



# Prime Hook Beach Flooding Evaluation Community Meeting



**Delaware Department of Natural Resources  
and Environmental Control**

**April 27, 2013**



This presentation includes data that shall not be disclosed outside the Client's office and shall not be duplicated, used, or disclosed—in whole or in part—for any purpose other than for informational purposes. This restriction does not limit the Client's right to use information contained in this data if it is obtained from another source without restriction.

# Overview

---

- ▶ Introduction
- ▶ Overview of National Flood Insurance Program (NFIP)
- ▶ Comparison of regulatory floodplain maps and preliminary maps for Prime Hook Beach
- ▶ Estimating Flood Risk
- ▶ FEMA's Hazard Mitigation Grant Program (HGMP)
- ▶ Overview of flood mitigation techniques
  - Elevation
  - Dry floodproofing
  - Wet floodproofing
  - Window and door coverings
- ▶ Prime Hook Discussion
  - Questionnaires
  - Field visits

# Introduction

- ▶ In the United States, flooding
  - Causes 90% of disaster-related property damage
  - Accounts for 75% of all disaster declarations
- ▶ Predominant types of flooding
  - Riverine flooding
  - Coastal flooding
- ▶ Coastal flooding in Delaware
  - Hurricanes
  - Northeasters
- ▶ Most severe damage due to
  - Storm surge
  - Wave action



High tides and surf break through sand dunes along Delaware's ocean coast during a November 2009 northeaster.



Storm surge and waves caused damage to properties along Delaware Bay Coast in 2006. (Image source : Homeowners Handbook to Prepare for Natural Hazards, Delaware Sea Grant College Program December 2012)

# National Flood Insurance Program (NFIP)

---

Required for properties located in areas at high risk of flooding

- Administered by Federal Emergency Management Agency (FEMA)
- Offers flood insurance to property owners and renters and covers a building and its contents
- Community participation in NFIP is voluntary
- Participating communities must
  - ▶ Meet the NFIP requirements to ensure that new buildings and substantially improved existing buildings in floodprone areas are protected from flood damage.
  - ▶ Adopt floodplain maps
  - ▶ Legally enforce floodplain management regulations (zoning ordinances, building codes, subdivision ordinances etc.)
- List of participating communities in Delaware found at <http://www.fema.gov/national-flood-insurance-program/national-flood-insurance-program-community-status-book>

# Factors Affecting Flood Insurance Rates

- Building occupancy - Single family, two - to four-family, non-residential etc.
- Building type - Number of floors, presence of basement, first floor elevation, manufactured home affixed to a permanent foundation
- Flood insurance zones - Zone A (A, AE, AR, AO and A1-30), Zone V (V, VE, and V1-30), Zones B, C and X
- Elevation of lowest floor or bottom or the lowest horizontal structure member of the lowest floor
  - ▶ Zone A – elevation of lowest floor in relation to the Base Flood Elevation (BFE)
  - ▶ Zone V – elevation of the bottom of the lowest floor’s lowest horizontal structure member in relation to the BFE

Floor Elevation above BFE	Reduction in Annual Flood Premium	Annual Premium	Savings
0	0%	\$ 7,821	\$ 0
1 foot	33%	\$ 5,256	\$ 2,565
2 feet	55%	\$ 3,511	\$ 4,310
3 feet	65%	\$ 2,764	\$ 5,057
4 feet	71%	\$ 2,286	\$ 5,535

Rates as of May 2011 per the National Flood Insurance Program Flood Insurance Manual (FEMA 2011) for a Zone V structure free of obstruction. Rates include building (\$250,000), contents (\$100,000), and associated fees, including increased cost of compliance; premium to be determined by NFIP underwriting.

Sample NFIP flood insurance premiums for buildings in coastal areas (V Zone) free of obstruction below the lowest floor.

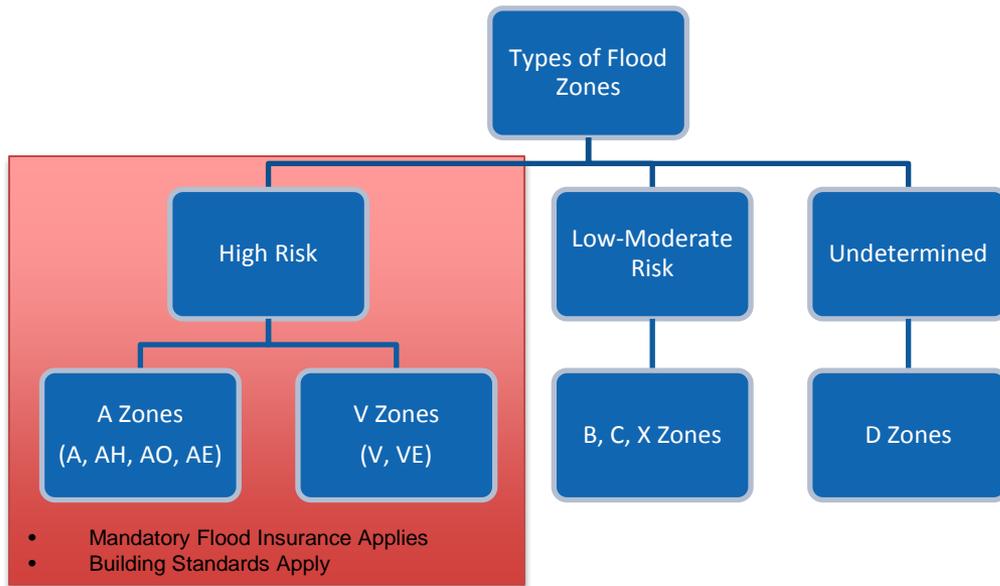
# Factors Affecting Flood Insurance Rates (cont.)

---

- Enclosure below the lowest floor
  - ▶ Free of obstruction/open
  - ▶ With obstruction
  - ▶ If area below lowest floor has 300 square feet enclosed by breakaway walls, has breakaway walls or is finished
- Location of utilities and service equipment
- Date of construction
  - ▶ Constructed on/before the date of first Flood Insurance Rate Map (FIRM) for the community or on/before December 31, 1974, whichever is later have rates “grandfathered” or “subsidized”.
  - ▶ Constructed after first FIRM, rated based on above mentioned factors

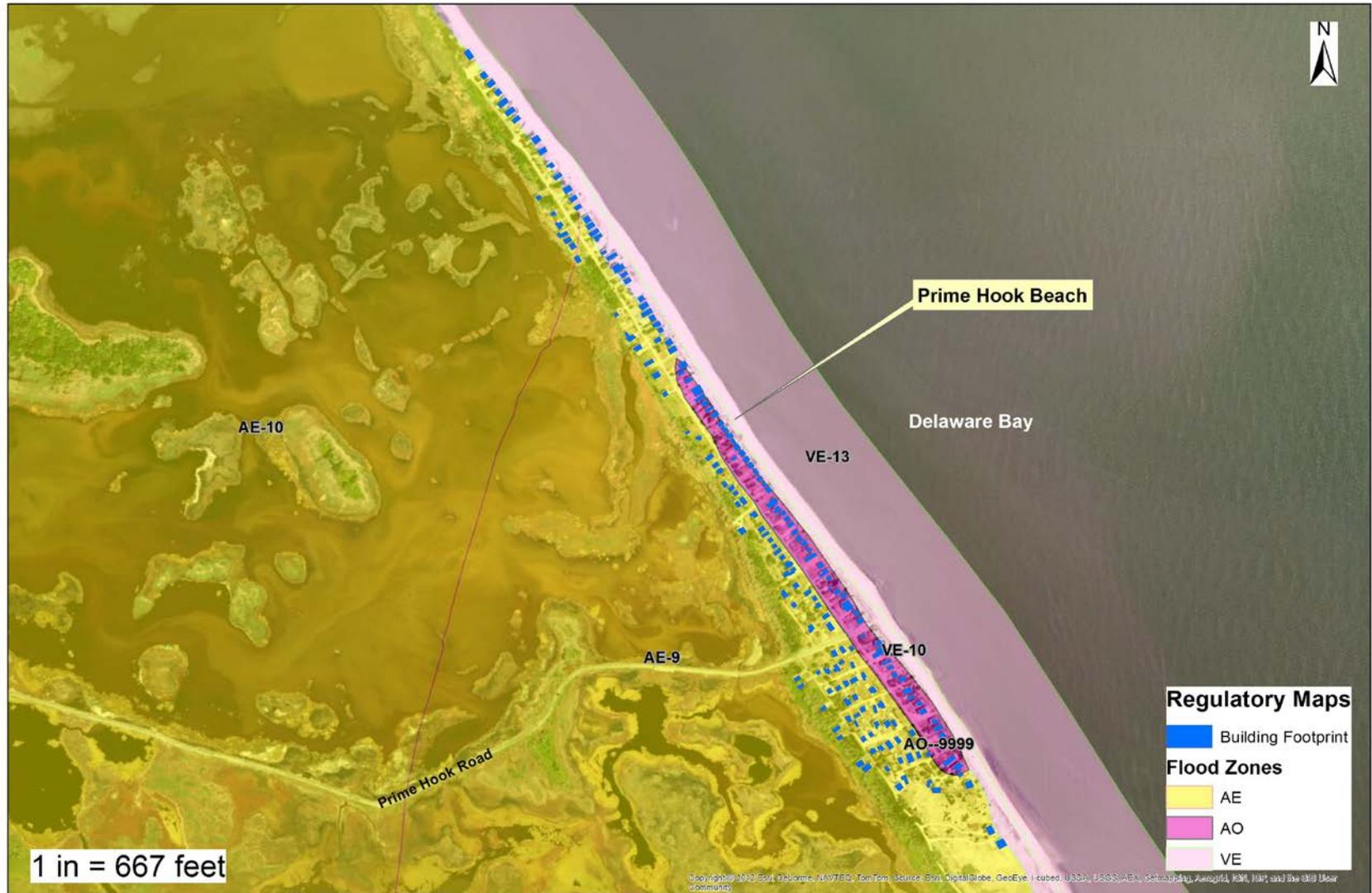
# Special Flood Hazard Areas (SFHA) – FEMA FIRMs

- FIRMS – Official map of NFIP community that shows areas susceptible to flooding by base flood and high-velocity wave action (coastal areas)

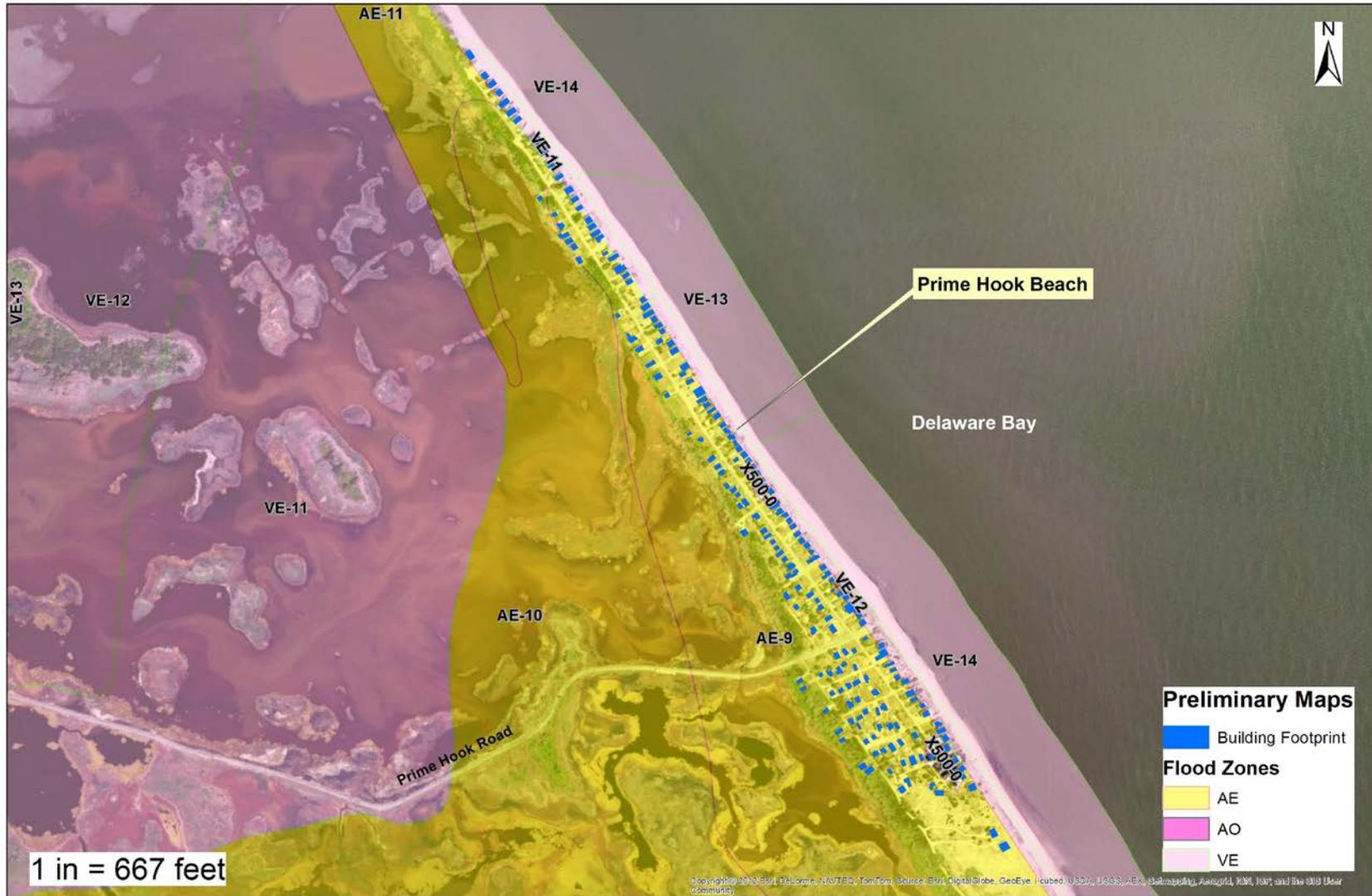


Zone	Description
<b>Zone V</b> (V, VE, V1-30)	Coastal High Hazard Area subject to inundation by base flood and high-velocity wave action
<b>Zone A</b> (A, AE, AO, AE)	SFHA subject to inundation by base flood
<b>Zones C and X</b> (Unshaded)	Minimal flood hazard shown above the 0.2%-annual-chance flood level.
<b>Zones B and X</b> (shaded)	Moderate flood hazard shown between base flood and 0.2%-annual-chance flood level.
<b>Zone D</b>	Areas of undetermined but possible flood hazard

# Special Flood Hazard Areas – Prime Hook Beach (Regulatory Maps)



# Special Flood Hazard Areas – Prime Hook Beach (Preliminary Maps)



# Estimating Flood Risk

- Available Resources
  - ▶ Mobile LIDAR data available through a recent DNREC study
    - Provides information on ground floor and first floor elevations of the structures
  - ▶ New FEMA Coastal Study depicts elevations for 10-year, 50-year, 100-year and 500-year flood events



# Overview of Flood Mitigation Techniques

---

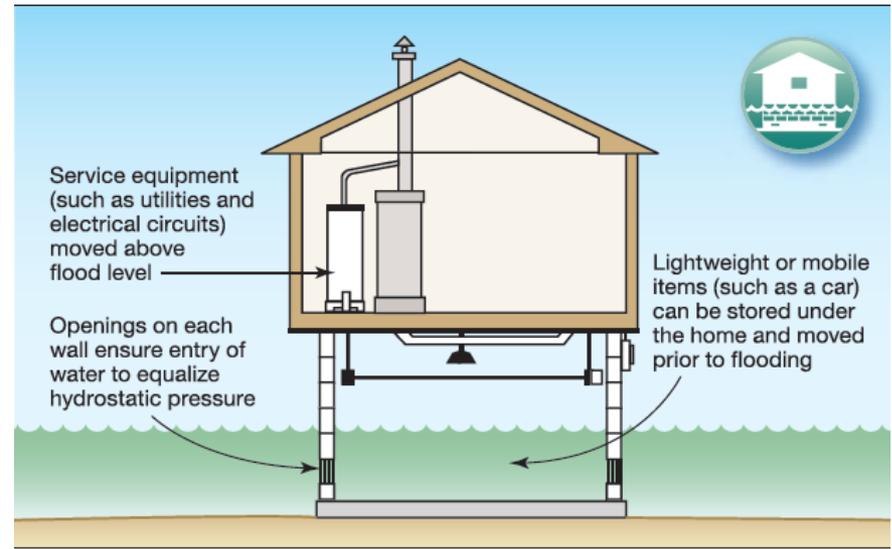
- Elevation
- Wet floodproofing
- Dry floodproofing
- Acquisition

# Elevation

- Structure is raised so lowest floor is at or above the Base Flood Elevation (BFE)
  - ▶ BFE- Elevation of the design flood, or the flood protection elevation required by a community, including wave effects, relative to the National Geodetic Vertical Datum, North American Vertical Datum, or other datum. The BFE is the locally adopted regulatory flood elevation.
  - ▶ Sussex County regulations require that any new construction and substantial improvements in coastal areas shall be elevated so that the bottom of lowest horizontal structural member of the lowest floor is elevated to or above the 100-year flood level
  - ▶ The American Society of Civil Engineers (ASCE) 24 standards recommend elevating the bottom of the of the lowest horizontal structural member to 100-year flood level + 1foot.
- Protects structure from damage in a base flood
- Elevation techniques include :
  - Elevation on solid perimeter foundation walls
  - Elevation on open foundation systems
- Must consider other hazards in design (e.g., seismic, wind)

## Elevation (cont.)

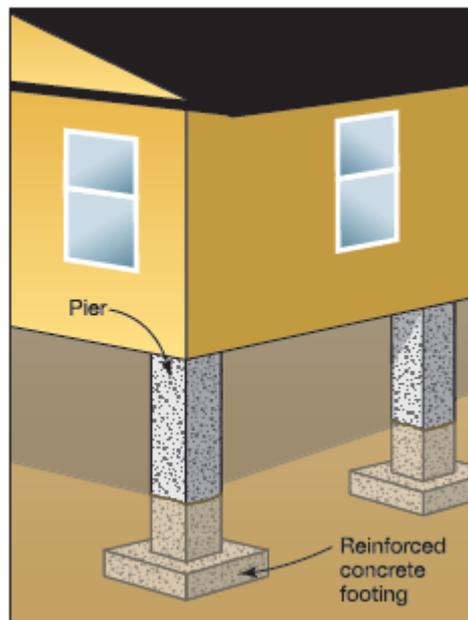
- Elevating on solid perimeter foundation walls
  - ▶ Used in areas of low to moderate water depth and velocity
  - ▶ Structure raised from current foundation, support walls extended
  - ▶ Suitable where risks of wave action and high-velocity flows are low.



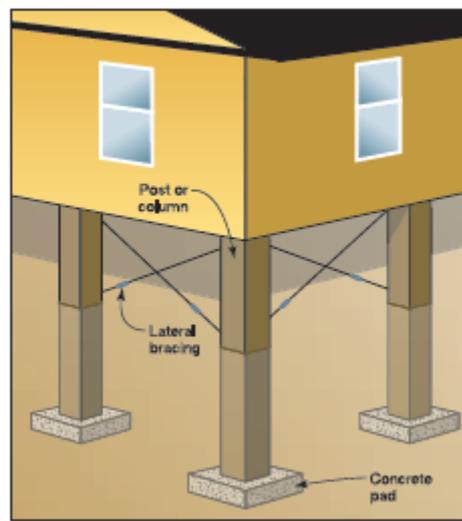
Elevation on solid perimeter foundation walls.

# Elevation (cont.)

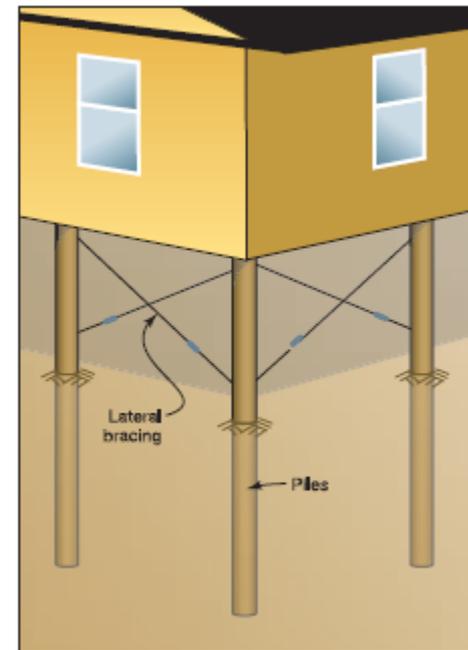
- Elevating on open foundations
  - ▶ Vertical structural members (not a continuous foundation wall)
  - ▶ Includes piers, posts, columns, and piles
  - ▶ Suitable in oceanfront areas exposed to high-velocity flow, waves and high winds



Elevation on piers



Elevation on posts or columns



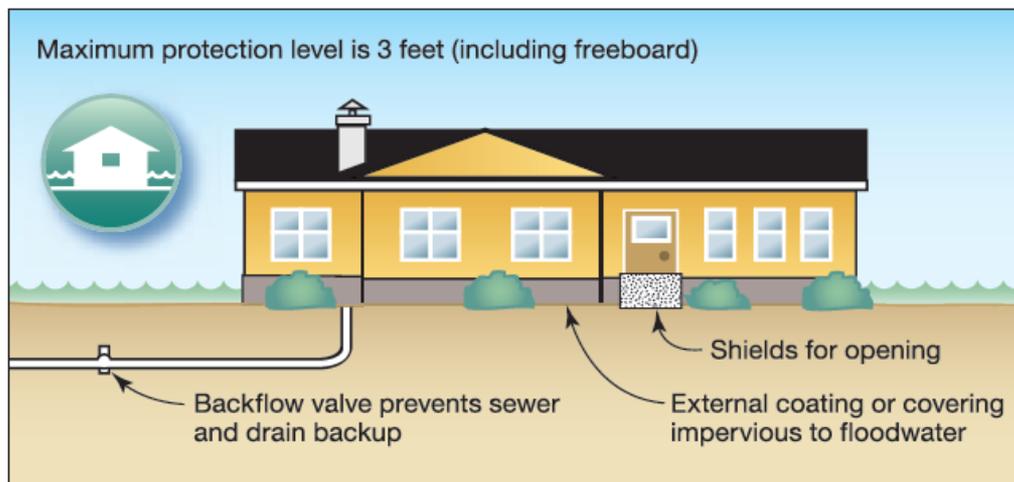
Elevation on piles

## Elevation (cont.)

Advantages	Disadvantages
Brings a substantially damaged or improved building into compliance with the NFIP if the lowest floor is elevated to the BFE	May be cost-prohibitive
Reduces flood risk to the structure and its contents	May adversely affect the structure's appearance
Eliminates the need to relocate vulnerable items above the flood level during flooding	Does not eliminate the need to evacuate during floods
Often reduces flood insurance premiums	May adversely affect access to the structure
Uses established techniques	Cannot be used in areas with high-velocity water flow, fast-moving ice or debris flow, or erosion unless special measures are taken
Can be initiated quickly because qualified contractors are often readily available	May require additional costs to bring the structure up to current building codes for plumbing, electrical, and energy systems
Reduces the physical, financial, and emotional strains that accompany flood events	Requires consideration of forces from wind and seismic hazards and possible changes to building design
Does not require the additional land that may be needed for floodwalls or levees	

# Dry Floodproofing

- Strengthening existing foundations, floors, and walls to withstand flood forces while making the structure watertight and substantially impermeable to floodwaters
- Includes
  - Sealing walls with waterproof coatings, impermeable membranes, or supplemental layers of masonry/concrete
  - Doors and windows below BFE must be equipped with permanent or removable shields
  - Backflow valves must be installed in sewer lines and drains
- Technique cannot be used on homes that have been substantially damaged or that are being substantially improved



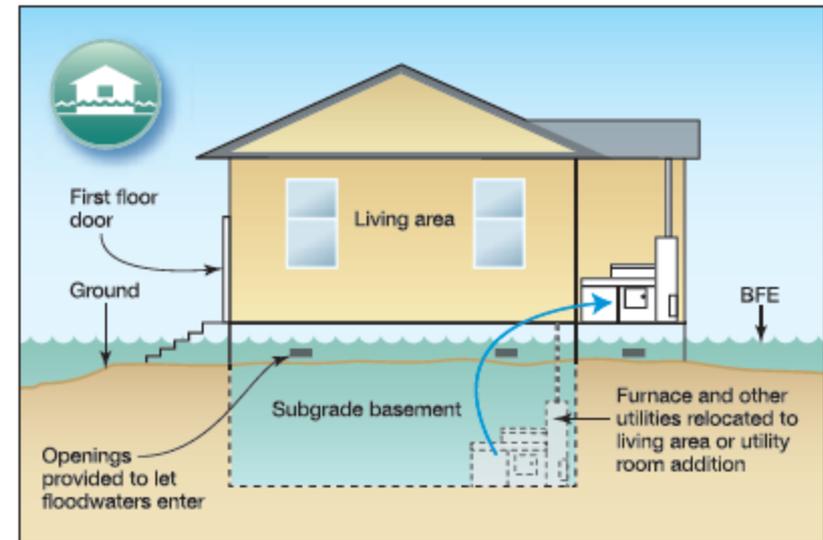
Dry floodproofed structure

# Dry Floodproofing (cont.)

Advantages	Disadvantages
Reduces the flood risk to the structure and contents if the design flood level is not exceeded	Does not satisfy the NFIP requirement for bringing substantially damaged or improved residential structures into compliance
May be less costly than other retrofitting measures	Requires ongoing maintenance
Does not require the extra land that may be needed for floodwalls or levees	Does not reduce flood insurance premiums for residential structures
Reduces the physical, financial, and emotional strains that accompany flood events	Usually requires human intervention and adequate warning time for installation of protective measures
Retains the structure in its present environment and may avoid significant changes in appearance	May not provide protection if measures fail or the flood event exceeds the design parameters of the measure
	May result in more damage than flooding if design loads are exceeded, walls collapse, floors buckle, or the building floats
	Does not eliminate the need to evacuate during floods
	May adversely affect the appearance of the building if shields are not aesthetically pleasing
	May not reduce damage to the exterior of the building and other property
	May lead to damage of the building and its contents if the sealant system leaks

# Wet Floodproofing

- Modifying the uninhabited portions of the home (crawlspace/basement) to allow water to enter without harming the structure or its contents
  - ▶ Reduces risk of structural collapses
  - ▶ Often less costly than other types of retrofitting
  - ▶ Does not require additional land
  - ▶ Appearance of home not adversely affected
- Technique cannot be used on homes that have been substantially damaged or that are being substantially improved



Wet floodproofed structure

# Wet Floodproofing (cont.)

Advantages	Disadvantages
Reduces the risk of flood damage to a building and its contents, even with minor mitigation	Does not satisfy the NFIP requirement for bringing substantially damaged or improved structures into compliance
Greatly reduces loads on walls and floors due to equalized hydrostatic pressure	Usually requires a flood warning to prepare the building and contents for flooding
May be eligible for flood insurance coverage of cost of relocating or storing contents, except basement contents, after a flood warning is issued	Requires human intervention to evacuate contents from the flood-prone area
Costs less than other measures	Results in a structure that is wet on the inside and possibly contaminated by sewage, chemicals, and other materials borne by floodwaters and may require extensive cleanup
Does not require extra land	Does not eliminate the need to evacuate during floods
Reduces the physical, financial, and emotional strains that accompany flood events	May make the structure uninhabitable for some period after flooding
	Limits the use of the floodable area
	May require ongoing maintenance
	May require additional costs to bring the structure up to current building codes for plumbing, electrical, and energy systems
	Requires care when pumping out basements to avoid foundation wall collapse

# Acquisition

- Eliminate risk by acquiring floodprone property and demolishing building
- Property owner relocates to a site outside of the floodplain
- Property owner is paid fair compensation for building and land
- HMGP requires that land be deed restricted as open space in perpetuity and maintained by a government entity

Advantages	Disadvantages
Can eliminate future risk if property owner relocates to a site outside of the floodplain	Loss of community
Fair compensation generally based on pre-flood market value	If not coordinated across a community, can result in “checkerboard” pattern of open space lots
An opportunity to recoup at least part of the investment lost due to flood damage	Cost to maintain land to government entity that becomes owner

# Hazard Mitigation Reference Documents

---

- *Delaware Home Owners Handbook to Prepare for Natural Hazards*, Delaware Sea Grant College Program, December 2012
  - ▶ [http://www.deseagrant.org/sites/deseagrant.org/files/product-docs/DE\\_Homeowner\\_Handbooklr.pdf](http://www.deseagrant.org/sites/deseagrant.org/files/product-docs/DE_Homeowner_Handbooklr.pdf)
- *Coastal Construction Manual (Volume I and II)*, FEMA, August 2011 (FEMA P-55)
  - ▶ <http://www.fema.gov/library/viewRecord.do?id=1671>
- *Homeowner's Guide to Retrofitting*, FEMA, December 2009 (FEMA P-312)
  - ▶ <http://www.fema.gov/library/viewRecord.do?id=1420>
- *Selecting Appropriate Mitigation Measures for Floodprone Structures*, FEMA, March 2007 (FEMA 551)
  - ▶ <http://www.fema.gov/library/viewRecord.do?id=2737>
- *Engineering Principles and Practices of Retrofitting Floodprone Residential Structures*, FEMA, January 2012 (FEMA P-259)
  - ▶ <http://www.fema.gov/library/viewRecord.do?id=1645>

# FEMA's Hazard Mitigation Grant Program (HMGP)

---

- Mitigation funding associated with declared disasters
- A percentage of total disaster funding is slated for mitigation via this program
- Hurricane Sandy (DR-4090) has some (limited) remaining mitigation funds
- 75/25 cost share

<http://www.fema.gov/hazard-mitigation-grant-program>

- Sussex County (Sub applicant) has to apply for funding through the State (Applicant) **(MIKE TO PROVIDE CONTACT PERSON?)**
- Homeowners cannot apply directly for the funding
- DNREC is working with homeowners to collect necessary grant application data
- Information will be shared with Sussex County for application development



# Questionnaire Responses

---

<b>Number of Questionnaires Distributed</b>	<b>185</b>
<b>Responses Received</b>	<b>115</b>
<b>Reports of Flooding in the Area</b>	<b>64</b>
<b>Reports of Structure Flooding</b>	<b>16</b>

# Upcoming Tasks

---

- Obtain additional questionnaire responses
- Select structures for field visits
- Determine field visit dates
- Conduct field visits

# Field Visits to Affected Structures

---

- URS Hazard Mitigation experts to conduct field visits to up to 20 structures
- Structures selected based on severity of flooding
- Purpose of field visits
  - ▶ Discuss past flood damages with homeowners
  - ▶ Discuss potential site-specific mitigation alternatives on a planning level basis
- Field visits will be scheduled by appointment over a 2-day period
- Preference for field visits



## Discussion

