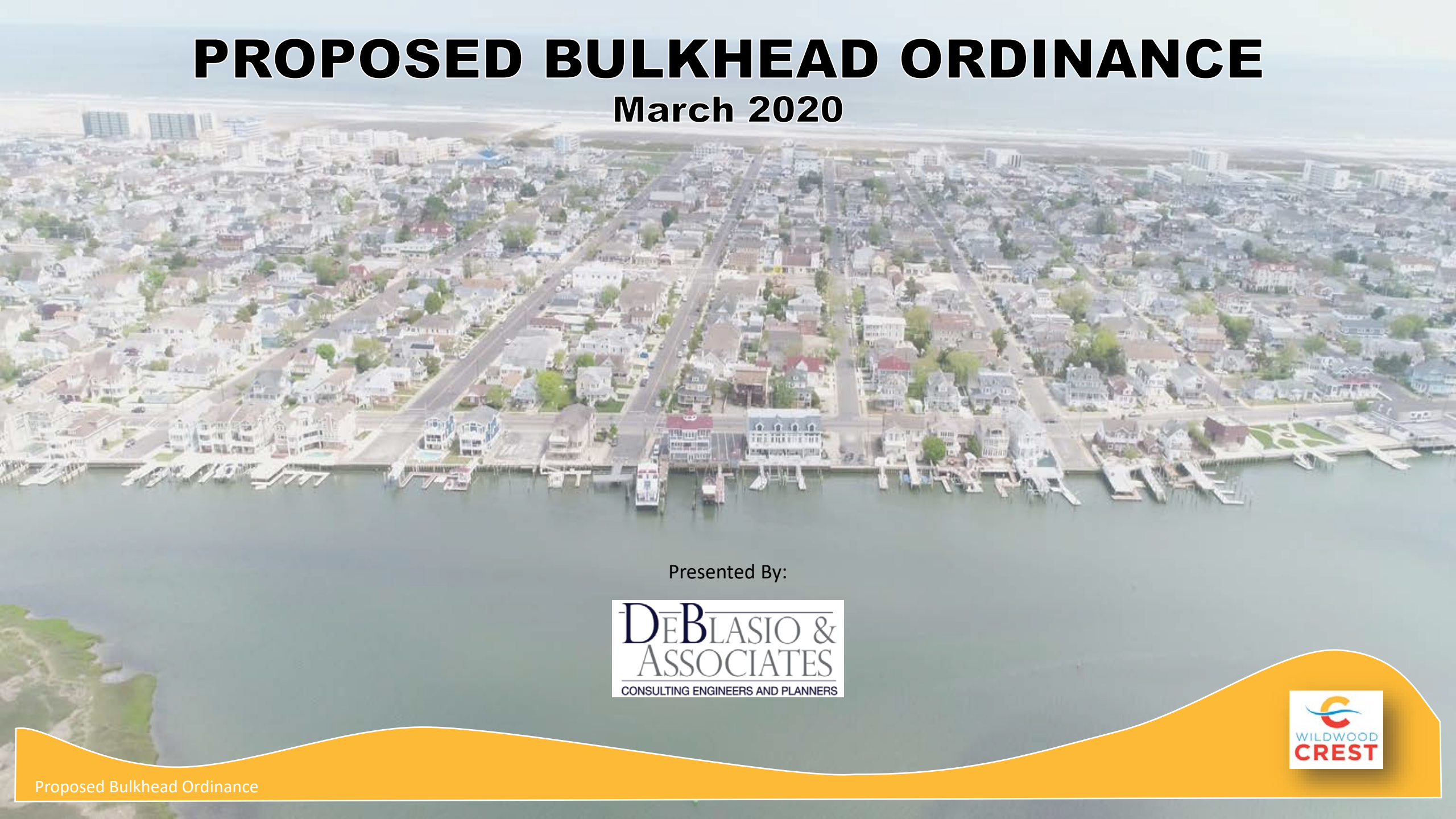
PROPOSED BULKHEAD ORDINANCE

March 2020



Presented By:

DeBlasio & Associates
CONSULTING ENGINEERS AND PLANNERS

WILDWOOD CREST

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FLOOD MITIGATION AND STORM SEWER MASTER PLAN

May 2019

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NOAA Technical Report NOS CO-OPS 073

Sea Level Rise and Nuisance Flood Frequency Changes around the United States

City Dock in Annapolis, Maryland. Photo Credit: Amy McGovern.

Silver Spring, Maryland

June 2014

noaa National Oceanic and Atmospheric Administration

U.S. DEPARTMENT OF COMMERCE
National Ocean Service
Center for Operational Oceanographic Products and Services

EXECUTIVE SUMMARY

The National Oceanic and Atmospheric Administration (NOAA) water level (tide) gauges have been measuring water levels around the U.S. for over a century, providing clear evidence of sea level rise relative to land (SLR_{rel}) around most of the continental United States and Hawaii. As SLR_{rel} increases mean sea level (MSL), there is naturally an increase in tidal datum elevations, which are typically used to delineate inundation thresholds. Direct consequences of rising sea level against fixed elevations such as *today's* built infrastructure also include increased inundation during extreme events both spatially and temporally. Not only are extreme flooding events reaching higher grounds and covering larger areas due to SLR_{rel}, the frequency and duration of these extreme flood events are increasing.

Another consequence of SLR_{rel} is the increase in *lesser extremes* such as occasional minor coastal flooding experienced during high tide. These events are becoming more noticeable and widespread along many U.S. coastal regions and are *today* becoming more of a *nuisance*. As sea levels continue to rise and with an anticipated acceleration in the rate of rise from ocean warming and land-ice melt, concern exists as to when more substantive impacts from tidal flooding of greater frequency and duration will regularly occur. Information quantifying these occurrences to inform mitigation and adaptation efforts and decision makers is not widely available.

In this report, we show that water level exceedances above the elevation threshold for "minor" coastal flooding (nuisance level) impacts established locally by the National Weather Service (NWS) have been increasing in time. More importantly, we document that event frequencies are accelerating at many U.S. East and Gulf Coast gauges, and many other locations will soon follow regardless of whether there is an acceleration of SLR_{rel}. Lastly, we show a regional pattern of increasingly greater event-rate acceleration as the height between MSL and a location's nuisance flood threshold elevation decreases.

Impacts from recurrent coastal flooding include overwhelmed stormwater drainage capacity, frequent road closures, and general deterioration and corrosion of infrastructure not designed to withstand frequent inundation or salt-water exposure. From this, we conclude that there is a time horizon, largely dependent upon the local rate of SLR_{rel}, when critical elevation thresholds for various public/private/commercial serving systems will become increasingly compromised by tidal flooding. This concept of a non-linear impact trajectory needs to recognized, as it is critical for coastal planning to prevent degradation to society-serving systems at risk from SLR_{rel}. The goal of this report is to heighten awareness of a growing problem of more frequent nuisance coastal flooding respective to a community's living memory and to encourage resiliency efforts in response to impacts from SLR_{rel}.

Bulkhead Comparison

TOWN	1929 DATUM	1988 DATUM
ATLANTIC CITY		
AVALON	9.3	8
CAPE MAY		
LONGPORT	11.05 - 11.55	9.75 - 10.25
LOWER TOWNSHIP		
MARGATE	9.3 Bay, 14.3 Ocean	8.0 Bay, 13.0 Ocean
MIDDLE TOWNSHIP	8	6.7
NORTH WILDWOOD	8	6.7
OCEAN CITY	8.3 Bay, 12.3 Ocean	7.0 Bay, 11.0 Ocean
SEA ISLE CITY	7.5	6.2
SOMERS POINT	8.3-15.3	7.0-14.0
STONE HARBOR	9.3	8
UPPER TOWNSHIP	9.3	8
VENTNOR	9.3 Bay, 11.8 Ocean	8.0 Bay, 10.5 Ocean
WEST WILDWOOD	9.8	8.5
WILDWOOD	conform to height of contiguous bulkhead	
WILDWOOD CREST	8	6.7 Bay, 13.0 Ocean

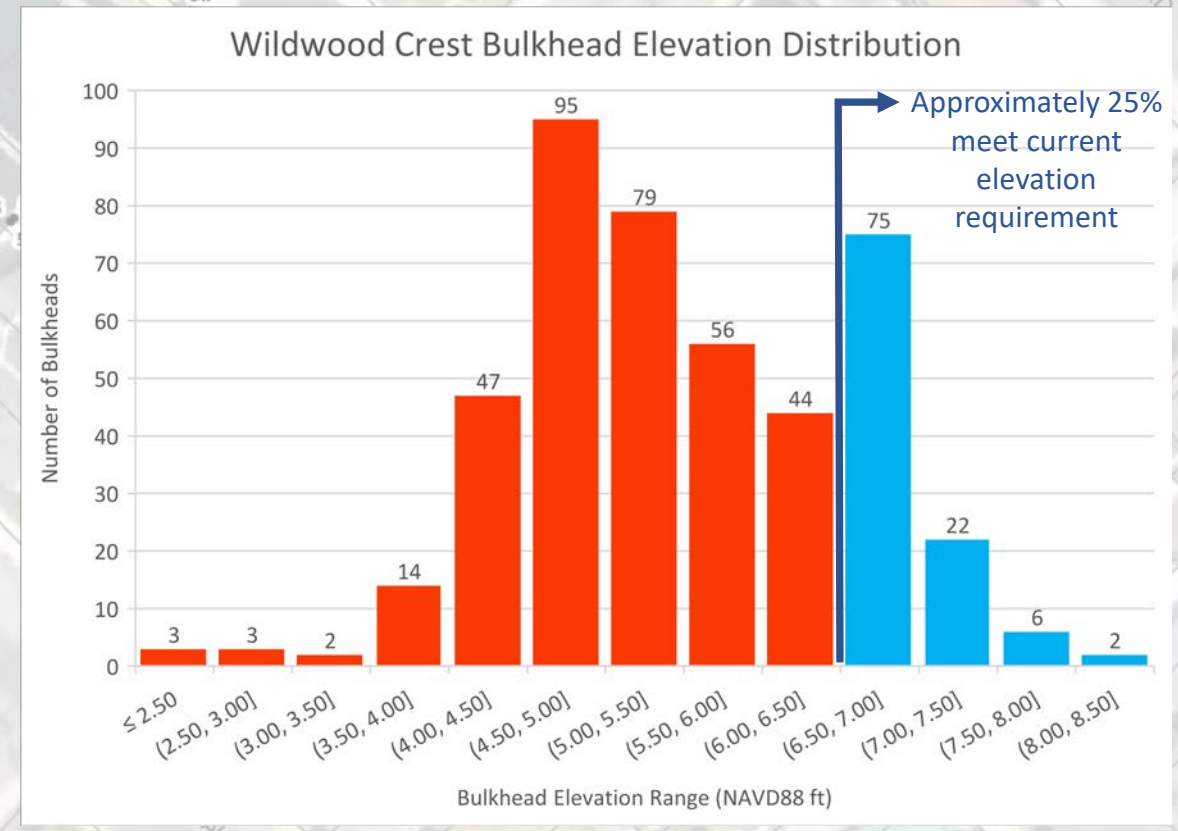
The Borough of Wildwood Crest should adopt a new bulkhead ordinance to establish a new, minimum bulkhead height elevation. The bayfront bulkheads are the primary barrier between the residents and tidal water flooding. Once the tide reaches the lowest bulkhead elevation, residents are susceptible to localized flooding. Based on FEMA's anticipated sea level rise in 2050, the new ordinance should specify a minimum height of 8.0 feet NAVD 88 for all existing, constructed, reconstructed, and/or repaired bulkheads. The entire bulkhead should be watertight above grade to provide a strong flood barrier. The recommended bulkhead ordinance is provided as a draft and is attached in the appendix.

Bulkhead/Land Berm Elevations

A bulkhead and land berm system is the main barrier between the mainland and the bay. In order to determine the height along the barrier, a survey of bayfront properties was completed in January 2019 utilizing a GPS receiver that was placed on each property's barrier top surface and that elevation was recorded in the North American Vertical Datum (NAVD) of 1988. Over 400 points were collected and analyzed.

The current bulkhead ordinance for the Borough of Wildwood Crest Chapter 17 Bulkheads requires the top elevation of constructed bulkheads to be set to a minimum elevation of 8.0 NGVD 1929. The required height can be converted to NAVD 1988 by subtracting 1.3' for a required minimum elevation of 6.7 NAVD 1988.

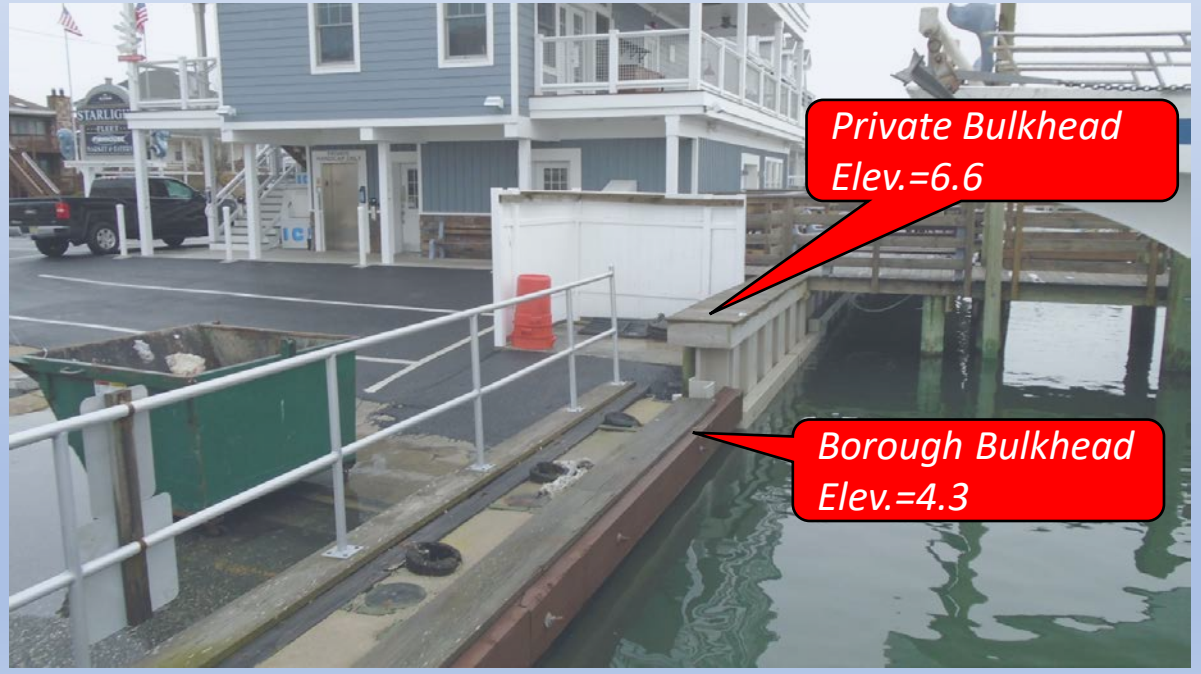
LOWEST ELEVATION	**2.11 FT. (NAVD 1988)**
HIGHEST ELEVATION	**8.35 FT. (NAVD 1988)**
MEAN ELEVATION	**5.49 FT. (NAVD 1988)**
MEDIAN ELEVATION	**5.33 FT. (NAVD 1988)**



Elevate Borough Bulkheads – Elevation 8.0 NAVD88

As sea level continues to rise, the elevation of the Borough of Wildwood Crest will need to increase. Land berms and bulkheads provide protection to bay side properties by blocking out tidal water. If the Borough chooses to adopt a new bulkhead and land berm ordinance requiring the finished height of newly constructed bulkheads and land berms to be 8.00 NAVD 88, all Borough owned bulkheads will be below this height. Borough owned bulkheads range in height from 4.35 to 7.00 feet. As residents begin to raise the height of their newly constructed bulkheads, the Borough owned bulkheads will need to be elevated as well.

The Borough is responsible for all street end bulkheads that are found in the roadway right-of-way. From Cresse Avenue to Rambler Road there are 18 street ends with Borough constructed bulkheads. These street end bulkheads range in elevation from 4.35 to 7.00 feet. As the Borough continues its efforts to decrease tidal flooding, bulkheads with the lowest finished elevations should be a priority. The tidal water will enter through the lowest access point along the bay side of the barrier island.



Current bulkhead ordinance 6.70 NAVD88

Lowest Elevation Point	Location
4.35	Sweet Briar Road
4.40	Cardinal Road
4.48	Wisteria Road
4.61	Cresse Avenue
4.73	Myrtle Road
4.83	Buttercup Road
4.89	Primrose Road
4.94	Columbine Road
4.99	Forget Me Not Road
5.00	Fern Road
5.16	Lotus Road
5.16	Palm Road
5.57	Morning Glory Road
6.42	Heather Road
6.47	Lavender Road
6.50	Rosemary Road
6.94	Crocus Avenue
7.00	Aster Road

What are the major highlights of the proposed bulkhead ordinance?

- **Provides an application process, technical standards and inspection procedures for bulkhead construction.**
- **Requires bulkheads that protrude above the landward grade to be constructed watertight.**
- **Establishes a new minimum bayside bulkhead elevation of (8.0 NAVD88) and oceanside bulkhead elevation of (13.0 NAVD88).**
- **Requires private property owners to raise bayside bulkheads within a time frame based on existing bulkhead height.**

Comments & Questions

- Presentation will be posted on Borough Website:
  - https://wildwoodcrest.org

- Detailed comments & questions can be submitted via email to:
  - engineering@wildwoodcrest.org