



The Environmental Commission welcomes you to this meeting to discuss the status of investigating flooding in Bay Head.

Our goal is to provide information on current activities related to understanding flooding in Bay Head and plans to mitigate the flooding.

November 9, 2021

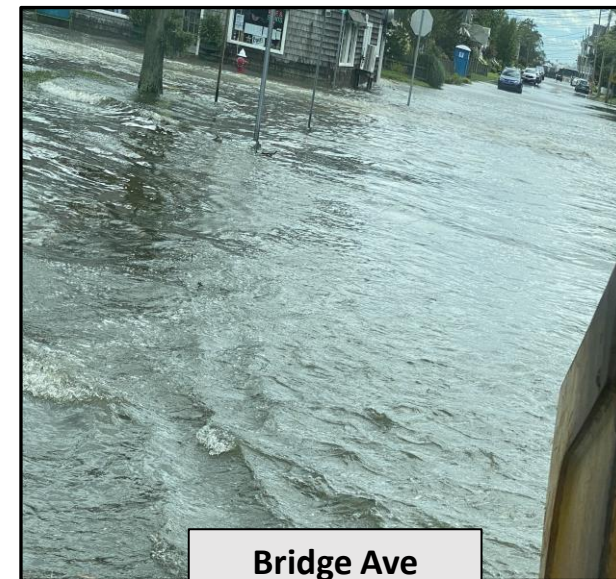
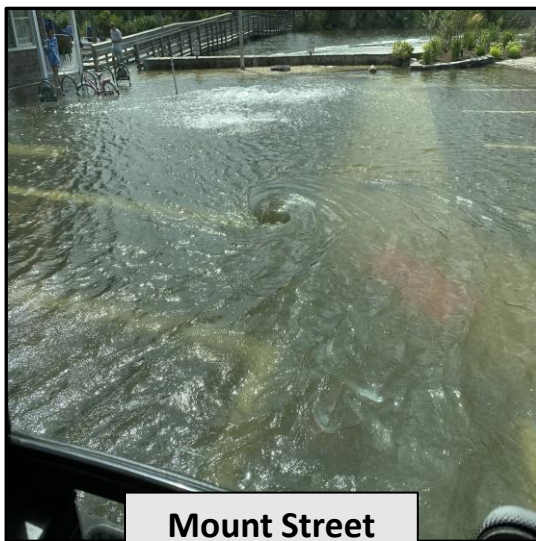


Bay Head

Status of Flooding Investigation

Agenda

- Background
- Summary of Activities
 - Flood Characterization
 - Collecting and Analyzing Data
 - Master Plan
- Flooding Events
 - Major Floods (Oct 27-31 Flood)
 - Nuisance Floods
- Flood Mitigation
 - Nuisance Flooding
 - Major Flooding
 - Catastrophic Flooding
- Proposed 5 Step Action Plan



November 9, 2021

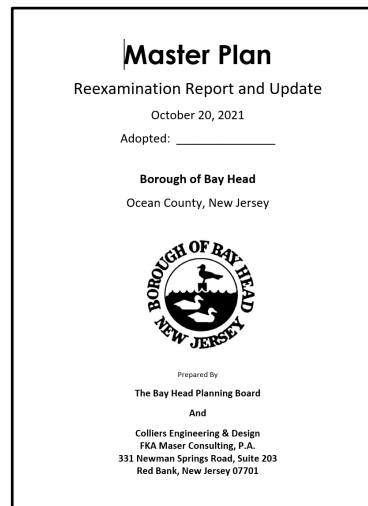


Bay Head

Status of Flooding Investigation

In early 2021 two activities converged to focus on flooding in Bay Head:

- Formation of Bay Head Environmental Commission Flooding Subgroup
- Bay Head Planning Board Initiative to Update the Master Plan to address climate change with a focus on flooding.





Bay Head Environmental Commission

- The Bay Head Environmental Commission formed a Flooding Subgroup to focus attention on the issue of flooding in Bay Head:

Environmental Commission Members:

- Dan Paulus, Chairman
- Diane Cornell, Council Representative
- Tom Charlton
- Heather Robertson
- Sharon Shaning
- Carol Tassini
- Paul Benziger

Flooding Subgroup:

- Paul Benziger
- Tom Charlton
- Rick McGoey
- Jon Youngans
- Jonathan Jones
- Jake Benedict

- The Environmental Commission meets the second Tuesday of each month at 5:30pm in the Town Hall. The public is welcome to attend meetings.
- Contact the environmental commission at:
bayheadenvironmental@gmail.com



Photos and Graphics

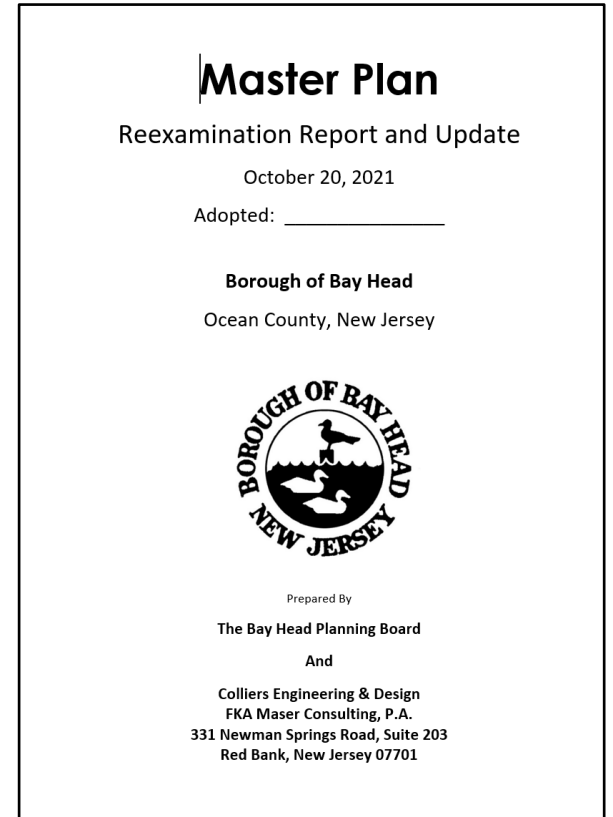
Thanks to:

Paul and Karen Benziger
Tom Charlton
Jon Youngans
Bay Head Cheese Shop
Rick McGoey
Suzie Van Schoick



Bay Head Planning Board

- The Bay Head Planning Board Prepared the Master Plan Reexamination Report and Update and approved it for public release on October 20, 2021.
 - William A. Furze, Chairman
 - Thomas S. Charlton, Vice Chairman
 - William Curtis, Mayor
 - James W. Gates, Councilman
 - Richard McGoey, Secretary
 - Patricia A. Wojcik, Assistant Secretary
 - Christopher F. Parlow
 - Kathleen Tell
 - R. Neil DeVesty
 - Mark F. Durham
 - Verity L. Frizzell
 - Kevin A. Feehan
 - Steven A. Zabarsky, Board Attorney
 - Darren Erbe, Planning Board Secretary
- The Master Plan is posted on the Borough Web Site under Announcements:
<http://www.bayheadnj.org/bhnj/Announcements/>
- **Public Comments on the Master Plan are welcomed.**





Bay Head

Status of Flooding Investigation

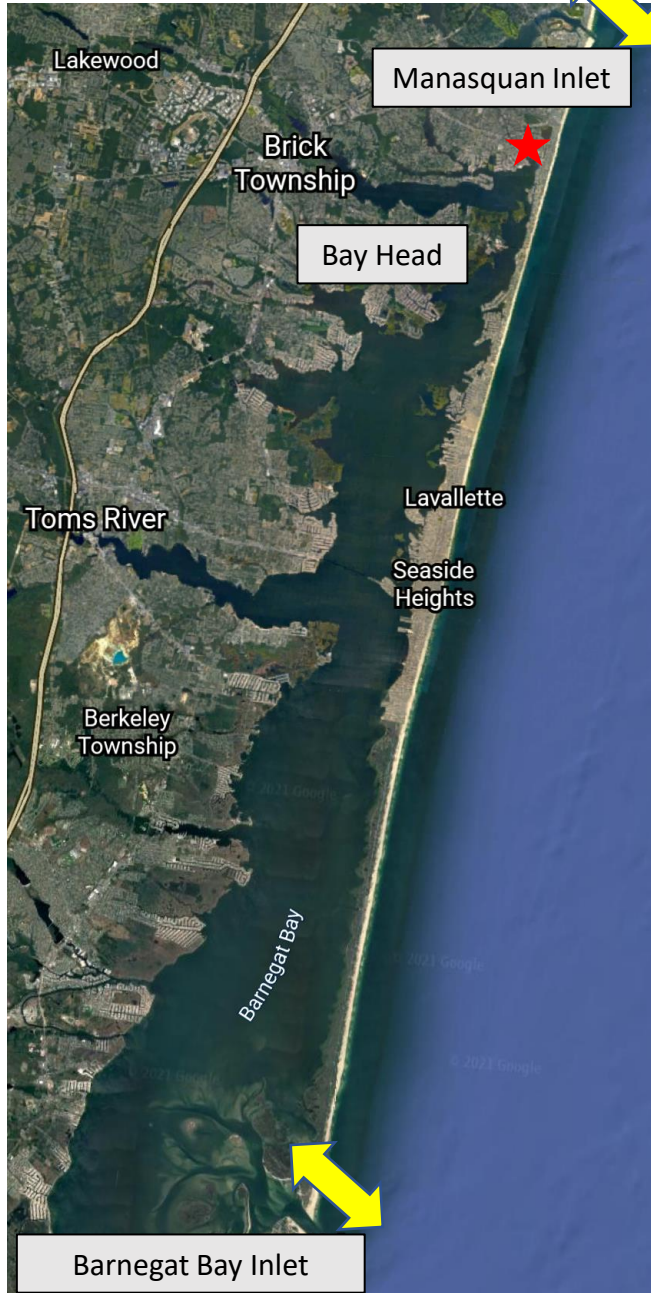
An effort commenced to collect information and study flood related information:

- Identified Bay Head Flood Locations for Nuisance and Major Floods
- Prioritized Relative Importance of Flood Locations
- Installed rain and flood level instrument
- Started collecting and analyzing flood data
- Reviewed Stormwater Management System - Analyzed and tested check valves
- Studied completed and planned flood mitigation programs
- Drafted Master Plan flood mitigation discussion
- Started entering data in MyCoast Flood Data Base



Rain/Flood Level Instrument
Thanks to Paul Benziger-BHEC

Basic Hydrology of Bay Head Flooding







- Barnegat Bay level changes based on tidal changes
- Ocean waters enter Barnegat Bay at:
 - Manasquan Inlet ↔
 - Barnegat Bay Inlet ↔
 - Egg Harbor Inlet
- Twilight Lake level follows the level of Barnegat Bay as Bay water flows through scow ditch and the Manasquan Inlet as water flows through the Point Pleasant Canal
- Pascal's Law of Physics: "Water seeks its own level"





Stormwater Management System

EXISTING INFRASTRUCTURE:

- STORM DRAINS – 200+ 
- OUTFALLS – 60+ 
- CHECK VALVES - 12 
- PUMP LOCATIONS - 3 



Categorization of Floods

No Floods



Nuisance Floods



Catastrophic Floods



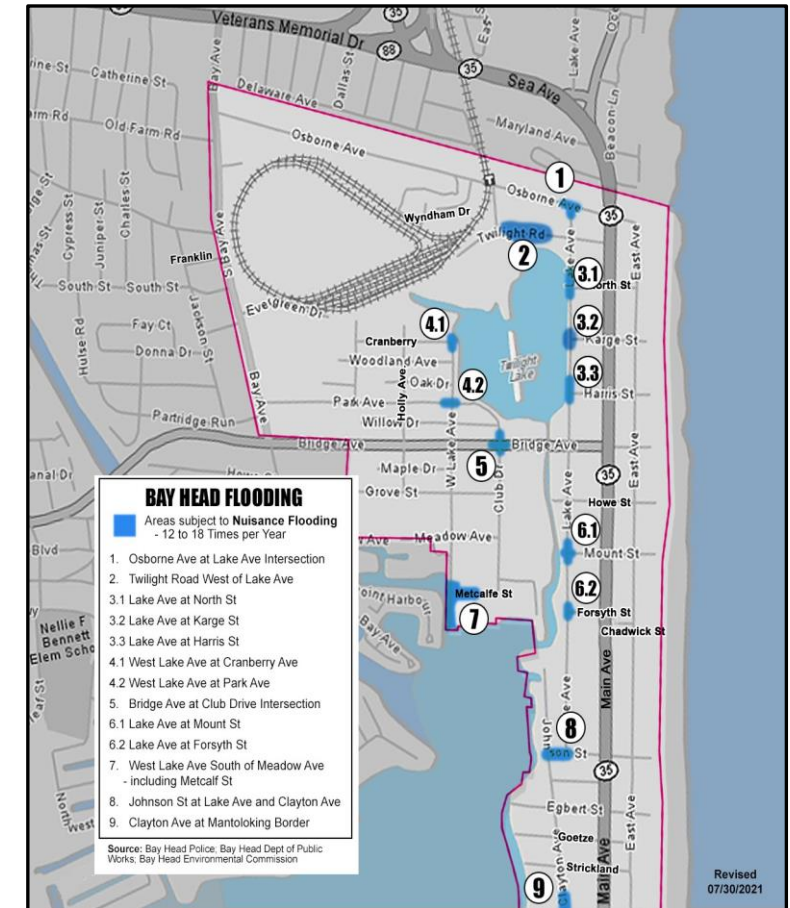
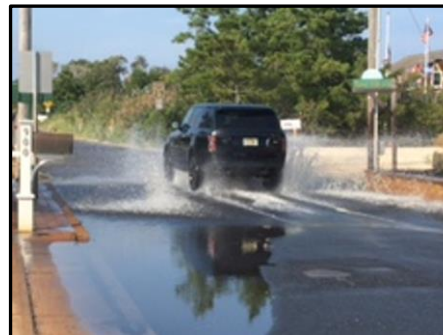
Major Floods



Nuisance Flooding

Flood Locations Identified and Types of Flooding Defined:

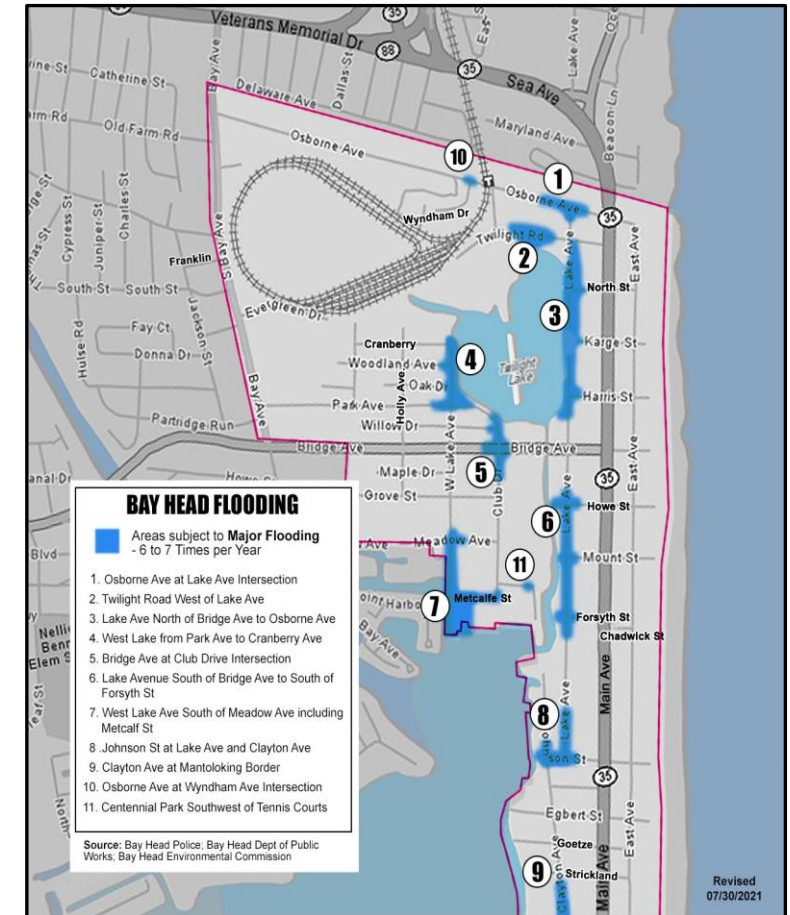
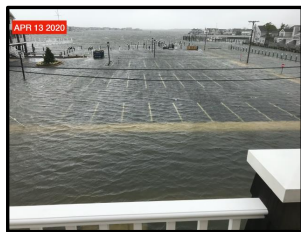
- ***Nuisance flooding:***
 - Characterized by the pooling of water in normally dry, self-contained low-lying locations,
 - Causes minimal disruption of normal activities and/or damage to property.
 - 13 Locations Identified
 - Nuisance flooding is occurring 12 to 18 times per year



Major Flooding

Flood Locations Identified and Types of Flooding Defined:

- **Major flooding:** (More severe than nuisance flooding)
 - Characterized by standing water covering larger areas, often including spill-over between smaller adjacent areas,
 - Causes more substantial disruption of activities (street closing or heavily limited vehicular passage, cancellation/delay of planned activities including business), as well as observable concern for physical or financial damage.
 - 11 Locations Identified
 - Major flooding is occurring about 6 to 7 times per year





Prioritization of Flood Locations

Summary of Analysis

Significant Concern
 Moderate Concern
 Less Concern

BAY HEAD "MAJOR" FLOODING														
FLOODING IMPACT AND PRIORITIZATION OF IMPORTANCE OF MITIGATION														
LOCATION		AMOUNT OF VEHICULAR TRAFFIC			IMPACT ON VEHICULAR TRAFFIC			RISK ON COMMERCIAL BUSINESS			ROADWAY USED AS ALTERNATE TO ROUTE 35	PRIORITY RANKING OF MITIGATION		
	DESCRIPTION	HIGH	MED	LOW	HIGH	MED	LOW	HIGH	MED	LOW		HIGH	MED	LOW
		Heavy Traffic	Moderate Traffic	Low Traffic	Blocking and Detouring Traffic is Sometimes Required	One lane in Center of Road is Sometimes Required	Little to no Traffic Pattern Change	Risk of Building Flooding and Restricted Access	Restricted Access to Business	Little Risk of Flooding and No Access Limitation	Considered a Traffic Safety Issue to Assure Reliable Evacuation from Barrier Island. Bridge, Lake and Clayton all serve as backup evacuation routes.	High Priority to Mitigate	Medium Priority to Mitigate	Lower Priority to Mitigate
1	Osborne Ave at Lake Ave Intersection	X			X					X			#6	
2	Osborne Ave at Wyndham Ave Intersection	X			X					X			#7	
3	Twilight Road West of Lake Ave			X		X				X				#10
4	Lake Ave North of Bridge Ave to Osborne Ave		X			X				X	X	#3		
5	West Lake Ave from Park Ave to Cranberry Ave			X		X				X				#9
6	Bridge Ave at Club Dr Intersection	X			X			X			X	#1		
7	Lake Ave South of Bridge Ave to South of Forsyth St		X			X			X		X	#2		
8	West Lake Ave South of Meadow Ave Including Metcalf St			X		X			X				#8	
9	Centennial Park Southwest of Tennis Courts			X			X			X				#11
10	Johnson St at Lake Ave and Clayton Ave		X			X				X	X	#4		
11	Clayton Ave at Mantoloking Border		X			X				X	X	#5		



Tracking/Reporting of Flood Events

Major Floods		Nuisance Floods
April 13, 2020	Winter Storm	
June 5, 2020	Tropical Storm FAY	
August 4, 2020	Tropical Storm ISAIAS	
September 30, 2020	Tropical Storm BETA	
November 30, 2020	Winter Storm (Unofficial Name URI)	
December 24, 2020	Winter Storm	
February 2, 2021	Winter Nor'easter (Unofficial Name ORLENA)	
		May 28-30, 2021
		June 14, 2021
		June 21, 2021
		July 9, 2021
		July 25, 2021
September 1, 2021	Tropical Storm IDA	
		September 8, 2021
		September 15, 2021
		September 23, 2021
		October 10, 2021
		October 16, 2021
		October 26, 2021
October 27-31, 2021	Fall Nor'easter/Five Day Flood Event	

Flood Events

- Recording and study of flood events started in March 2021.
- Flood Reports prepared for events since March 2021. (Blue font)
- Flood Reports Contents:
 - Observed Conditions
 - Categorization
 - Analysis of Data
 - Conclusions
 - Pictures

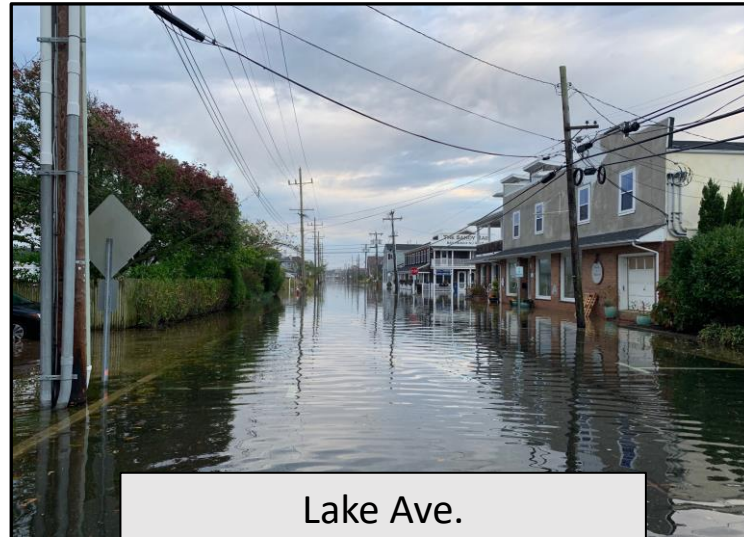
Note: Major Floods dates recorded by Bay Head Police with official requests to County to block or restrict traffic on Bridge Avenue due to depth of flooding.

Note: Events in **BLUE** have Flood Event Reports.



Bay Head "5 Days of Flooding"

Oct 27-31, 2021 Flood Event



Lake Ave.





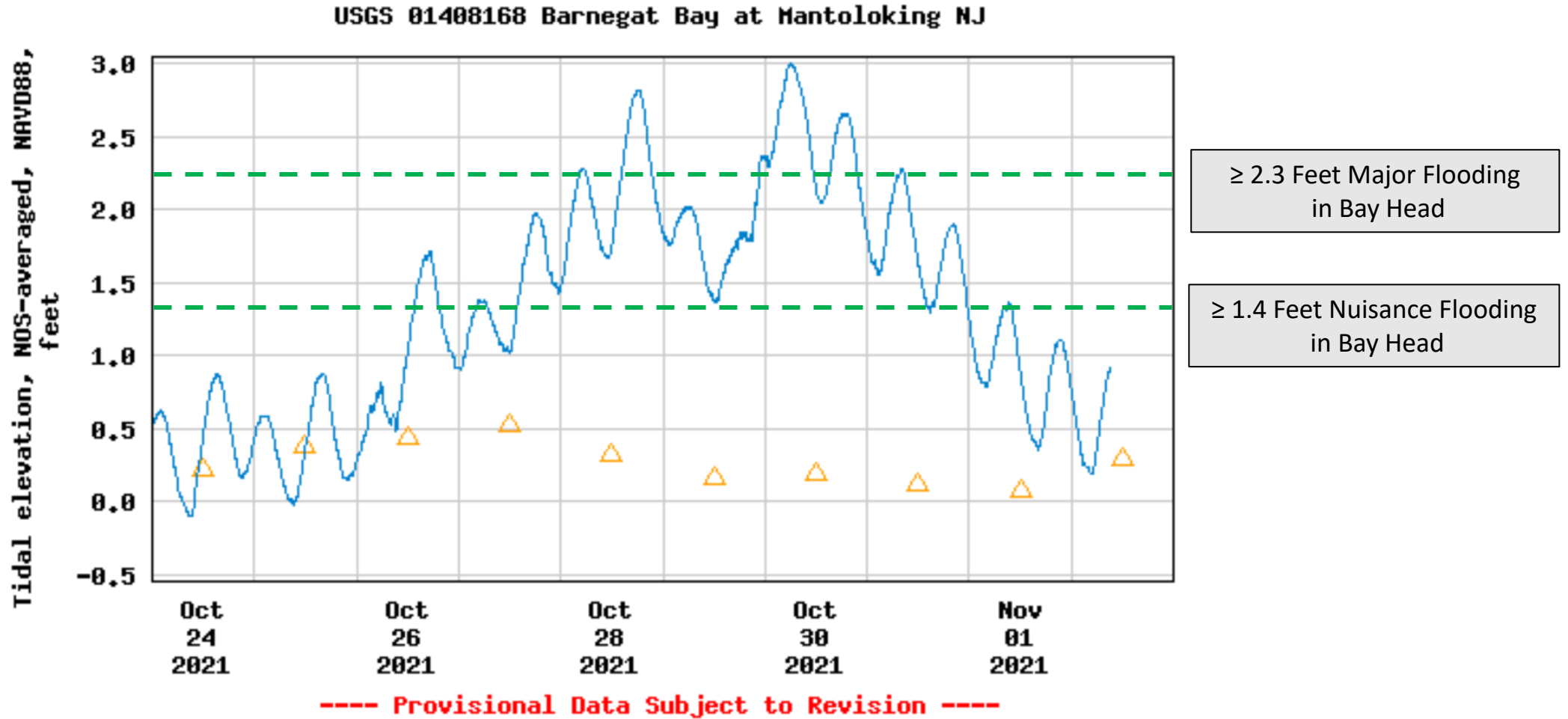
Bay Head “5 Days of Flooding”

Oct 27-31, 2021 Flood Event

- Bay Head experienced major flooding over a five day period from October 27 to October 31, 2021.
- We did not experience heavy rains
- We did not experience strong southern winds
- The moon was not full.
- Bay Head experienced the worst flooding since Superstorm Sandy (This was the nine year anniversary of the Oct 29, 2012 Superstorm Sandy)
- **What caused the severe flooding?**



Bay Head “5 Days of Flooding” Oct 27-31, 2021 Flood Event



Bay Head “5 Days of Flooding”

Oct 27-31, 2021 Flood Event



References:

- Email from Todd Ehret, Oceanographer, National Oceanic and Atmospheric Administration (NOAA) to R. McGoey Nov 2, 2021
- Phone call with Ray Kruzdlo, Senior Hydrologist, National Weather Service with R. McGoey on Nov. 3, 2021.
- Confirmed with Professor Dave Robinson, Professor of Climatology, Rutgers University, phone call on Nov 2, 2021 with R. McGoey

QUESTION:

What caused the severe Bay Head Flooding?

SHORT ANSWER:

“Tidal Piling” caused the severe Bay Head Flooding.

ANSWER:

Two large back-to-back offshore weather conditions caused high ocean levels for five days.

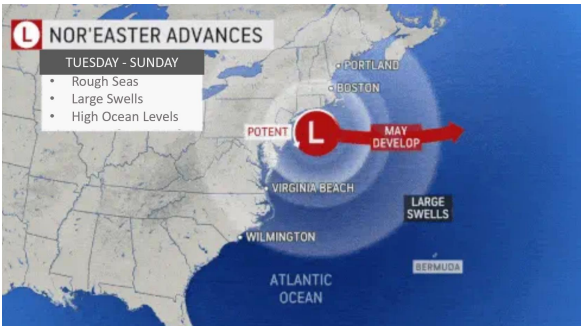
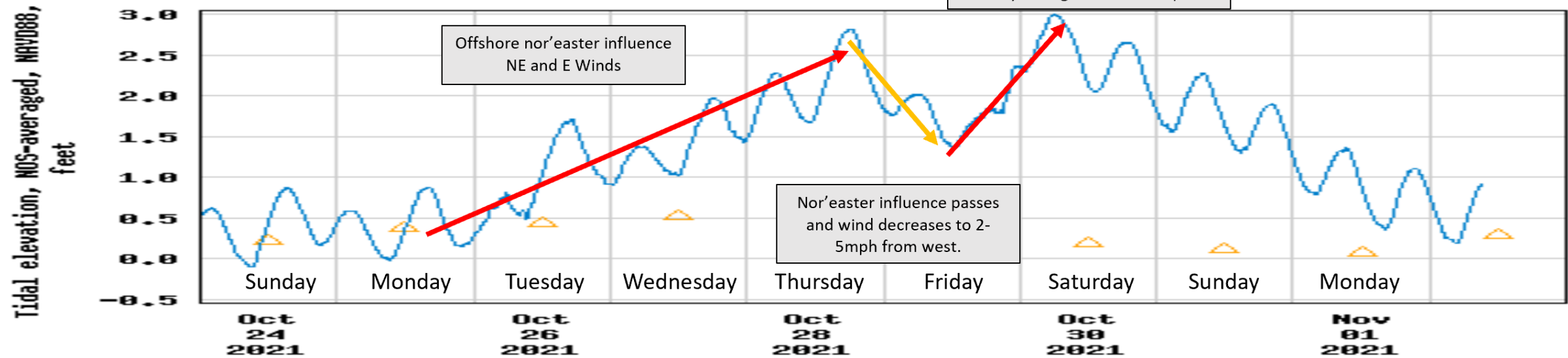
Prolonged winds from the northeast and east caused coastal water levels to be higher than normal.

Barnegat Bay and Twilight Lake were not able to “drain” to the ocean during low tides resulting in high tides causing significantly greater flooding in Bay Head.

This condition is called **“Tidal Piling.”**

Bay Head “5 Days of Flooding”

Oct 27-31, 2021 Flood Event



Day	Offshore Weather Front	Local Winds
Tues.	Nor'easter passes NJ	Wind remains steady at 12 to 24 mph with gusts to 30mph predominantly from the northeast and east. Barnegat Bay and Twilight Lake levels remains high.
Wed	Nor'easter Intensifies as it moves east and slightly south bearing east-north-east of NJ	
Thurs	Nor'easter moves slightly north and east of NJ	
Fri	The influence of Tuesday's Nor'easter passes as a new Low Pressure forms south of NJ	Wind shifts to the west and decreases to 2-5 mph.
Sat	A second large, strong low pressure moves north along the NJ Coast	Winds increases all day reaching 45 mph sustained and gusts to 60mph
Sun	The strong low pressure moves north.	Winds decrease and shift coming from the west.



Bay Head

Major Flooding: Measured Parameters

DATE	STORM	BARNAGET FLOOD LEVEL	MOON	RAIN FALL	WIND INFORMATION	
		Feet (NAVD88)	Percent Full	Inches	Speed	Direction From
Apr 13, 2020	Winter Storm – High Winds/ Rain	2.5 Ft	68%	0.49in	12-39 mph (Gusts to 53mph)	South and Southwest
Jun 5, 2020	Tropical Storm FAY	1.6 Ft	Full 100%	0.43in	6-20 mph (Gusts to 23 mph)	South Partial Southwest
Aug 4, 2020	Tropical Storm ISAIAS	2.7 Ft	Full 100%	0.13in	5-60 mph (Gusts to 70mph)	South Partial Southwest & SE
Sep 30, 2020	Tropical Storm BETA	1.8 Ft	Full 99%	0.58in	7-31 mph (Gusts to 46mph)	Mainly from East
Nov 30, 2020	Winter Storm – High Winds/Rain (Unoffical Name URI)	2.2 Ft	Full 100%	0.51in	12-20 mph (Gusts to 24mph)	South
Dec 24, 2020	Winter Storm	2.65 Ft	73%	0.49in	20-24 mph (Gusts to 31mph)	Southeast for 18 hours
Feb 2, 2021	Winter Nor'easter Storm (Unofficial Name: ORLENA)	2.5 Ft	87%	0.36in	21-26 mph (Gusts to 40mph)	Northeast
Sep 1, 2021	Tropical Storm IDA	2.6 Ft	33%	2.7in	15-20mph (Gusts to 26mph)	East and Shifting
Oct 27-31, 2021	Fall Nor'easter Storm	2.95 Ft	63% on Oct 27 to 47% on Oct 31	0in	6-38mph (Gusts to 50 mph)	Northwest/Northeast/East



Bay Head

Major Flooding: Measured Parameters

DATE	STORM	BARNAGET FLOOD LEVEL	FULL MOON	RAIN FALL	WIND INFORMATION	
		Feet (NAVD88)	Percent Full	Inches	Speed	Direction From
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Significant Contributing Factor to Major Flooding



Major Flooding in Bay Head

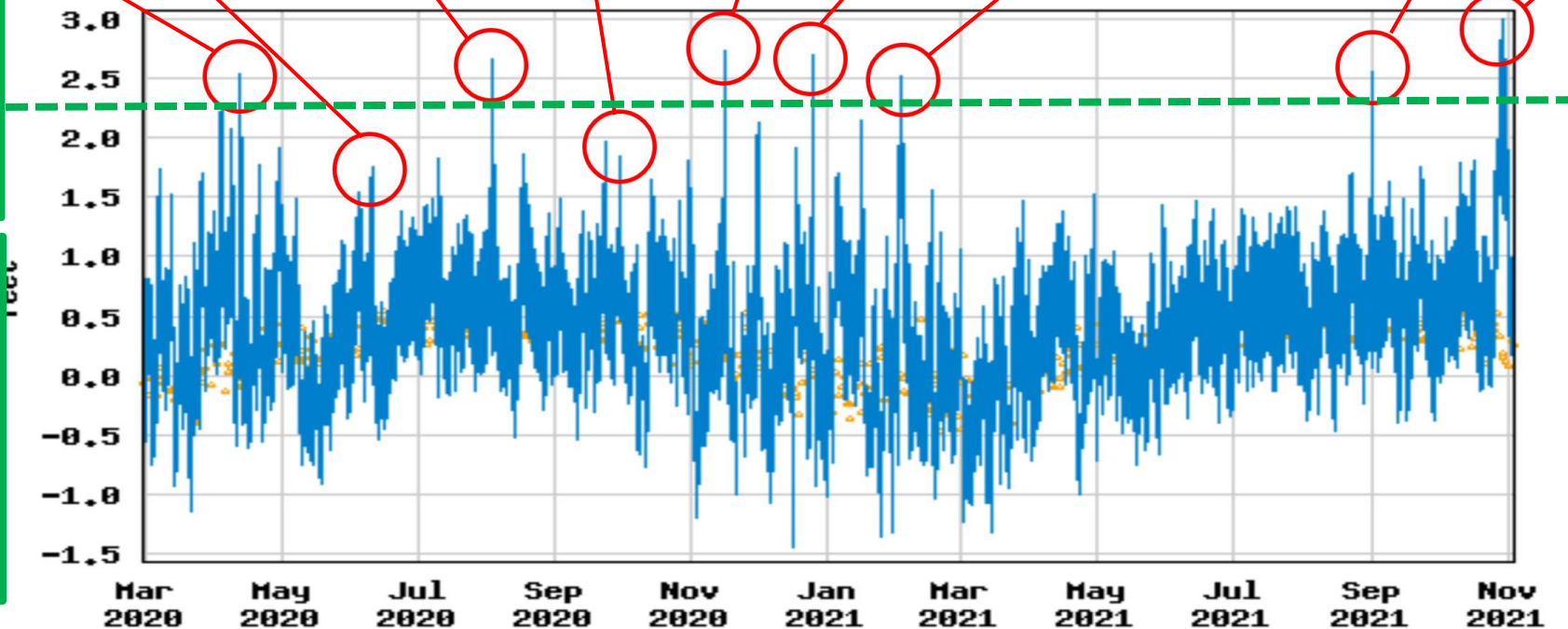
Storm Event and Barnegat Bay Level

Apr 13, 2020 Winter Storm: 2.5'	Jun 5, 2020 Trop. Storm FAY: 1.6'	Aug 4, 2020 Trop. Storm ISAIAS: 2.7'	Sep 30, 2020 Trop. Storm BETA: 1.8'	Nov 30, 2020 Winter Storm: 2.2'	Dec 24, 2020 Winter Storm 2.65'	Feb 2, 2021 Nor'easter URI: 2.5'	Sep 2, 2021 Trop. Storm IDA: 2.6'	Oct 27-31, 2021 Nor'easter 3.0'
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MARCH 2020 – NOVEMBER 2021
USGS 01408168 Barnegat Bay at Mantoloking NJ

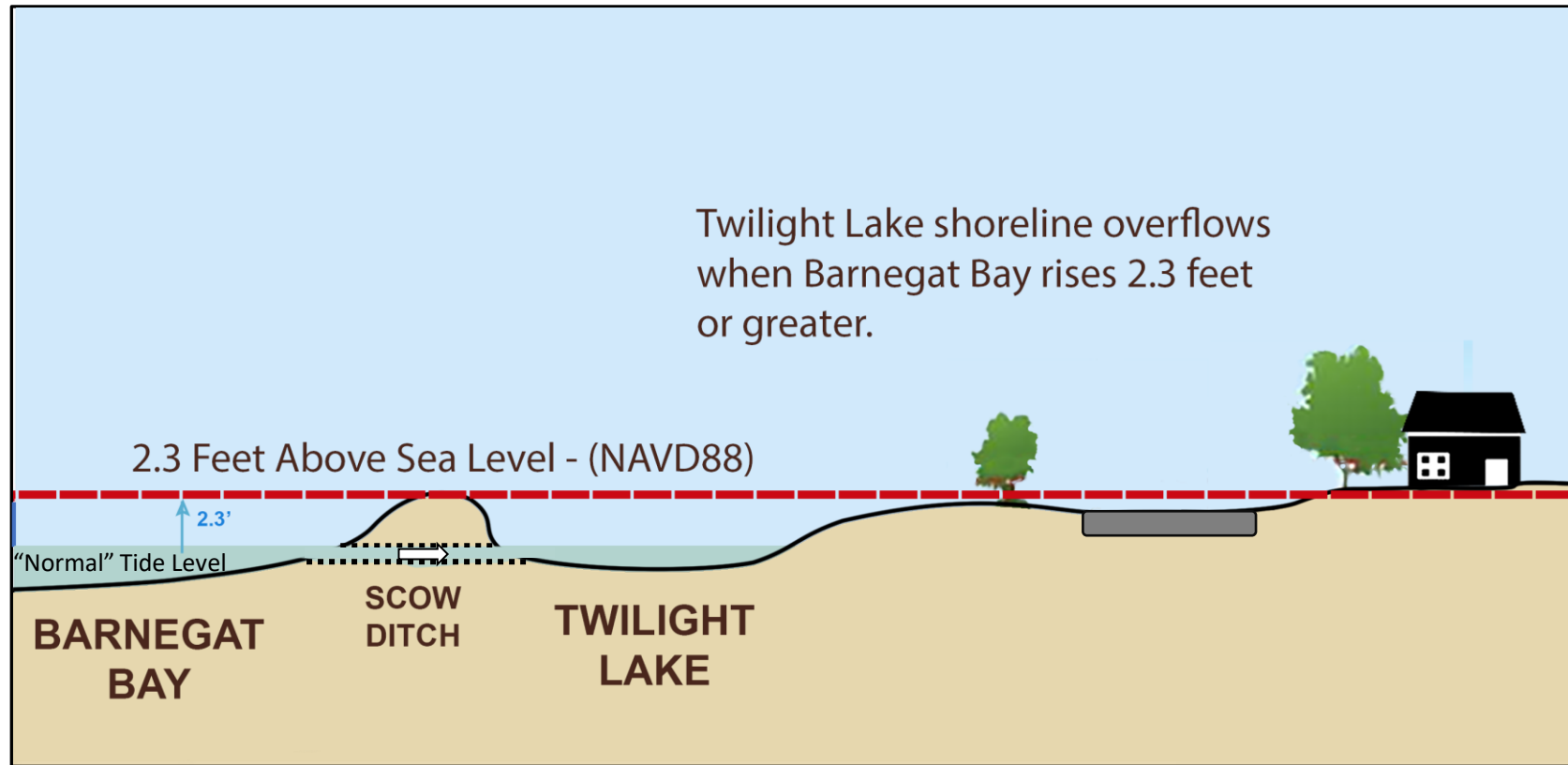
OBSERVATION
EVERY TIME BARNEGAT BAY LEVEL WAS ABOVE 2.3 FT, BAY HEAD EXPERIENCED MAJOR FLOODING

REASON
AT 2.3 FT, TWILIGHT LAKE OVERFLOWS SOME SECTIONS OF ITS SHORELINE AND BARNEGAT BAY OVERFLOWS SOME BAY HEAD BULKHEADS





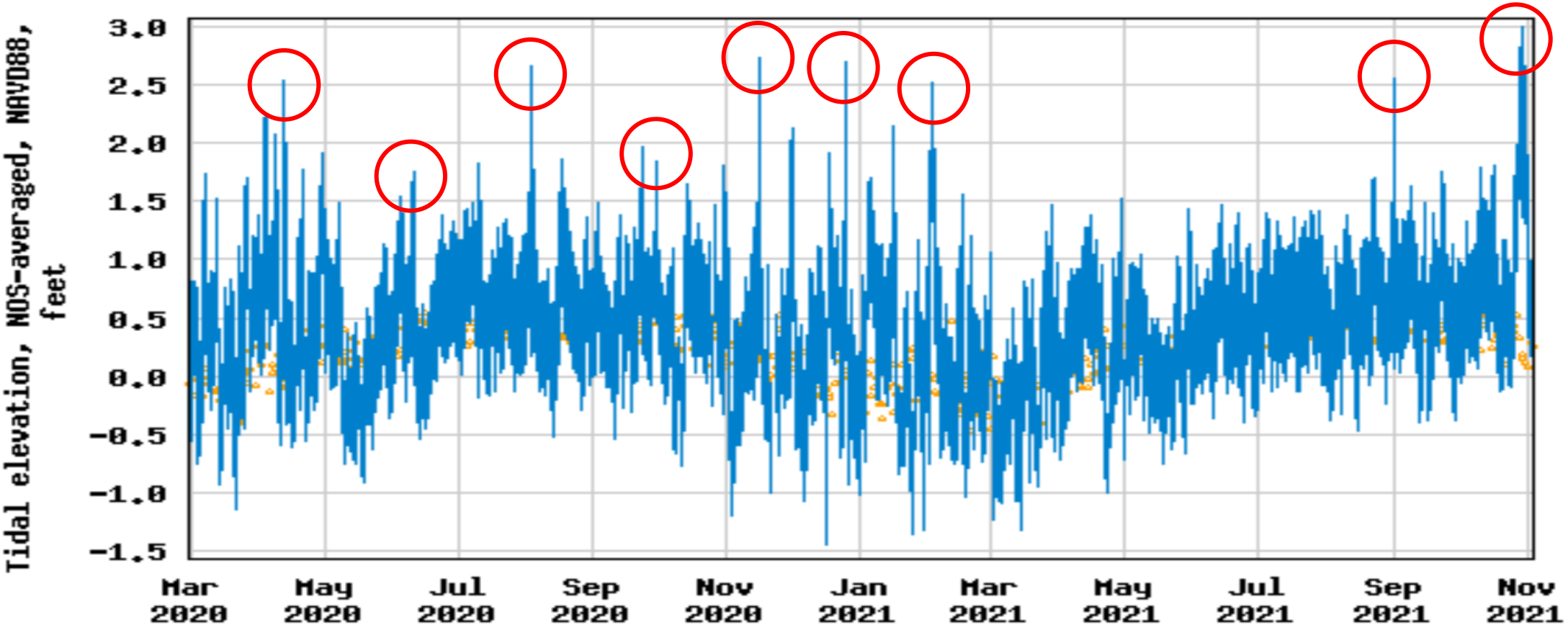
Road Surfaces Start to Flood when Barnegat Bay and Twilight Lake are Greater Than 2.3 feet above sea level





Circles Show the Level of Barnegat Bay for Major Flooding Events in Bay Head Is The Frequency of Flooding Getting Worse?

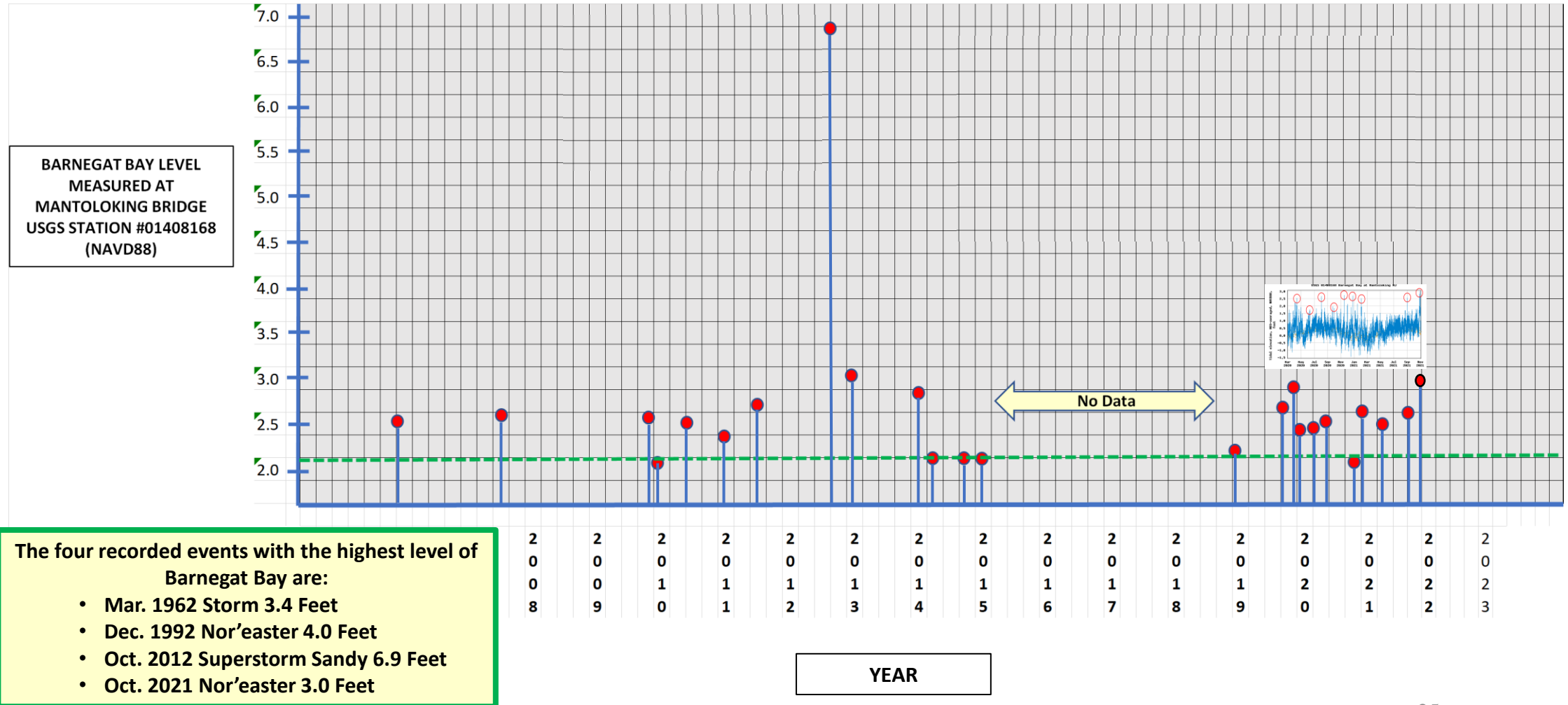
USGS 01408168 Barnegat Bay at Mantoloking NJ





HISTORY OF BARNEGAT BAY LEVEL 2005 to 2021

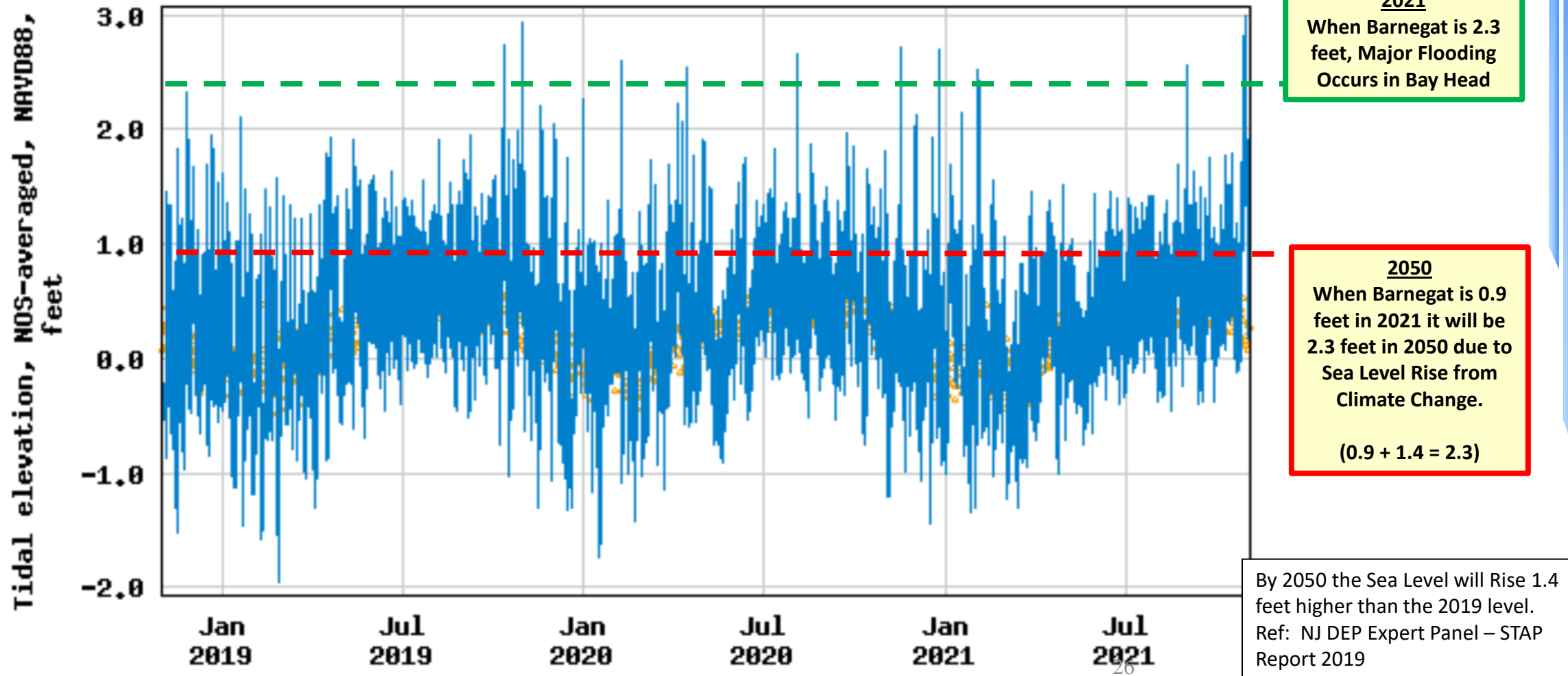
Level Greater Than or Equal to 2.3 feet





The Number of Major Flooding Events in 2050 is likely to increase due to Sea Level Rise from Climate Change

USGS 01408168 Barnegat Bay at Mantoloking NJ





Major Flooding in Bay Head

Twilight Lake Overflows Shoreline



OBSERVATION:

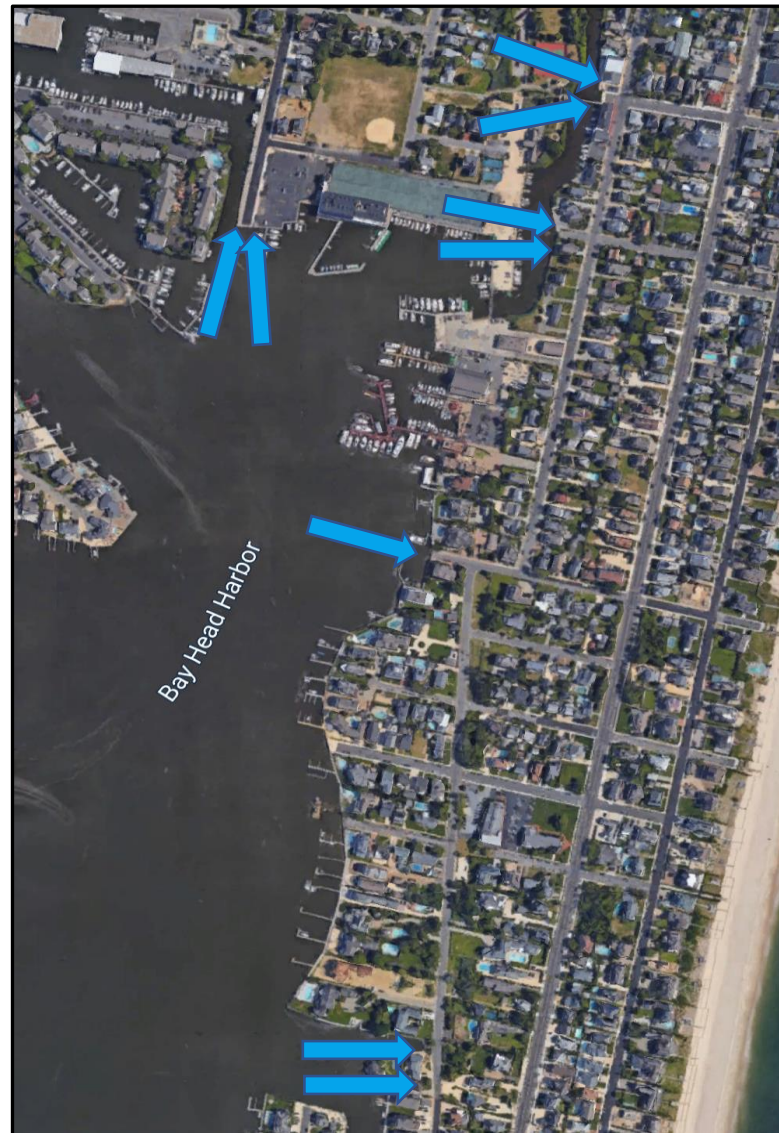
When Barnegat Bay level increases above 2.3 feet NAVD88, Twilight Lake level increases.

The Lake starts to overflow its shoreline causing major flooding at four low level locations around the lake.



Major Flooding in Bay Head

Barnegat Bay Overflows Bulkhead



OBSERVATION:

When Barnegat Bay level increases above 2.3 feet NAVD88, Bay waters start to flow over or through the bulkhead at five locations causing major flooding.



Bay Head

Flooding Investigation Status

Nuisance Flooding Parameters

DATE	NUISANCE FLOOD	BARNAGET BAY LEVEL	MOON	RAIN FALL	WIND INFORMATION	
		Feet (NAVD88)	Percent Full	Inches	Speed	Direction From
May 28-30, 2021	Heavy Rain and Strong Winds	1.49 Feet	94%	3.48 In.	25-35mph	North and Northeast
June 14, 2021	"Sunny Day Flood" (Strong South Wind)	1.45 Feet	16%	No Rain for previous 3 days	17-20 mph (Gust to 28 mph)	South for 7 hours
June 21, 2021	"Sunny Day Flood" (Strong South Wind)	1.46 Feet	85%	No rain for previous 2 days	18-25 mph for 6 hours (Gust 30mph)	South for 12 hours
July 9, 2021	Some rain with strong winds	1.37 Feet	1%	1.19 In.	20-22 mph for 7 hours (Gust 35mph)	Northwest
July 25, 2021	Limited Rain with sustained south wind	1.41 Feet	Full 98%	0.28 In.	15-20 mph for 5 hours	South for 15 hours
January 0, 1900	"Sunny Day Flood" (Strong South Wind)	1.6 Feet	3%	No rain for previous 2 days	22-25 mph Sustained (34 mph Gust)	South for 13 hours
September 15, 2021	"Sunny Day Flood" (Strong South Wind)	1.50 Feet	63%	No rain for previous 2 days	11-13 mph Sustained (30 mph Gust)	South for 24 hours
September 23, 2021	"Sunny Day Flood" (Strong & plonged South Wind)	1.74 Feet	94%	No rain for previous 2 days	23-27 mph Sustained (39 mph Gusts)	South-South-East for 36 hours
October 10, 2021	"Sunny Day Flood" Some rain with strong winds	1.75 Feet	15%	Limited rain 0.6 inches	19-24 mph Sustained (26 mph Gusts)	East to Northeast for 30 hours
October 16, 2021	"Sunny Day Flood" (Strong & plonged South Wind)	1.75 Feet	79%	No rain for previous 2 days	14-22 mph Sustained (28mph Gusts)	South for 31 hours
October 26, 2021	Limited Rain with sustained wind	1.6 Feet	72%	0.6 inches	12-24 moh Sustained (30 mph Gusts)	East from midnight to 6am West from 6am to 12pm



Bay Head

Flooding Investigation Status

Nuisance Flooding Parameters

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July 25, 2021	Limited Rain with sustained south wind	1.41 Feet	Full 98%	0.28 In.	15-20 mph for 5 hours	South for 15 hours
September 8, 2021	"Sunny Day Flood" (Strong South Wind)	1.6 Feet	3%	No rain for previous 2 days	22-25 mph Sustained (34 mph Gust)	South for 13 hours
September 15, 2021	"Sunny Day Flood" (Strong South Wind)	1.50 Feet	63%	No rain for previous 2 days	11-13 mph Sustained (30 mph Gust)	South for 24 hours
September 23, 2021	"Sunny Day Flood" (Strong & plonged South Wind)	1.74 Feet	94%	No rain for previous 2 days	23-27 mph Sustained (39 mph Gusts)	South-South-East for 36 hours
October 10, 2021	"Sunny Day Flood" Some rain with strong winds	1.75 Feet	15%	Limited rain 0.6 inches	19-24 mph Sustained (26 mph Gusts)	East to Northeast for 30 hours
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October 26, 2021	Limited Rain with sustained wind	1.6 Feet	72%	0.6 inches	12-24 moh Sustained (30 mph Gusts)	East from midnight to 6am West from 6am to 12pm



Nuisance Flooding Will Become Major Flooding in 2050 due to Sea Level Rise from Climate Change

DATE	NUISANCE FLOOD	BARNAGET BAY LEVEL	PROJECTED 2050 BARNAGAT BAY LEVEL *	MOON	RAIN FALL	WIND INFORMATION	
		Feet (NAVD88)	Feet (NAVD88)			Speed	Direction From
May 28-30, 2021	Heavy Rain and Strong Winds	1.49 Feet	2.89 Feet	94%	3.48 In.	25-35mph	North and Northeast
June 14, 2021	"Sunny Day Flood" (Strong South Wind)	1.45 Feet	2.85 Feet	16%	No Rain for previous 3 days	17-20 mph (Gust to 28 mph)	South for 7 hours
June 21, 2021	"Sunny Day Flood" (Strong South Wind)	1.46 Feet	2.86 Feet		No rain for previous 3 days	18-25 mph for 6 hours (Gust 30mph)	South for 12 hours
July 9, 2021	Some rain with strong winds	1.37 Feet	2.77 Feet			20-22 mph for 7 hours (Gust 35mph)	Northwest
July 25, 2021	Limited Rain with sustained south wind	1.41 Feet	2.84 Feet			15-20 mph for 5 hours	South for 15 hours
September 8, 2021	"Sunny Day Flood" (Strong South Wind)	1.6 Feet	3.0 Feet		No rain for previous 3 days	22-25 mph Sustained (34 mph Gust)	South for 13 hours
September 15, 2021	"Sunny Day Flood" (Strong South Wind)	1.50 Feet	2.90 Feet	85%	2 days	11-13 mph Sustained (30 mph Gust)	South for 24 hours
October 10, 2021	Some rain with strong winds	1.75 Feet	3.15 Feet	94%	Limited rain 0.6 inches	19-24 mph Sustained (26 mph Gusts)	East to Northeast for 30 hours
October 16, 2021	"Sunny Day Flood" (Strong & plunged South Wind)	1.75 Feet	3.15 Feet	15%	No rain for previous 2 days	14-22 mph Sustained (28mph Gusts)	South for 31 hours
October 26, 2021	Limited Rain with sustained wind	1.6 Feet	3.0 Feet	79%	0.6 inches	12-24 moh Sustained (30 mph Gusts)	East from midnight to 6am West from 6am to 12pm

OBSERVATION:
Nuisance Flooding Experienced in Bay Head now will be Major Flooding by 2050.

*NJ DEP Expert Panel and USACE predict sea level rise of 1.4 feet by 2050.

Questions?

Are there any questions on the material presented so far before we discuss mitigation plans?



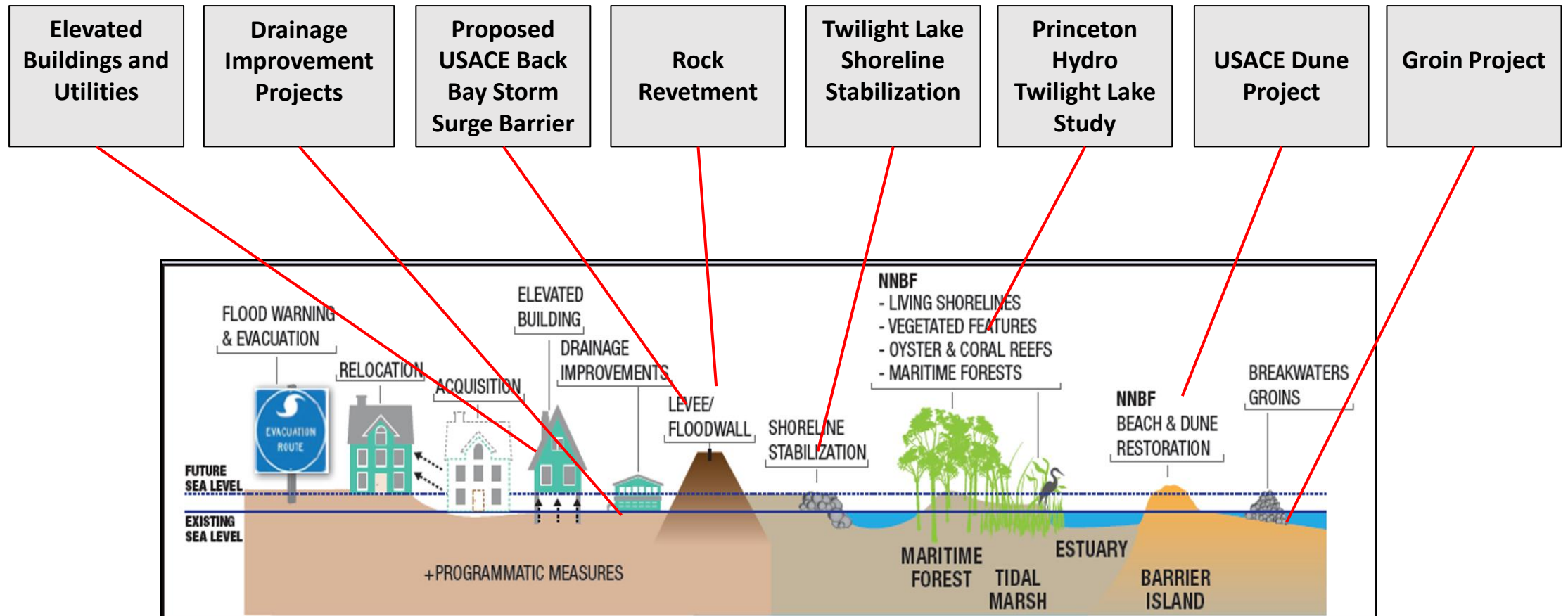
Flood Mitigation

What actions has Bay Head
taken to mitigate flooding
and what actions are
planned?



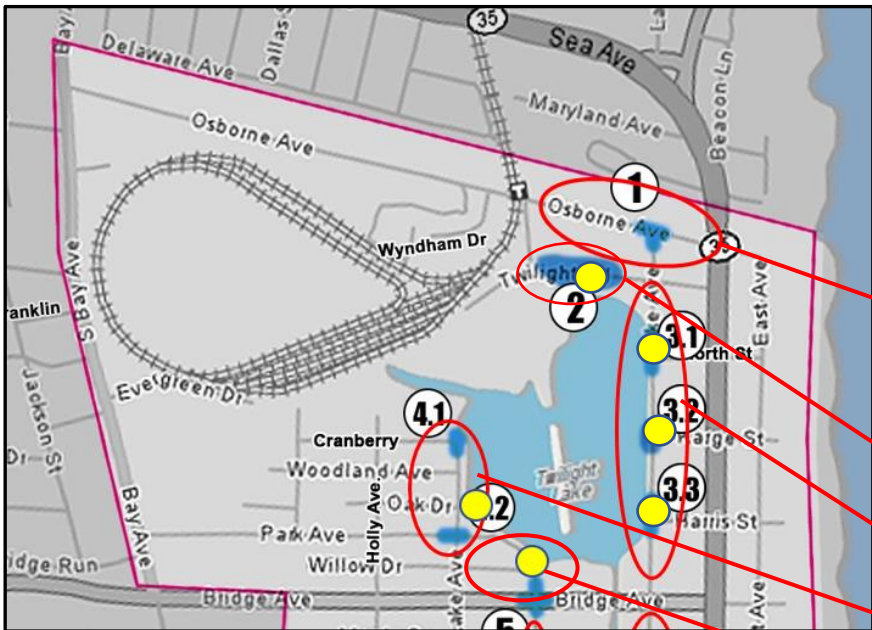
Flood Mitigation Measures

Bay Head has and continues to implement multiple mitigation measures.





Completed and Pending Flood Mitigation Projects

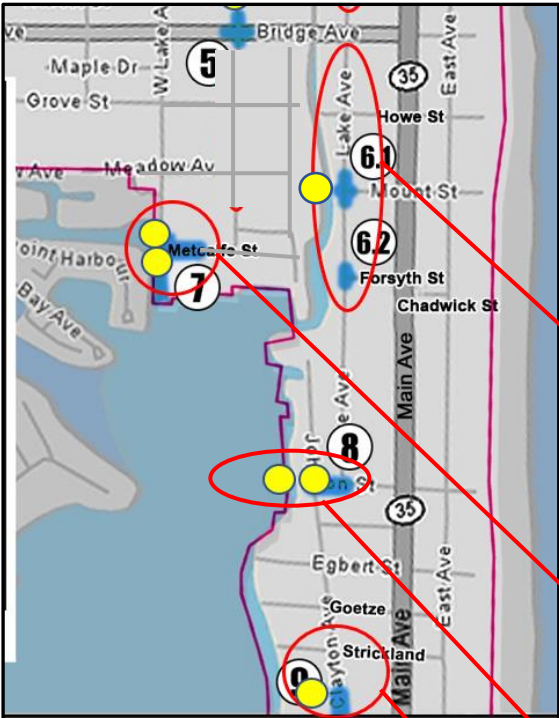


Completed and Pending Flood Mitigation Projects			
Flood Location		Mitigation Project Description	Time Frame
All	All	Drain Collection Basins Cleaned	Continuous
All	All	Street Sweeping	Continuous
All	All	Clear Clogged Storm Drain Pipes	Ongoing
All	All	Twilight Lake Shoreline Stabilization	Ongoing
All	All	Grant for Twilight Lake Study	2021-2022
1	Osborne Ave at Lake Ave	Major County Project due to start construction in the spring of 2022	2021-2022
		Raise street level 7" at crown and 4" at side	
		Osborne Ave Storm Drain System will be redirected to Rt 35	
		Rt. 35 Pumping Station will pump to ocean	
2	Twilight Road	Check Valve Installed	Oct 20, 2021
3.1, 3.2, 3.3	Lake Ave. North of Bridge Ave.	Active project to resurface Lake Ave, raise the crown about 3-4," new drain system outfall pipes, new check valves	2021-2022
4.1, 4.2	West Lake Ave. North of Bridge Ave.	Installed check valve at Oak Dr. drain to Twilight Lake	2015
5	Bridge Ave. at Club Dr.	Installed check valve in Club Dr. drain to Twilight Lake	2015
		Club Dr. South of Bridge resurfaced raising road surface 3=4"	2021

Yellow circles show check valve locations.



Completed and Pending Flood Mitigation Projects



Yellow circles show check valve locations.

Location		Mitigation Project Description	Time Frame
All	All	Drain Collection Basins Cleaned	Continuous
All	All	Street Sweeping	Continuous
6.1, 6.2	Lake Ave. South of Bridge Ave.	Pending Project to raise Lake Ave. road surface south of Bridge Ave to beyond Forsyth St. 3-4" (Council Resolution 2021-81)	2022-2023
		NJ Installed pumping station to pump Rt 35 storm drains to scow ditch. Drains at Lake Ave. and Mount St drain to that system	2014-2015
		Check valves were installed in the new pumping system	2014-2015
		New bulkhead was installed at the end of Mount Lake on Scow Ditch	2015
7	Metcalf St at West Lake Ave.	West Lake Avenue was raised and the pitch pitch was changed	2016
		New Storm Drain Piping and Collection Basins Installed	2016
		Two check valves installed at the storm drain outfall	2018
8	Johnson Street	New bulkhead was installed at the end of Johnson St. on Barnegat Bay	2014
		A check valve was installed at the storm drain outfall	2020
9	Clayton Ave. at Mantoloking Border	An active project is proceeding to change the storm drain piping configuration	2021-2022
		Raise the road surface	2021-2022
		Install two check valves in the outfall to Barnegat Bay	2021-2022



Flood Mitigation

Bay Head 5 Step Action Plan

**CONTINUE
ANALYSIS**

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Flood Mitigation

Bay Head 5 Step Action Plan

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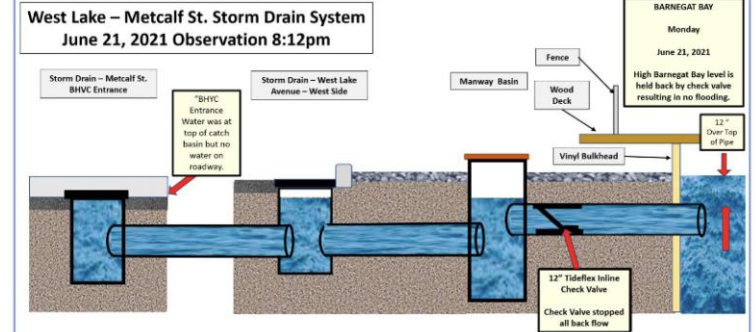
- COLLECTION OF FLOOD DATA
- ANALYSES OF CAUSES & MITIGATION
- FLOOD INVESTIGATION REPORTS



BAY HEAD HAZARD MONITORING

SOUTH WIND EVENT (NOT FLOODING) – JUNE 21, 2021

Barnegat Bay was particularly high, just below the bulkhead on the south side of West Lake Avenue, but not high enough to overflow the bulkhead. The high-water level of Barnegat Bay caused high pressure on the check valve in the storm drain system which shut tight and did not allow water to back flow into the storm drain system. The result is NO FLOODING ON WEST LAKE AVENUE OR METCALF STREET occurred in the area of the BHYC.





Flood Mitigation Bay Head 5 Step Action Plan

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- Master Plan has extensive discussion on Flood Mitigation
- Planning Board Approved the Master Plan on Oct 20 for public release
- Posted in Bay Head Web Site
- Public Meeting held on Nov 8

Master Plan

Reexamination Report and Update

October 20, 2021

Adopted: _____

Borough of Bay Head
Ocean County, New Jersey



Prepared By

The Bay Head Planning Board
And

Colliers Engineering & Design
FKA Maser Consulting, P.A.
331 Newman Springs Road, Suite 203
Red Bank, New Jersey 07701



Flood Mitigation

Bay Head 5 Step Action Plan

**CONTINUE
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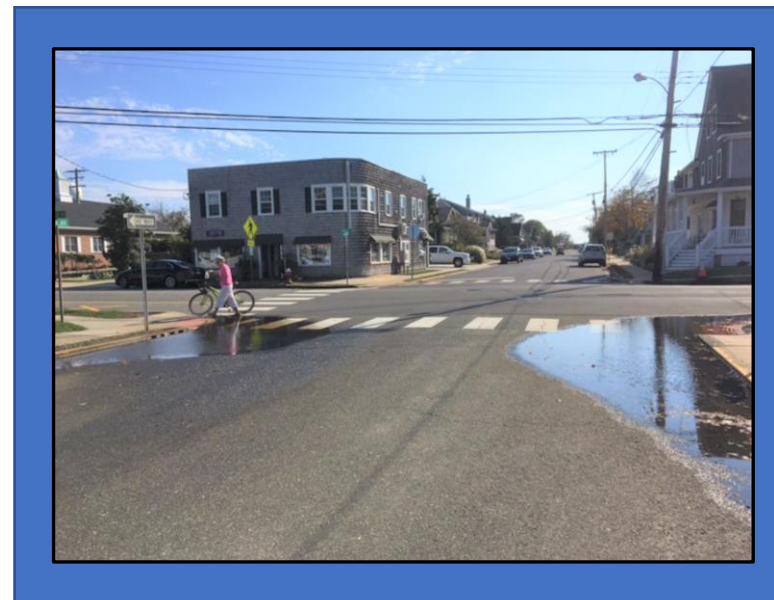
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- Continue to maintain storm drain system
- Continue to make improvements in drainage
 - Raise roads
 - Install check valves
 - Upgrade drain system piping
- Explore Other Improvements
 - Install bulkhead at Forsyth street end
 - Install bulkhead at Cranberry Ave. street end
 - Alter NJ DOT Mount St. Pumping Discharge





Flood Mitigation

Bay Head 5 Step Action Plan

**CONTINUE
ANALYSIS**

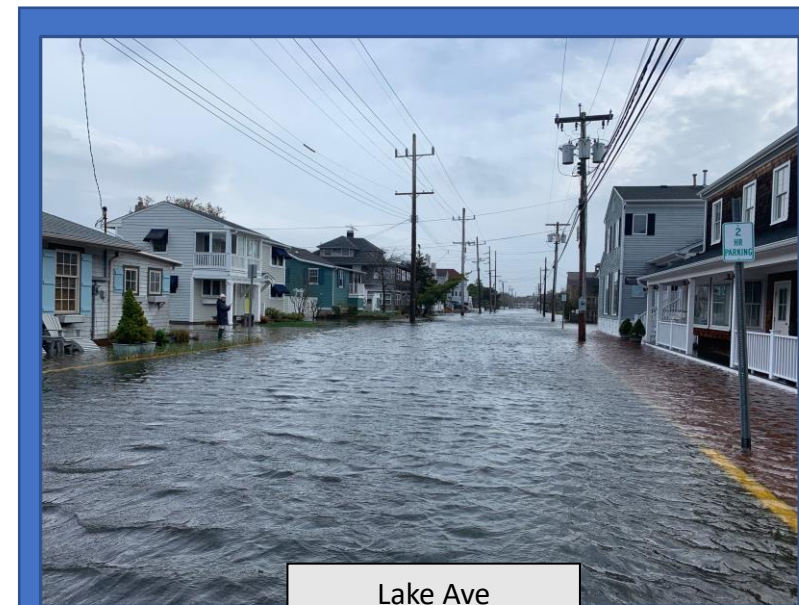
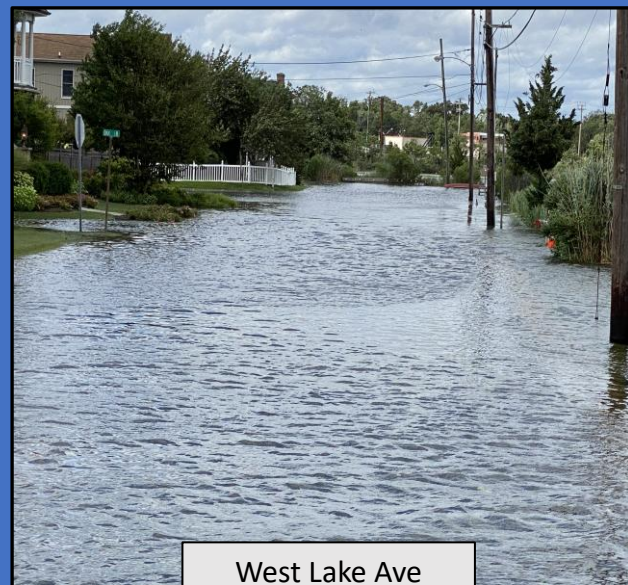
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- Seek action from Ocean County to address Bridge Ave. flooding
- Initiate project to mitigate flooding from Twilight Lake
- Initiate project to mitigate flooding from Barnegat Bay





Major Flooding Mitigation Alternatives Being Considered

Flooding from Twilight Lake – (Flooding North of Bridge Avenue)

Options Identified:

- Pump Twilight Lake to the Ocean
- Install flood gate(s) on scow ditch
- Raise shoreline/Build Berm
- Other options/Combination of first three?

Flooding from Barnegat Bay – (Flooding South of Bridge Avenue)

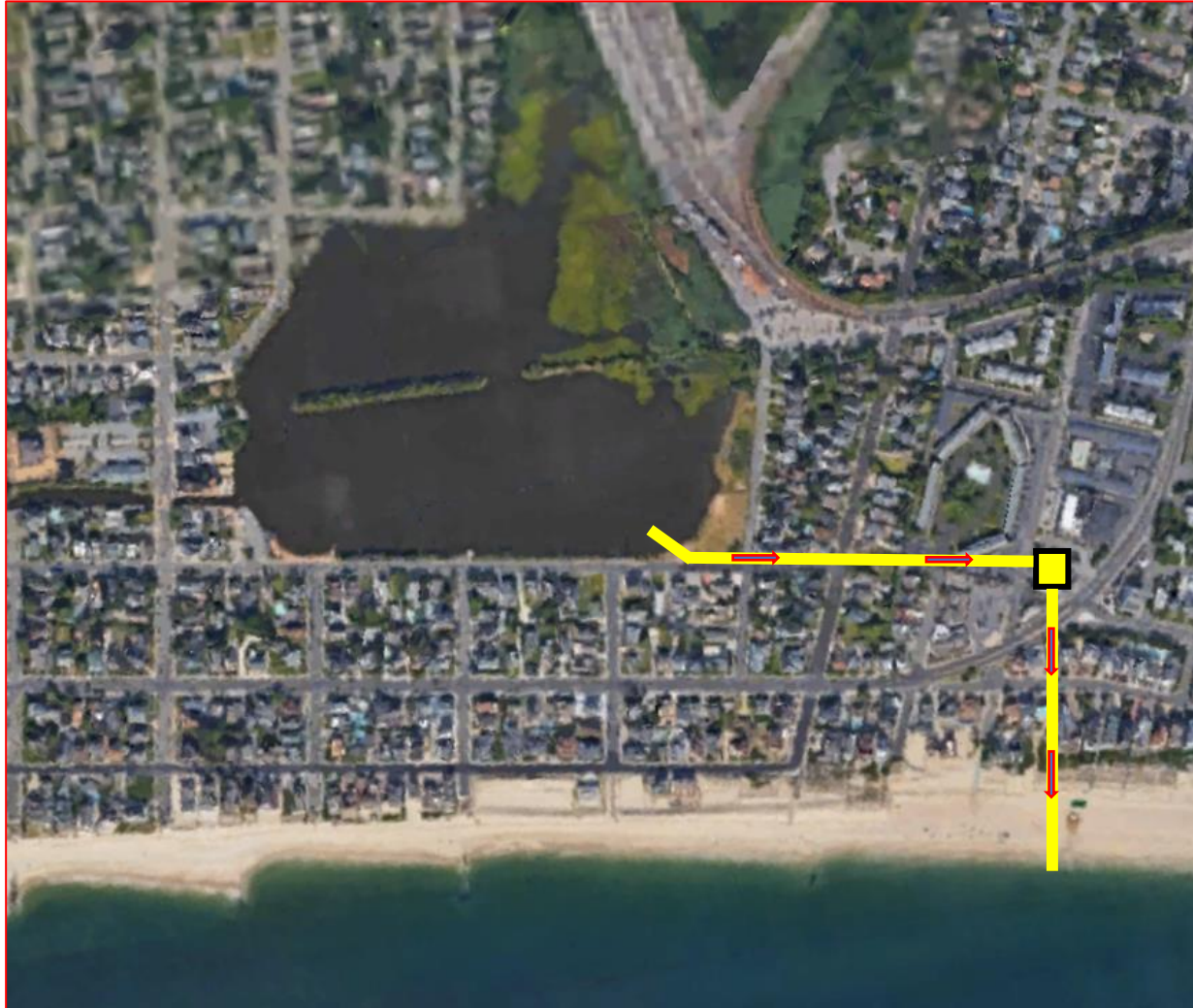
Options Identified:

- Raise select bulkhead sections
- Other options?



Mitigate Major Flooding From Twilight Lake

Option 1: Pump Twilight Lake to Ocean



Existing equipment and systems can be used:

Mitigate Major Flooding From Twilight Lake

Option 1: Pump Twilight Lake to Ocean

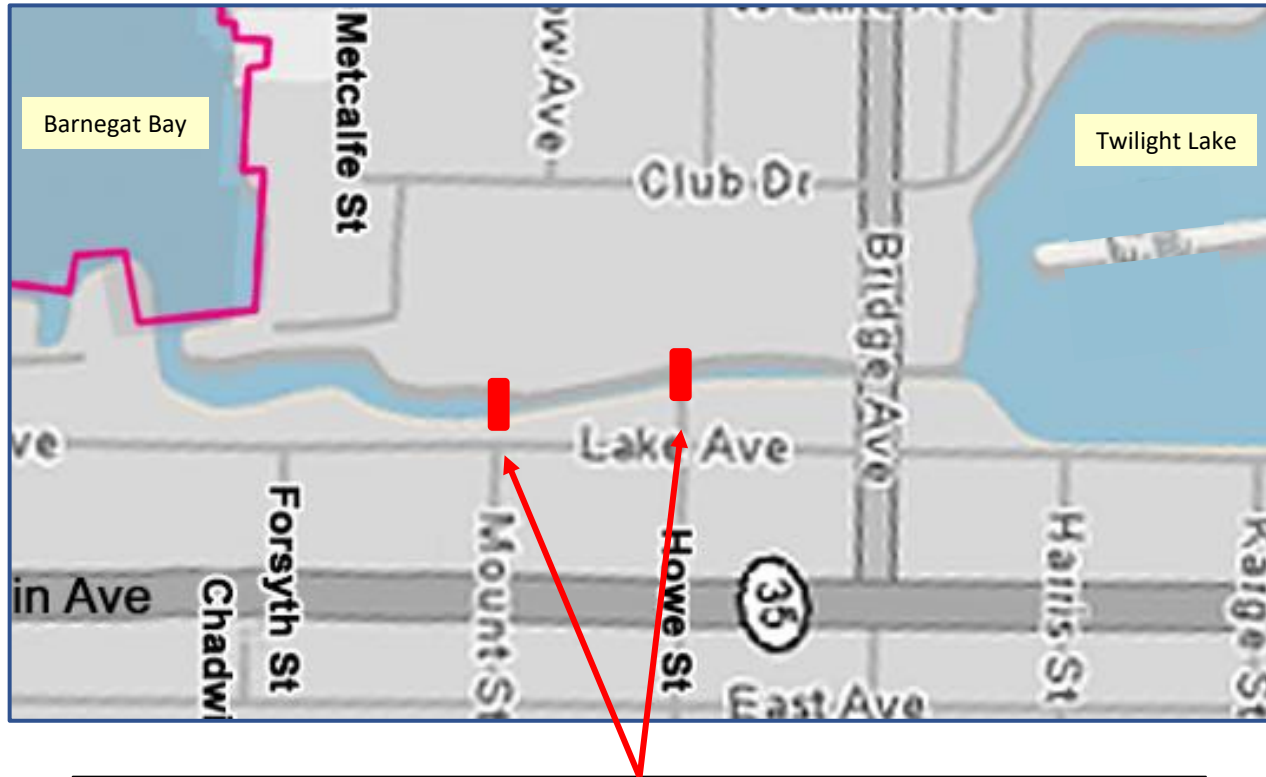


- Existing equipment and systems can be used:
 - Brick Municipal Pumping Station on Route 35 in Point Pleasant Beach
 - Piping going to the pumping station from Twilight Lake
 - Piping from the pumping station to the ocean



Mitigate Major Flooding From Twilight Lake

Option 2: Control Flow Through Scow Ditch



- Install a slice gate at the end of Howe or Mount Streets
- Both locations have Borough of Bay Head property on both sides of scow ditch avoiding disruption of private property for construction.



A sluice gate on Howe or Mount will also avoid disrupting recreational boating on the south side of scow ditch.

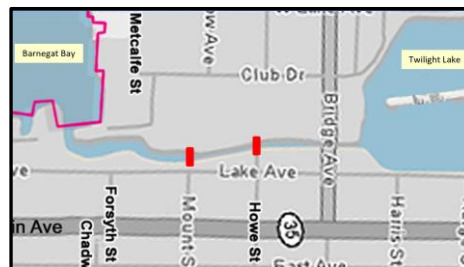


Mitigate Major Flooding From Twilight Lake

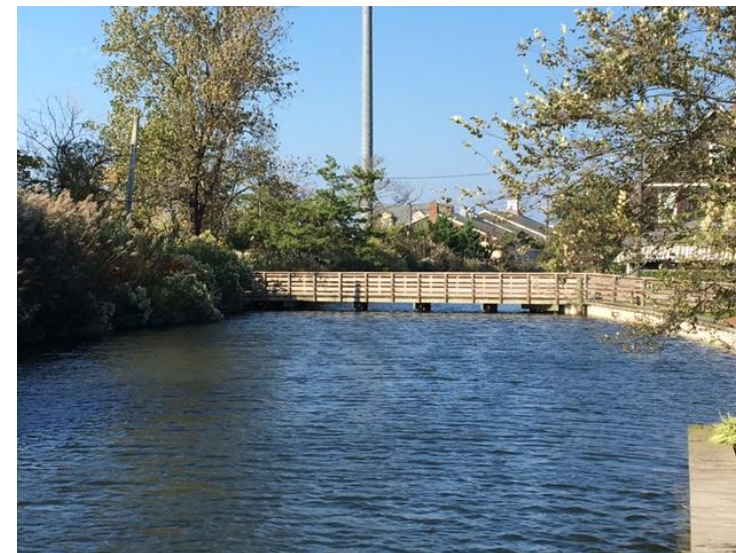
Option 2: Control Flow Through Scow Ditch



Sluice Gate on
Howe Street



Sluice Gate on
Mount Street






Mitigate Major Flooding From Twilight Lake

Option 3: Raise Shoreline

Twilight Lake

- Raise shoreline (Install Berm) to about 3.5 feet NAVD 1988
- Stabilize with rocks
- Use native plants to install a "Living Shoreline"



-  - Shoreline low spots where Twilight Lake Overflows
-  - Minimum suggested locations to raise shoreline
-  - Raise perimeter of shoreline (3,300 Feet)



Mitigate Major Flooding From Twilight Lake and Scow Ditch

Option 3: Raise Shoreline







Twilight Lake

- Raise shoreline (Install Berm) to about 3.5 feet NAVD 1988
- Stabilize with rocks
- Use native plants to install a "Living Shoreline"

Scow Ditch

- Install bulkhead at select locations

-  - Shoreline low spots where Twilight Lake Overflows
-  - Minimum suggested locations to raise shoreline
-  - Raise perimeter of shoreline (3,300 Feet)
-  - Raise bulkheads in sections experiencing overflow.





Flood Mitigation

Bay Head 5 Step Action Plan

**CONTINUE
ANALYSIS**

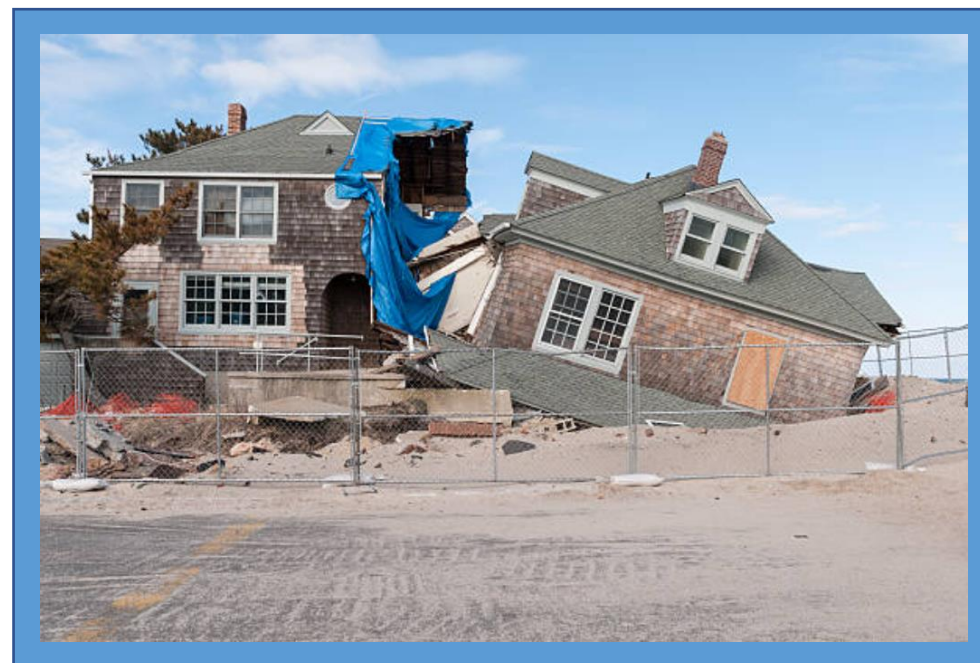
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- Catastrophic Flooding caused by major storms like Superstorm Sandy

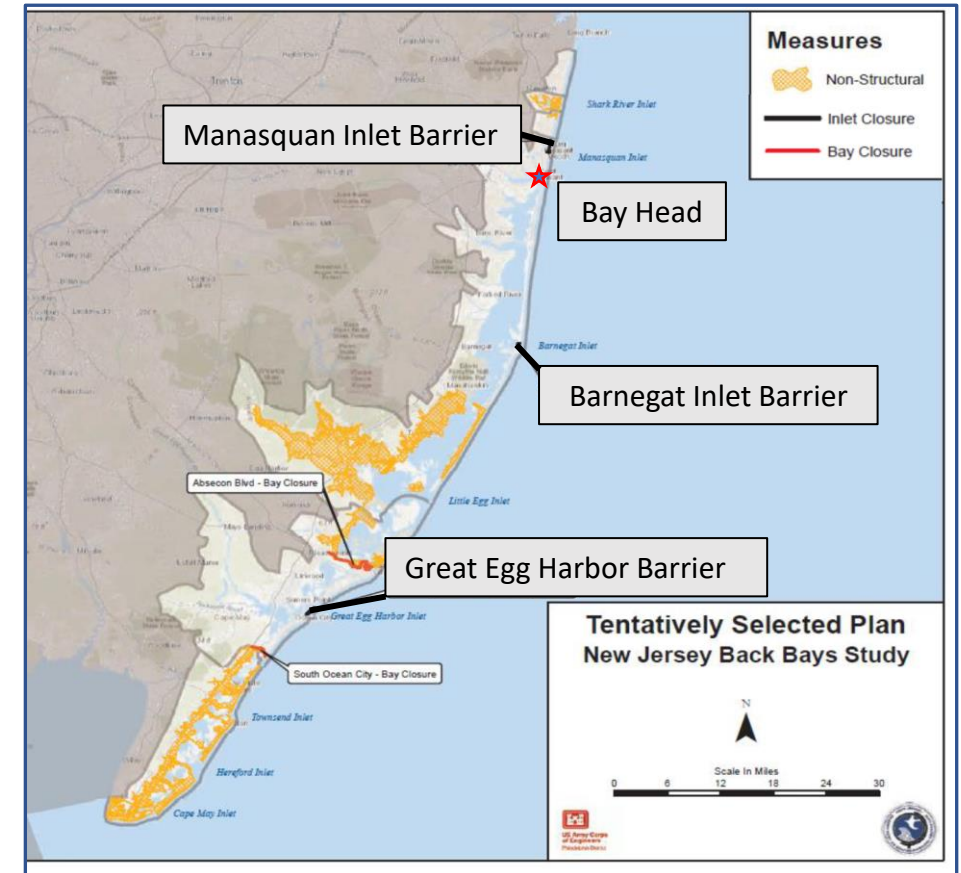




Study to Mitigate Catastrophic Flooding (Superstorm Sandy)

Back Bay Study

- The USACE is conducting an extensive study to mitigate major flooding events in New Jersey.
- Studies include flooding from Coastal Back Bay waters (coastal lakes, tributaries, bays, etc. including Twilight Lake and Barnegat Bay) in 5 counties.
- After five years of analyses, a “Selected Approach” has been identified:
 - Includes three closure gates
 - Includes multiple flood walls
 - Includes raises 18,800 structures in the area of Shark River Inlet, Long Beach Island and Beach Haven West
- The Project needs to be approved and funded
- Construction is not expected to commence until 2030.

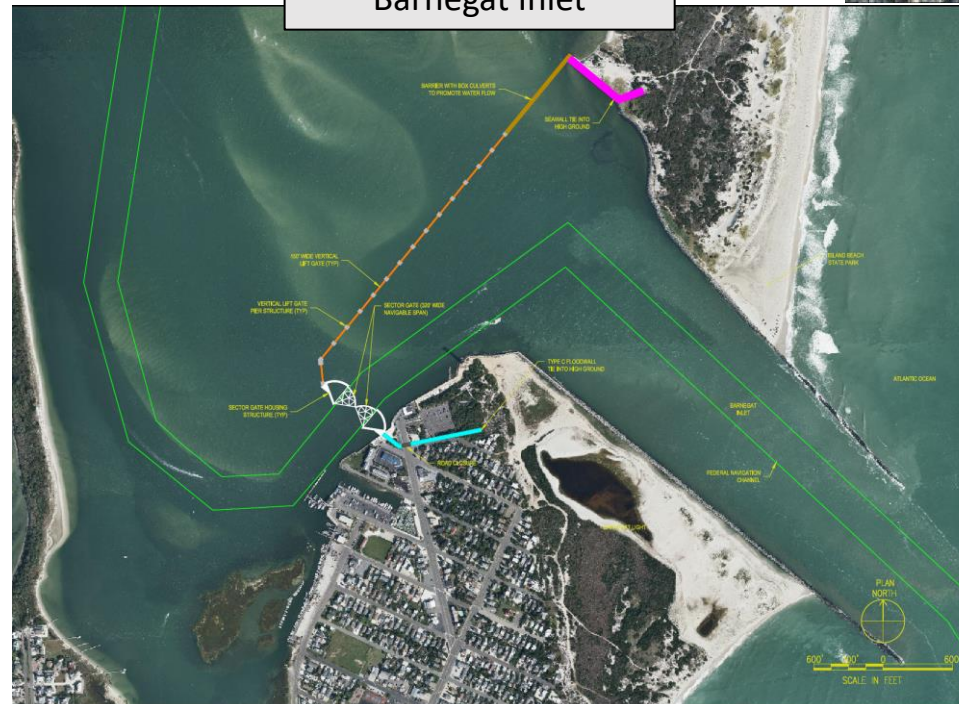


Manasquan Inlet



USACE Back Bay Flood Mitigation Project Inlet Closure Plan

Barnegat Inlet



Great Egg Harbor Inlet



Seawall

Floodwall

Levee/Dune Buried Seawall

150' Wide Vertical Lift Gates

340' Wide Double Swing Gates



Flood Mitigation

Bay Head 5 Step Action Plan

1. Continue collecting and analyzing flood data.
2. Incorporate Public Comments on the Master Plan and gain Council Adoption
3. Nuisance Flood Mitigation
 - A. Support Twilight Lake Study
 - B. Evaluate actions to mitigate known flood problem areas:
 - 1) Install new bulkhead at end of Forsyth Street
 - 2) Install bulkhead at Cranberry/West Lake Ave.
 - 3) Raise bulkhead at end of Mount Street
 - 4) Work with DOT to reroute pump discharge to south end of Scow Ditch
 - C. Investigate additional projects to raise roads, install check valves, manage water table, etc..
4. Major Flooding Mitigation
 - A. Seek action from the County to mitigate Bridge Avenue flooding.
 - B. Prepare a request for Federal Funding for two studies:
 - 1) Evaluate options to Flooding from Twilight Lake
 - Raise shoreline/Build Berm to 3.0+ feet NAVD88
 - Pump Twilight Lake to the Ocean
 - Install flood gates on scow ditch
 - 2) Evaluate options for mitigate Flooding from Barnegat Bay/Scow Ditch
 - Raise select bulkhead sections
 - Other
5. Catastrophic Flooding Mitigation
 - A. Remain Active in the USACE Back Bay Study



Bay Head

Status of Flooding Investigation

CONCLUSION:

- Bay Head has completed many actions to mitigate flooding.
- Bay Head has plans to further mitigate flooding.
- A lot of work is ahead to prepare for sea level rise due to climate change effects.

QUESTIONS?



A copy of this presentation is posted on the
Borough Web Site.