

# FloodNet

Hyperlocal, Street-level  
Flood Monitoring in  
New York City

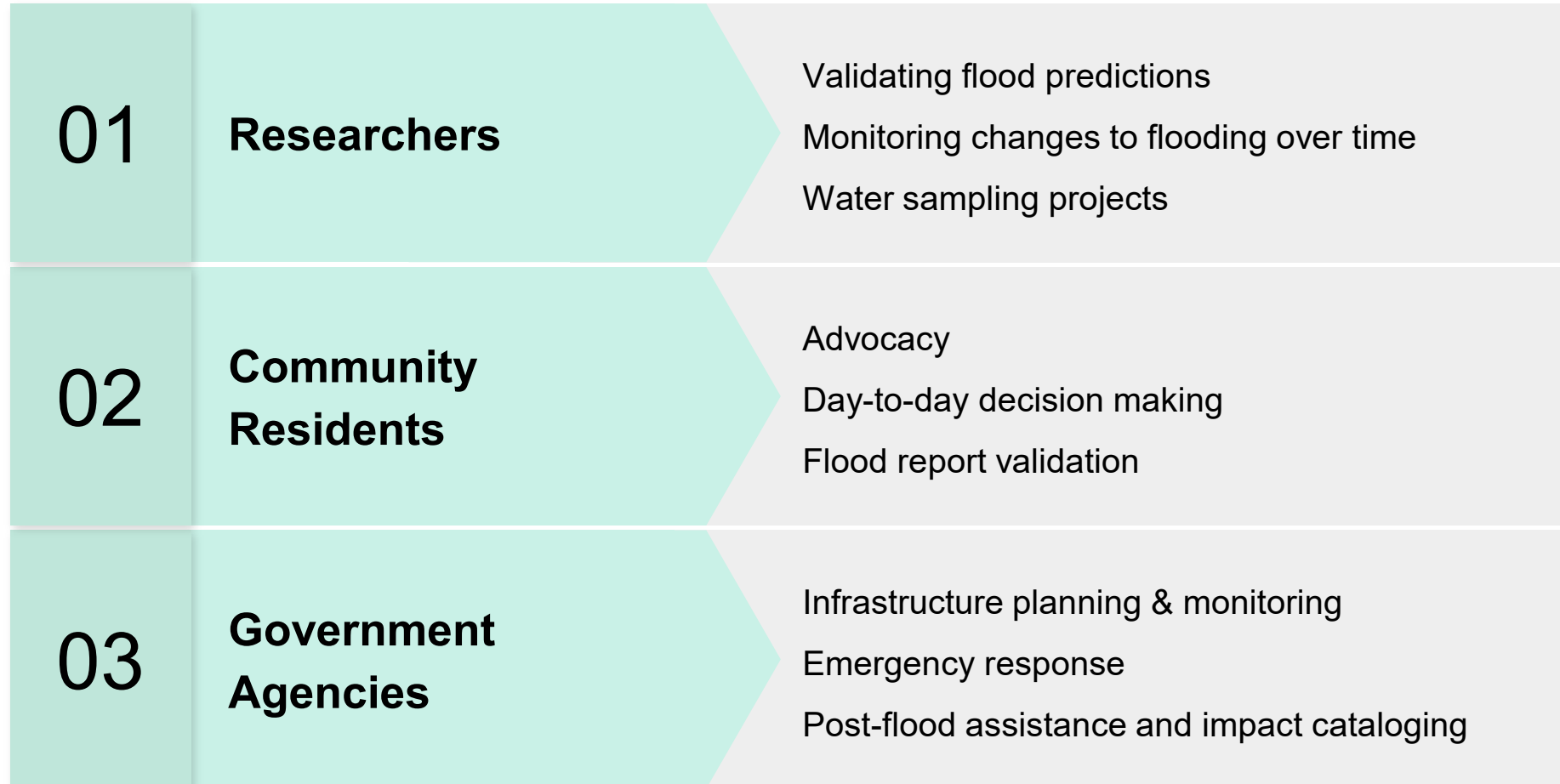
*CKE Flooding Working Group  
Meeting, 11/6/2023*



# Overview of the FloodNet Project

# Project Motivation:

## The Need for Real-time, Quantitative Urban Flood Data



Making waves: Uses of real-time, hyperlocal flood sensor data for emergency management, resiliency planning, and flood impact mitigation

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# FloodNet NYC: Our Mission



- Develop tools for real-time urban flood monitoring
- Implement these tools to measure flooding in New York City
- Make flood data and monitoring tools **accessible and useful** to stakeholders including residents, community-based organizations, government agencies, and researchers

# FloodNet NYC: Our Guiding Principles



## **Equity + Accountability**

- *We work with attention to histories of inequality and environmental injustice.*

## **Accessibility + Usefulness**

- *Our process and outputs are open access for meaningful use by partners and the public.*

## **Relevance + Credibility**

- *Address real-world problems and contribute to contemporary research.*

## **Openness + Transparency**

- *Openly share principles, practices, and decision-making processes as well as sensor architecture, data, and data processing tools.*

## **Collaboration + Community**

- *Collaborate with multiple stakeholders, with a focus on community in high-impact flood locations.*

## **Sustainability + Integrity**

- *Aim to build a flood monitoring network that is relevant now and into the future for NYC communities, researchers, and agencies.*



# Our Tools: The FloodNet Sensor

- Sense water depth with accuracy of  $\pm 5$  mm
- Collect and transmit measurements every 1 min
- Operate independent of existing power and networking infrastructure
- Comprise low-cost components for sensor network scalability

Solar Panel



Ultrasonic sensor

Antenna for data transmission

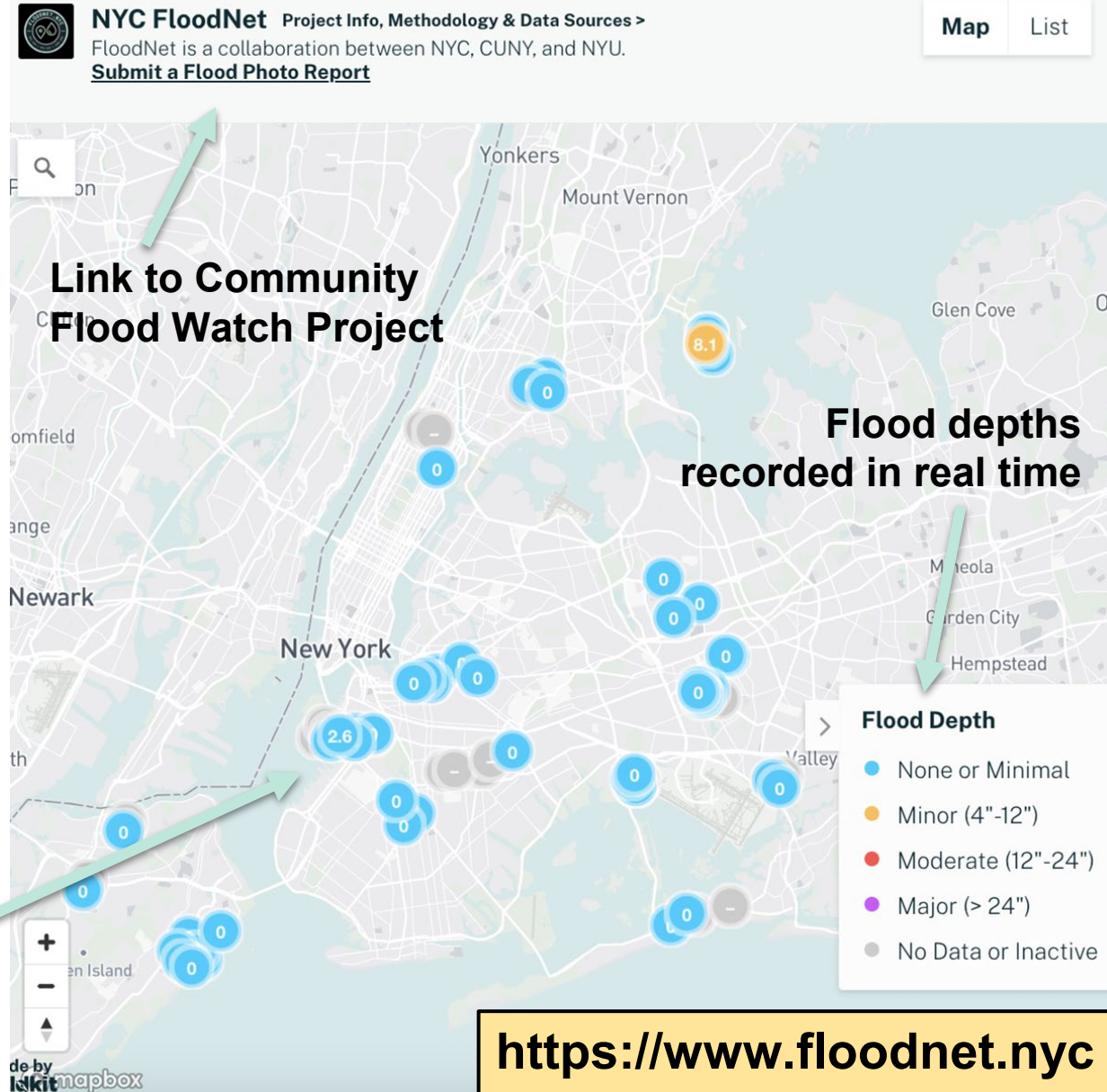






# Our Tools: The Data Dashboard

- Public facing tool for data dissemination and outreach
- Shaped by ongoing feedback from community partners and other key stakeholders





# Community Engagement (CE)

*CE increases our project's ability to foster sustainable impact within communities most at risk. The core of this lies in the spaces of community outreach, community education, and community action.*

## Community Outreach

- Raise awareness of project goals and current initiatives
- Facilitate direct information sharing of real-time data with key community stakeholders

## Community Education

- Develop internal team knowledge about flood-prone neighborhoods and potential uses for FloodNet data.
- Cultivate and sustain collaborative practices of information sharing and action

## Community Action

- Contribute our data, learnings, and evidence-based practices to various flood-related efforts and climate justice initiatives around the City

*including through collaboration with partners like the Community Flood Watch project.*

# FloodNet Community Engagement In Practice



## FLOODNET NYC

A NETWORK FOR REAL TIME URBAN FLOOD MONITORING AND COMMUNITY RESILIENCE

### WHAT IS FLOODNET?

FloodNet is a cooperative of communities, researchers, and New York City government agencies working to better understand the frequency, severity, and impacts of flooding in New York City. We especially focus on neighborhoods that are vulnerable to high tides, storm surge, and stormwater runoff.

### ACCESS OUR DATA.

Our data dashboard collects real-time data from our flood sensors and can be viewed at [www.floodnet.nyc](http://www.floodnet.nyc).

### OUR FLOOD SENSORS.

Flood sensors monitor flooding in NYC neighborhoods. They collect information that is used by local residents, researchers, city agencies, and others to better understand how flooding impacts NYC communities. They are not cameras and do not collect identifying information.

### HOW TO GET INVOLVED.

If you experience flooding in your neighborhood, send suggestions for potential sensor locations. **Contact us via our website: [www.floodnet.nyc](http://www.floodnet.nyc)**

### HOW TO STAY CONNECTED.

Talk with our Community Engagement Manager about the project, collaboration, or meetings with your team. **Email [info@floodnet.nyc](mailto:info@floodnet.nyc) now!**

### HELP COLLECT FLOOD DATA.

To submit a flood report with a photo, time, depth, location and impacts, download the 'MyCoast' app, register, and add a 'Flood Watch' report: [mycoast.org/ny/flood-watch](http://mycoast.org/ny/flood-watch)



### WHO WE ARE.

FloodNet began in 2020 as a partnership between academic researchers at NYU and CUNY, and NYC agencies, including the Mayor's Office of Climate & Environmental Justice, NYC Department of Environmental Protection, and the Mayor's Office of Technology & Innovation.

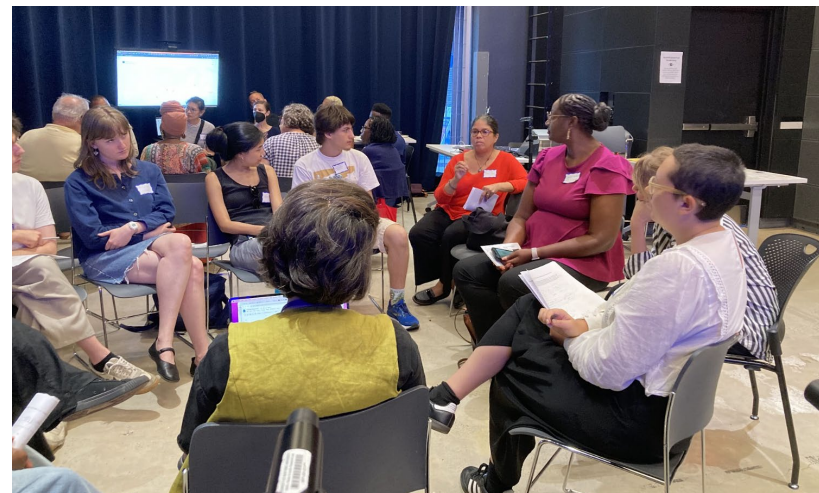
### QUESTIONS OR FEEDBACK?




[info@floodnet.nyc](mailto:info@floodnet.nyc)  
[www.floodnet.nyc](http://www.floodnet.nyc)



Educational materials offer residents accessible and relevant information to keep them informed about FloodNet.



Community outreach events foster direct interactions, build relationships, and address local concerns and needs.



## FloodNet NYC

### Neighborhood Profile: Canarsie, Brooklyn

Last Updated: October 2023

Canarsie is a neighborhood in Brooklyn, NYC that was historically named for the indigenous people who inhabited the land. It is most identified by its residential homes, waterfront views, and fusion city living. Due to its location and position within the Jamaica Bay watershed, Canarsie faces recurrent flooding, exacerbated by the impacts of climate change. Despite ongoing efforts to address this problem, Canarsie continues to grapple with severe flooding, posing a significant threat to the neighborhood and its residents.

#### Geographical Location

Situated in Jamaica Bay, Canarsie's boundaries include the Fresh Creek Basin in the northeast, and Paerdegat Basin in the southwest. To the north Canarsie is bordered by Linden Boulevard and Ralph Avenue to the west. As severe storms drop high amounts of water into Fresh Creek and Paerdegat Basin, areas nearby are affected by them overflowing.

#### Quick Facts

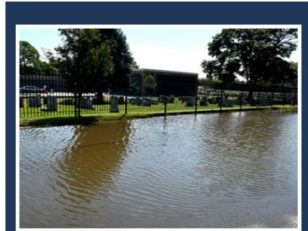
- As of 2021 Canarsie's population is at 196,219.
- Based data from the NYU Furman Center, community residents primarily identify as black (55.7%), white (20.4%), Asian (6.3%), and Hispanic (9.2%) populations.
- In 2021, the income diversity ratio was 4.6, indicating a moderate level of income diversity in the neighborhood, with a range of income levels represented.
- Housing units and rental vacancy rates have been slightly decreasing from 2019-2021.

#### Flooding in Canarsie, BK

- **Stormwater or Pluvial Flooding**
  - Stormwater flooding most often occurs when precipitation, accumulates in the city faster than it can drain out through our stormwater drainage systems, e.g., Hurricane Ida in 2021.
  - Lack of sewage capacity has led to combined sewer overflows, causing untreated sewage and stormwater to infiltrate the environment and people's homes during heavy rain events.
- **Coastal Flooding**
  - Coastal flooding can occur during coastal storms (e.g. hurricanes, tropical storms, Nor'easters) when water from the ocean surges towards the land and come up and over the coastline due to winds and other forces.
  - Canarsie is particularly vulnerable to coastal flooding since much of the residential land sits on infilled marshland.

#### Key Flood-related Projects

- **Flood Protection Project (2021):** Enhancing flood protection with tidal gates.
- **Sewer Upgrade Project (2022):** Upgrading sewage lines to reduce flooding.
- **Wetland Restoration (Ongoing):** Restoring wetlands at Fresh Creek Nature Preserve.
- **Tidal Gates (Ongoing):** Installing tidal gates to prevent debris in sewage.
- **Adopt a Catch Basin (Ongoing):** Volunteer program to keep drains clear.
- **Sewer System Separation (Ongoing):** Separating combined sewer systems for better drainage.



(Source: Brooklyn Paper, 2017)

#### Community Stories

*"And water does flow in different ways throughout that street, it has nowhere to go. At one point it does enter the cemetery at our driveway. I'm not an engineer, I don't know how it has to be addressed, but somebody needs to see it because that is standing water there."*

(Related to community concerns about flooding on Church Lane above, Source: Brooklyn Paper, 2017)

*The combination of degraded sewers, being surrounded by three bodies of water...as well as the rise in extreme weather events resulting from the climate crisis, makes this community particularly vulnerable," Jeffries said. "That's why it was so important in this first round of funding to fight hard to secure support for the tide gate project."*

(Related to tidal gate installation in Canarsie, Source: Brooklyn Paper, 2022)

#### Suggest Locations for Flood Sensors

Flood sensors monitor flood events at the street-level in order to contribute to a deeper understanding of how flooding impacts flood-prone NYC communities. Currently, we are looking to get more suggestions from the community about cross-streets where flooding is happening. This helps the FloodNet NYC team to cross-reference and validate information we are learning from our academic collaborators and DEP. Recommend sensor locations using the QR code here.



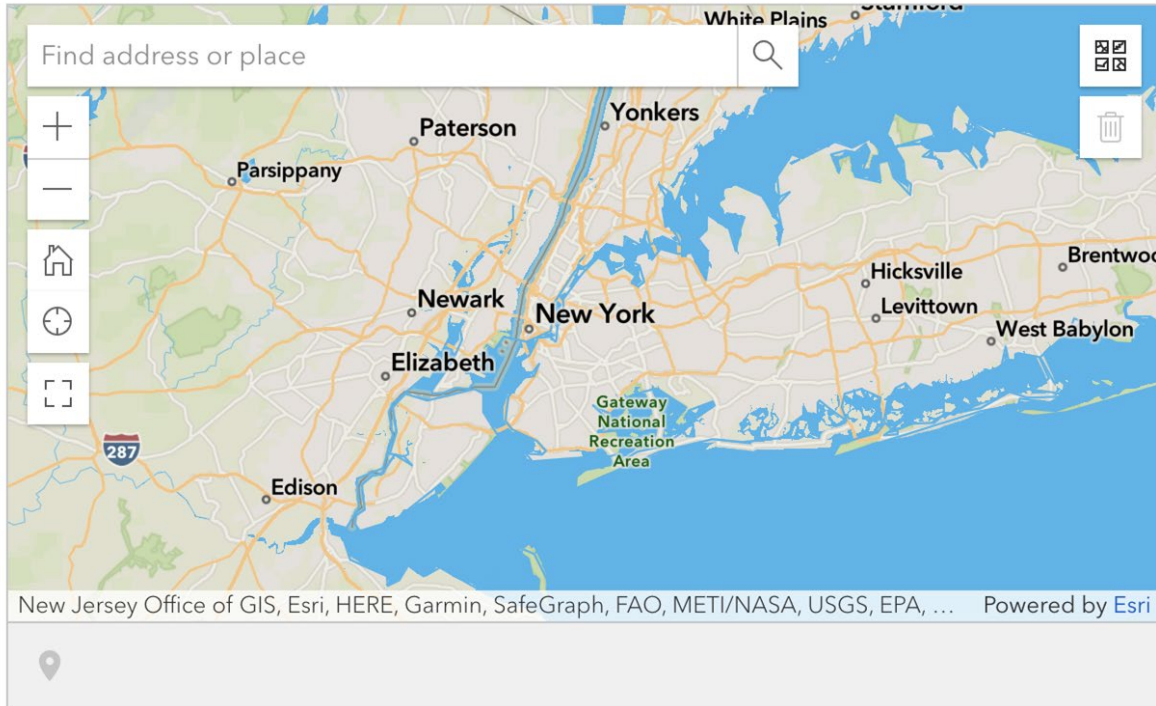
Community profiles provide a concise and accessible resource for information sharing and collaboration.



# FloodNet Community Sensor Suggestion

Please select your suggested sensor location on the map below:

You can select a location by zooming in and dropping a pin or by searching for an address via the search bar.



QR code to suggest sensors

**FloodNet has a mandate from NYC DEP to install 500 sensors over the next four years.**

Sensor placement is informed by requests we collect from NYC residents, city government, and researchers. We analyze these requests alongside predicted flood maps and other indicators of flood risk and vulnerability.



**Partner Highlight:  
Community Action in Jamaica Bay & the  
Community Flood Watch Project**

Documenting local flooding since 2018:

# Community Flood Watch Project



Beach 78<sup>th</sup> St, Oct 27, 2018



Beach 84<sup>th</sup> St, Sep 29, 2019



Davenport Court, Sept 10<sup>th</sup>, 2018



Neptune Ave, Sept 2, 2019





Government



Coastal Hazard Message  
National Weather Service New York NY  
1012 PM EDT Sat Sep 28 2019

...LOCALIZED MINOR COASTAL FLOODING SUNDAY MORNING...

Southern Queens-Southern Nassau-  
1012 PM EDT Sat Sep 28 2019

...Brief minor flooding of the most vulnerable locations near the waterfront and shoreline...

\* LOCATIONS...Southern Nassau and Southern Queens.

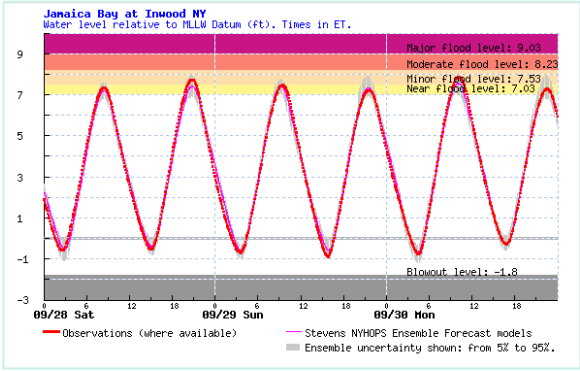
\* TIMING...From 7 AM EDT Sunday through Sunday morning.

\* COASTAL FLOOD IMPACTS...There is a low threat of property damage. Shallow flooding is expected in the most vulnerable locations near the waterfront and shoreline.

COMMUNITY  
FLOOD WATCH  
PROJECT

Residents

Scientists





**Submit your photos of flooding to build an  
online resource for your community**

[www.mycoast.org/ny/flood-watch](http://www.mycoast.org/ny/flood-watch)



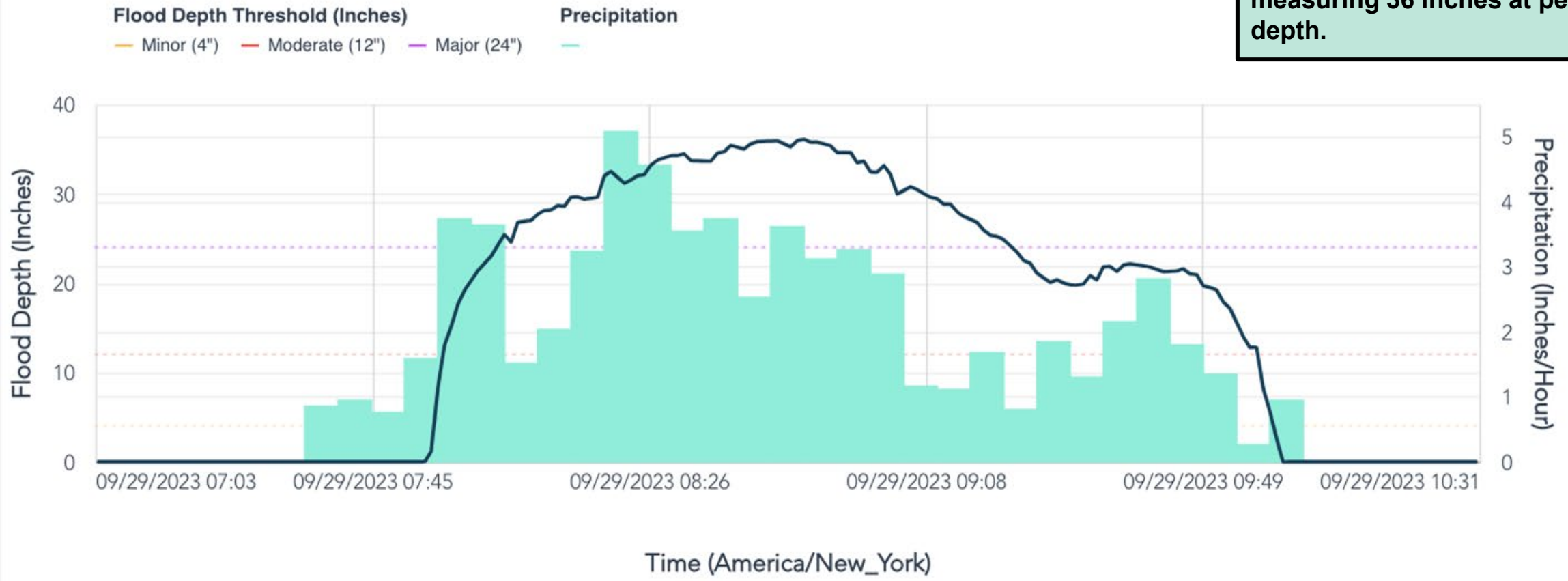
# A Deep Dive on Flood Sensor Data





BK-Carroll St/4th Av Flood Depth Remove  
 BK-Carroll St/4th Av Precipitation Remove
Time Series ▼

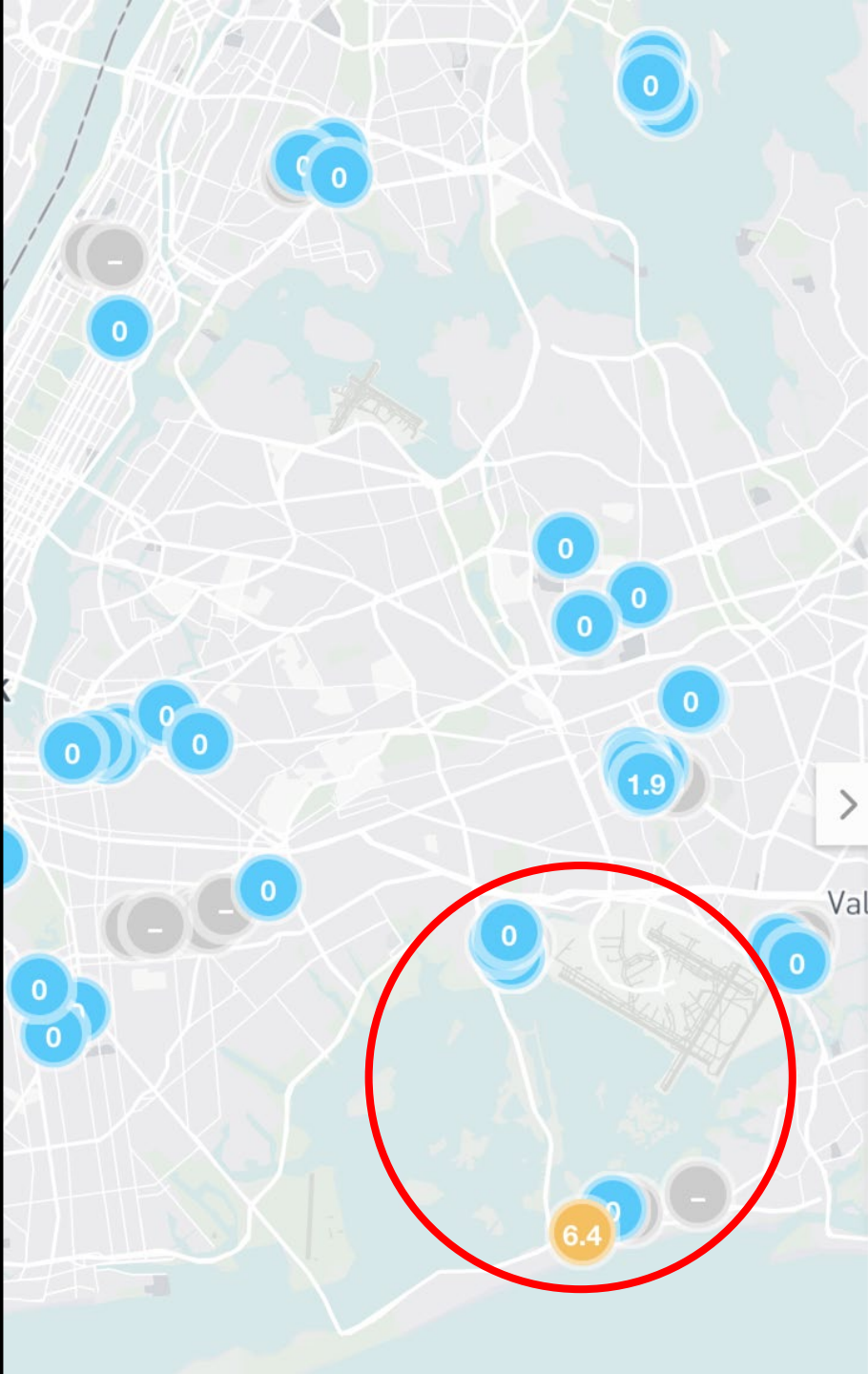
**Our Carroll St/4th Ave sensor recorded the deepest flood, measuring 36 inches at peak depth.**



2021
April
July
October
2022
April
July
October
2023
April
July
October




**Frequent coastal flooding caused by high tides**



< Back to Sensor Map

# Data View

 Add Chart

 Share



## Q - Beach 84 St

📍 Far Rockaway , Queens

📅 Deployed on December 10, 2021 by FloodNet

**Last Seen** 11/3/2022, 20:08

◀ 19 of 23 ▶

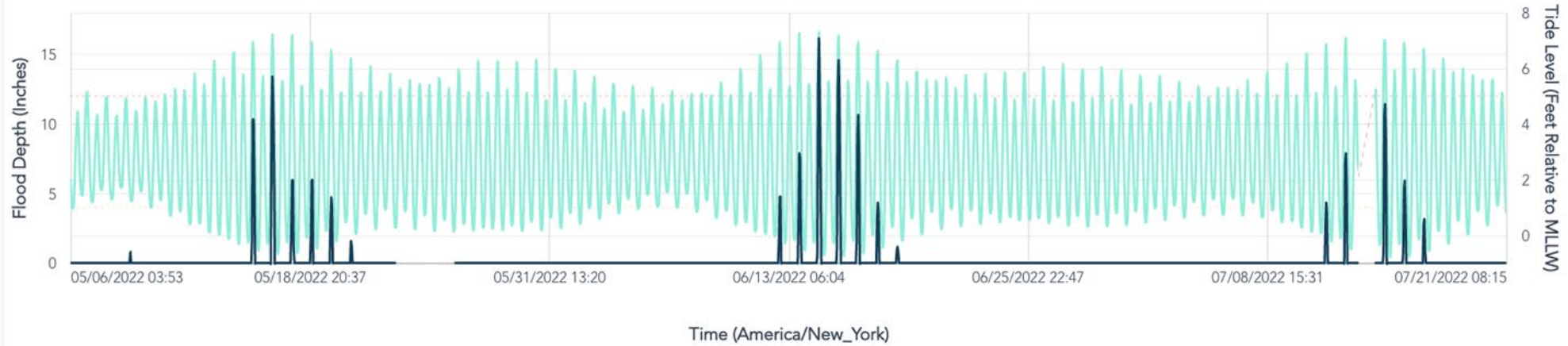
View By: Day Week 2 Week Month Year All

05/06/22

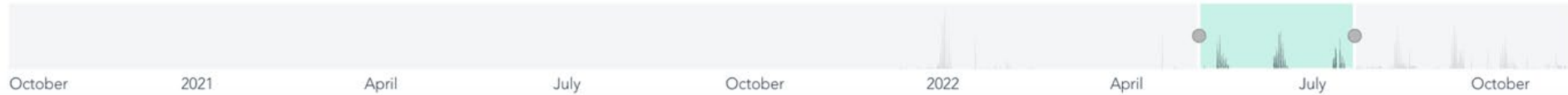
07/21/22

-  Q-Beach 84 St
-  Q-Beach 84 St

**Flood Depth Threshold (Inches)**      **Tide Level**  
— Minor (4")   — Moderate (12")   — Major (24")   —



**Tidal flooding on Beach 84th St from May-July 2022**





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ALFRED P. SLOAN  
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**New York University**

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Ricardo Toledo-Crow, Praneeth sai venkat Challagonda, Kendra Krueger

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(Brooklyn College) + New York Sea Grant**

Brett Branco, Véronëque Ignace, Hannah Eisler Burnett, Polly Pierone

**NYC Mayor's Office of Climate & Environmental Justice**

Hayley Elszasz

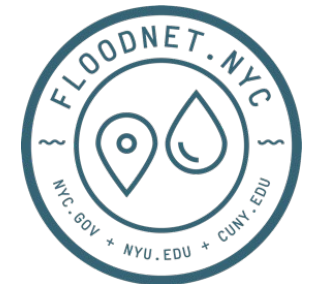
**NYC Office Technology & Innovation**

Paul Rothman, Briana Garcia

+ student researchers at NYU and CUNY

**Thank you to community  
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El Puente Bushwick Leadership Center, Sixth Street Community Center, New Hamilton Beach Civic Association, Gowanus Canal Conservancy, Red Hook Initiative, Pioneer Works Community Sensor Lab, Resilient Red Hook, Rockaway Initiative for Sustainability and Equity, Bronx River Alliance, Canarsie Community Development Inc., Edgemere Community Civic Association



<https://www.floodnet.nyc/>

# Q&A

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