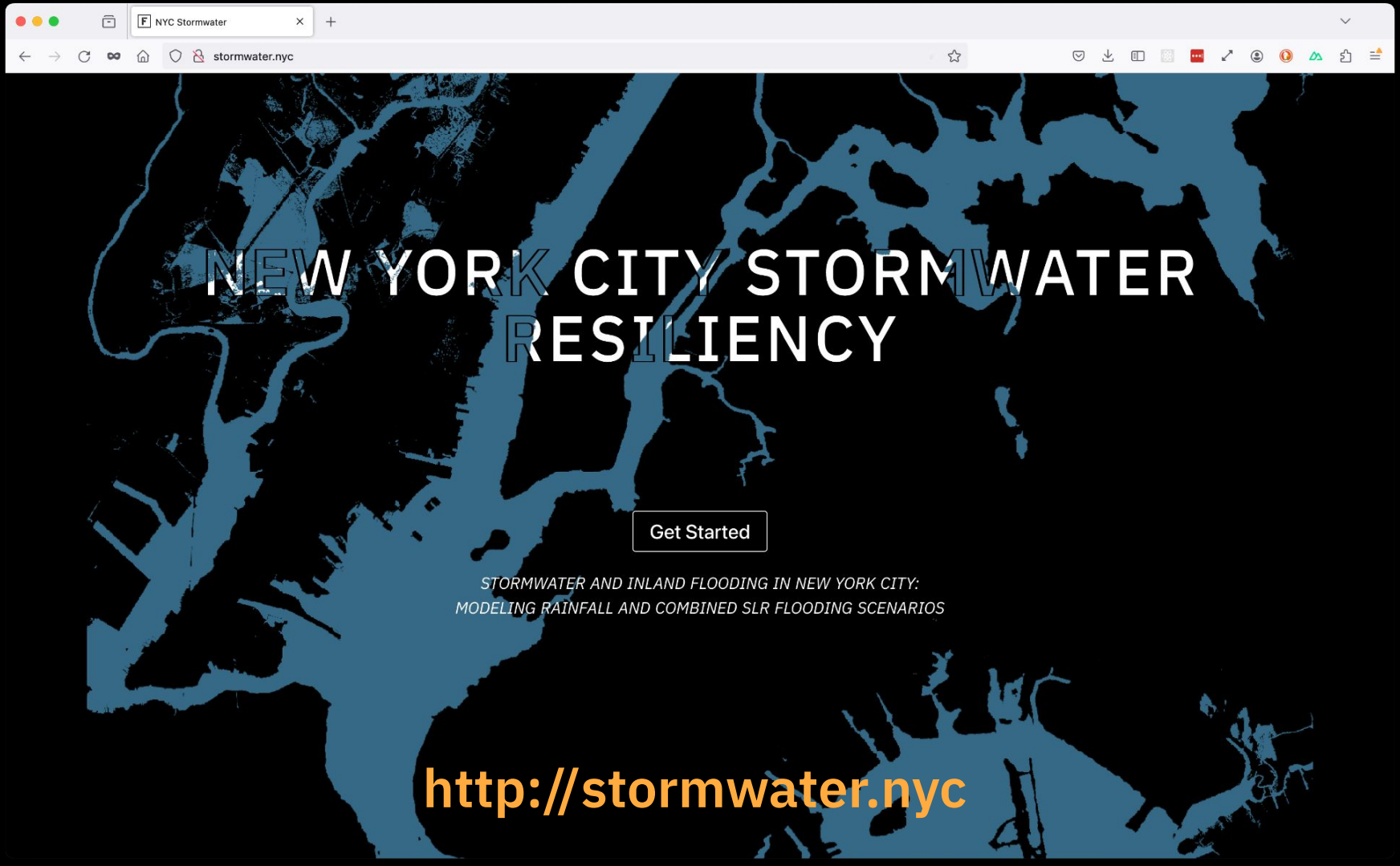
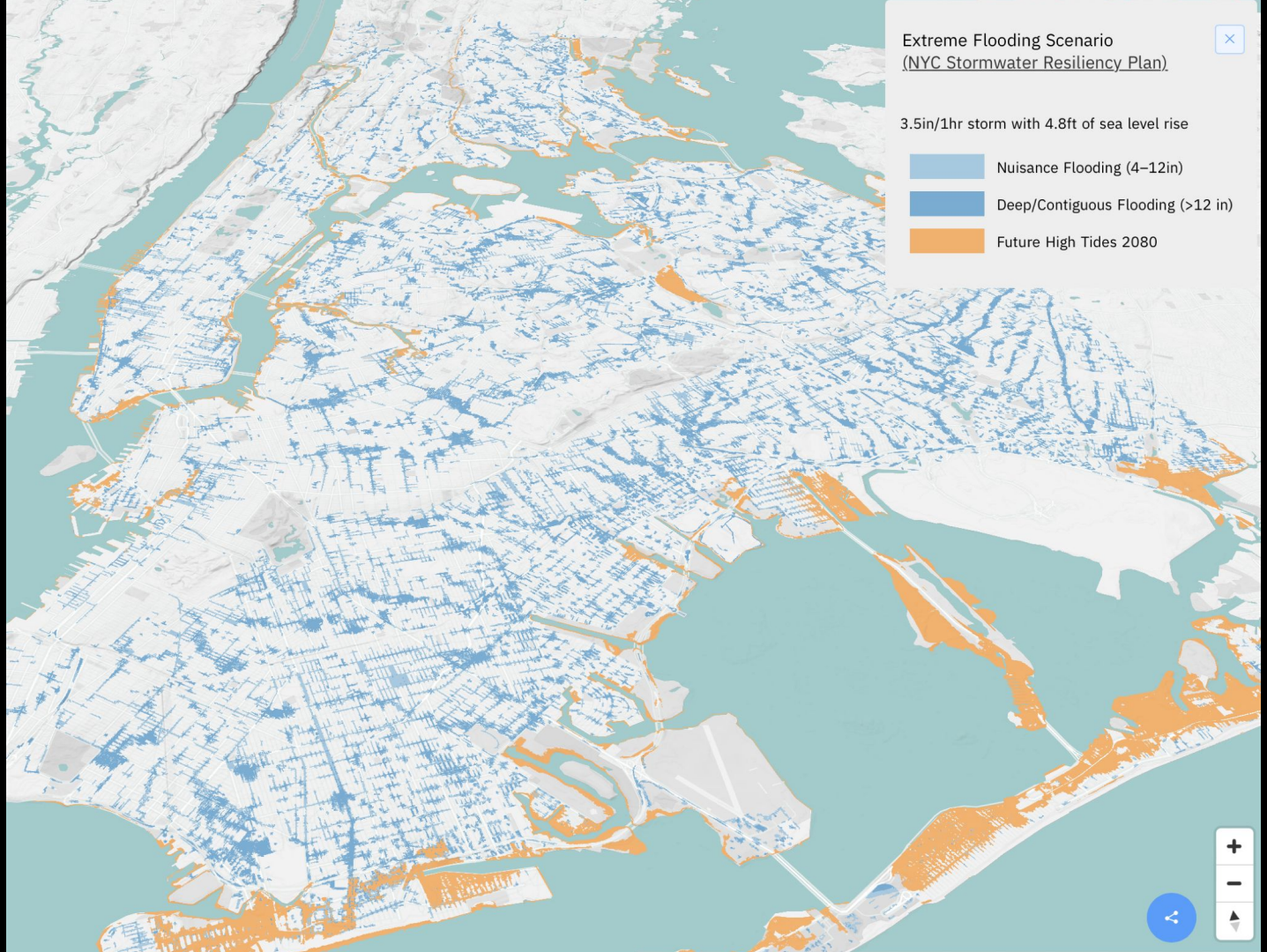
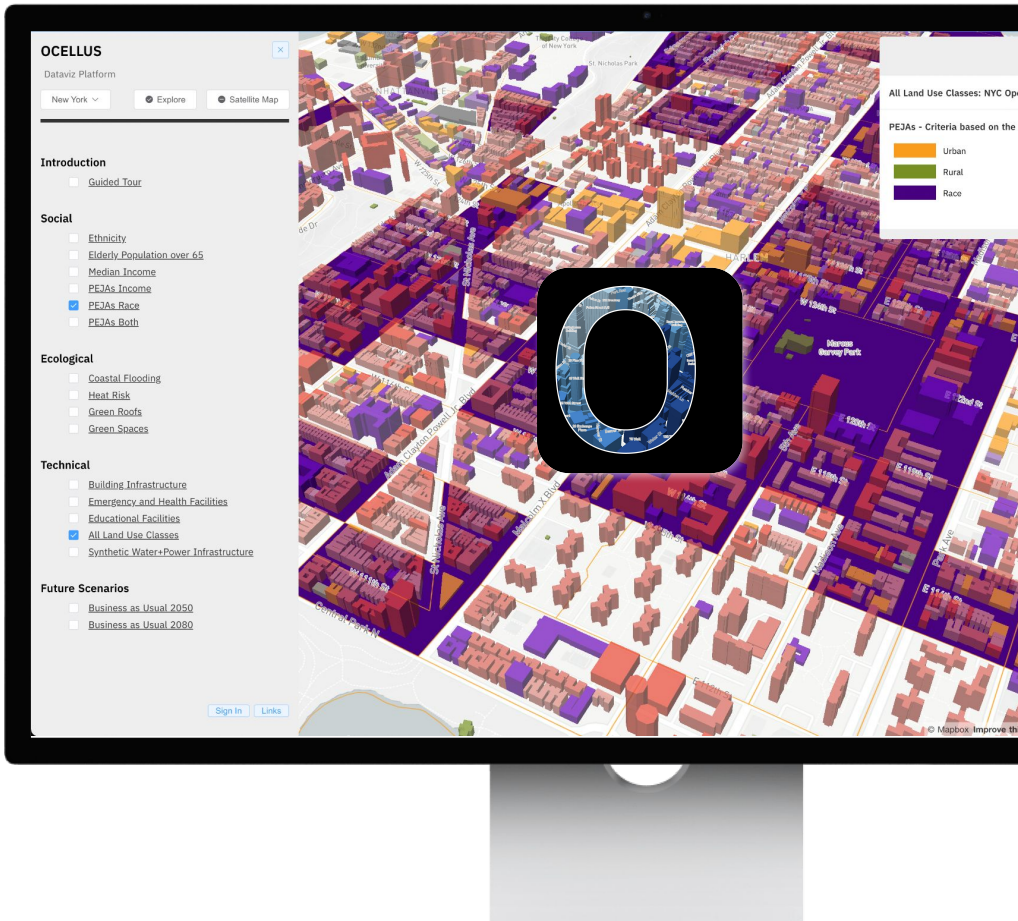

NYC Stormwater
stormwater.nyc
NEW YORK CITY STORMWATER RESILIENCY
Get Started
STORMWATER AND INLAND FLOODING IN NEW YORK CITY:
MODELING RAINFALL AND COMBINED SLR FLOODING SCENARIOS
http://stormwater.nyc


Extreme Flooding Scenario
(NYC Stormwater Resiliency Plan)
3.5in/1hr storm with 4.8ft of sea level rise
Nuisance Flooding (4–12in)
Deep/Contiguous Flooding (>12 in)
Future High Tides 2080


OCELLUS


Enter your location
XR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New York
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Satellite Map
Introduction
Guided Tour
Social
Ethnicity
Elderly Population over 65
Median Income
PEJAs Income
PEJAs Race
PEJAs Both
Ecological
Coastal Flooding
Heat Risk
Green Roofs
Green Spaces
Technical
Building Infrastructure
Emergency and Health Facilities
Educational Facilities
All Land Use Classes
Synthetic Water+Power Infrastructure
Future Scenarios
Business as Usual 2050
Business as Usual 2080
Sign In
Links
All Land Use Classes: NYC Op
PEJAs - Criteria based on the
Urban
Rural
Race
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