# Land Subject to Coastal Storm Flowage


**Rebecca Haney**
Coastal Geologist
Massachusetts Office of Coastal Zone Management

# *Definitions/Terminology*

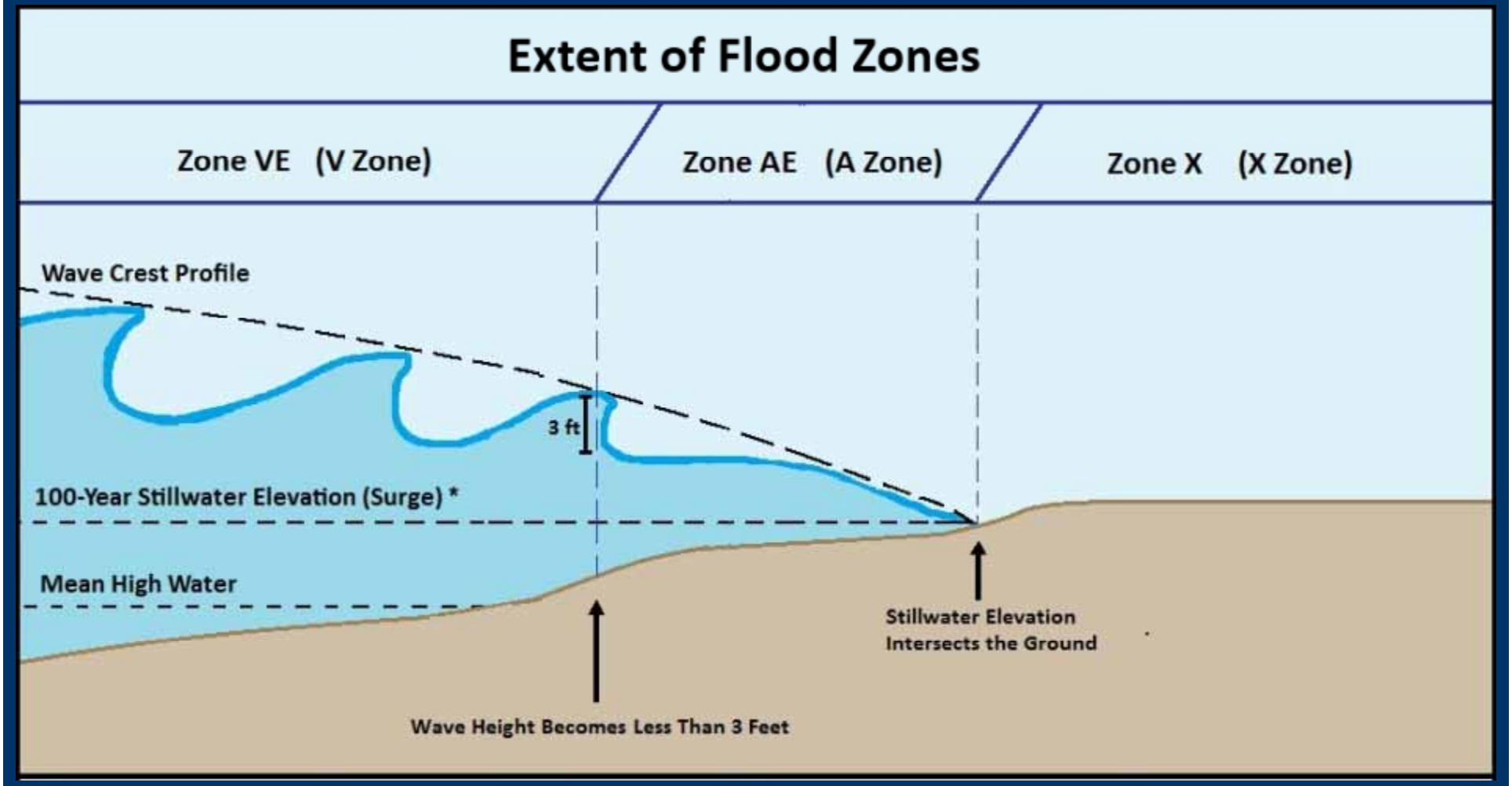
- Land subject to coastal storm flowage: means land subject to any inundation caused by coastal storms up to and including that caused by the 100-year storm, surge of record or storm of record, whichever is greater. (310 CMR 10.04)

- 100 year storm = storm having a 1% chance of being equaled or exceeded in a given year.

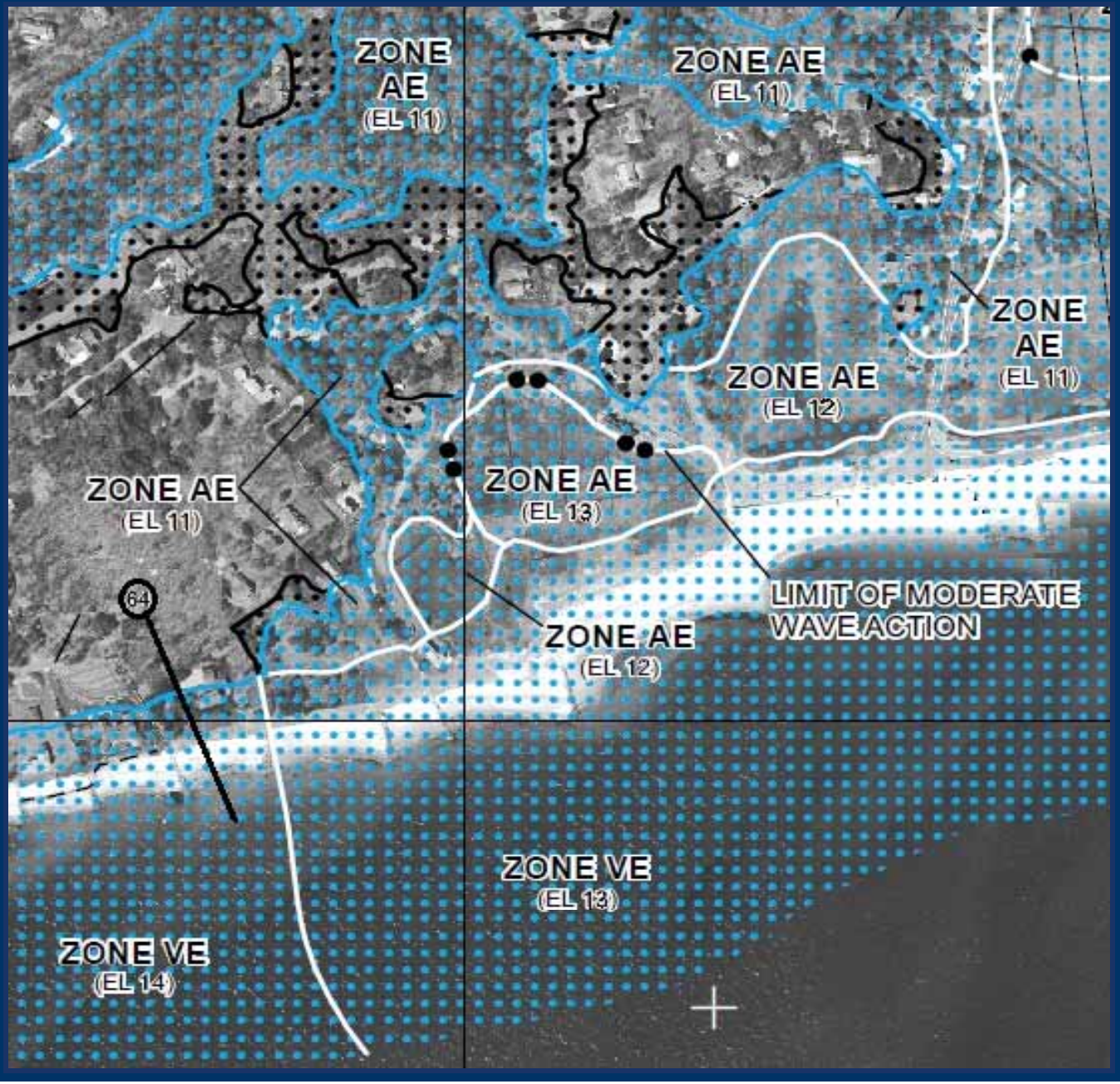
# *FEMA Flood Zone Definitions*

- **Zone VE (V1-30) – Areas of 100-year coastal flood with velocity**
  - Wave height 3 feet or greater
  - Wave runup depth 3 feet or greater
  - Within primary frontal dune (first dune landward of the beach)
- **Zone AE (A1-30) – Areas of 100-year flood; flood elevations**
  - May be coastal or riverine
  - Coastal can contain up to 2.9 feet wave height
  - Coastal flood elevations at top of wave envelope
- **Zone AO – "Overwash" areas with flow depths of 1 to 3 feet**
  - Generally coastal with sloping ground
  - Flow velocities can vary greatly
  - Flow paths are typically not well defined
- **Zone A – Areas of 100-year flood; NO flood elevations given**
- **Shaded Zone X (B) – Areas of 500-year flood**
- **Unshaded Zone X (C) – "Areas of minimal flooding"**

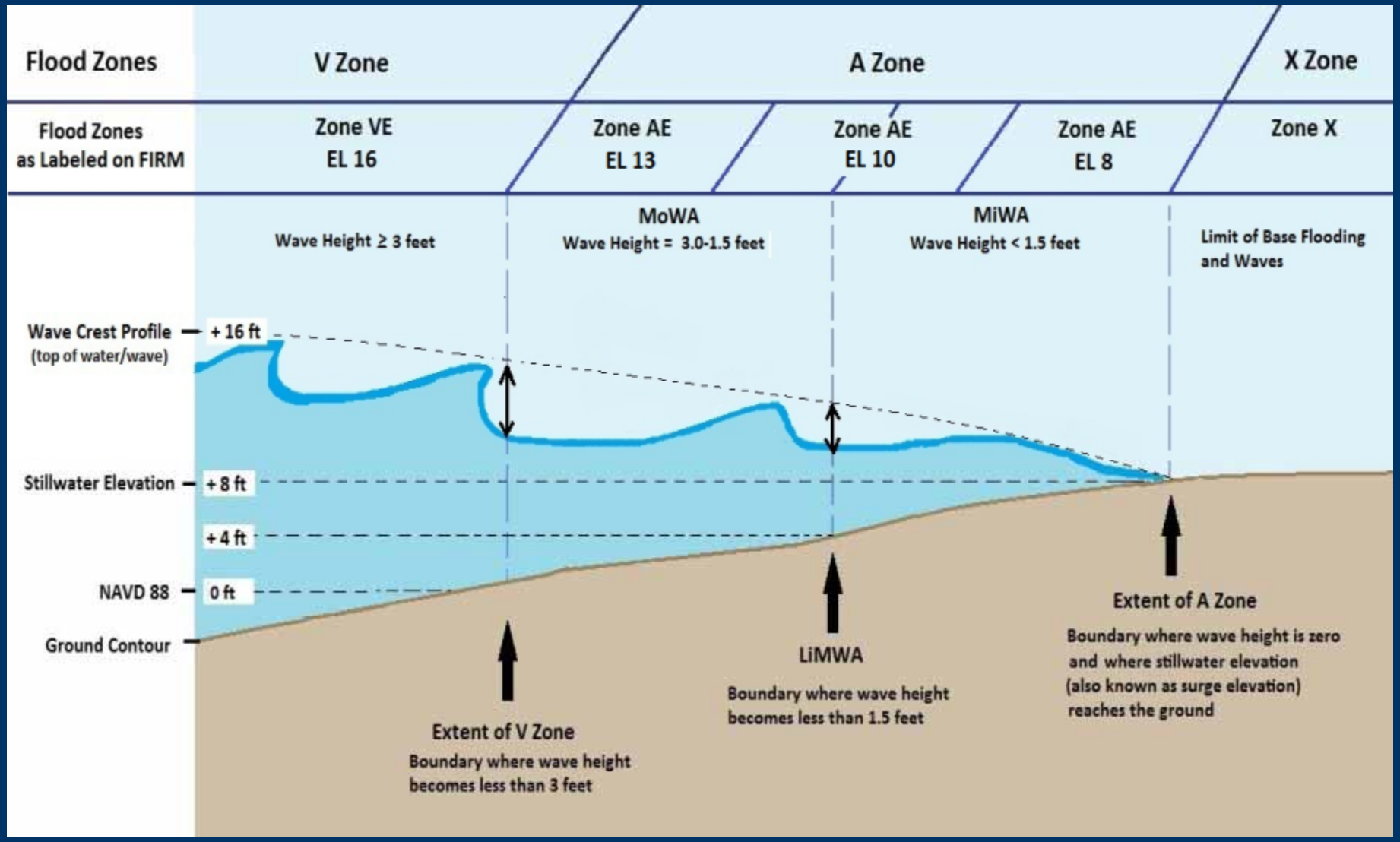
# Flood Zones on the Ground



# Flood Insurance Rate Maps

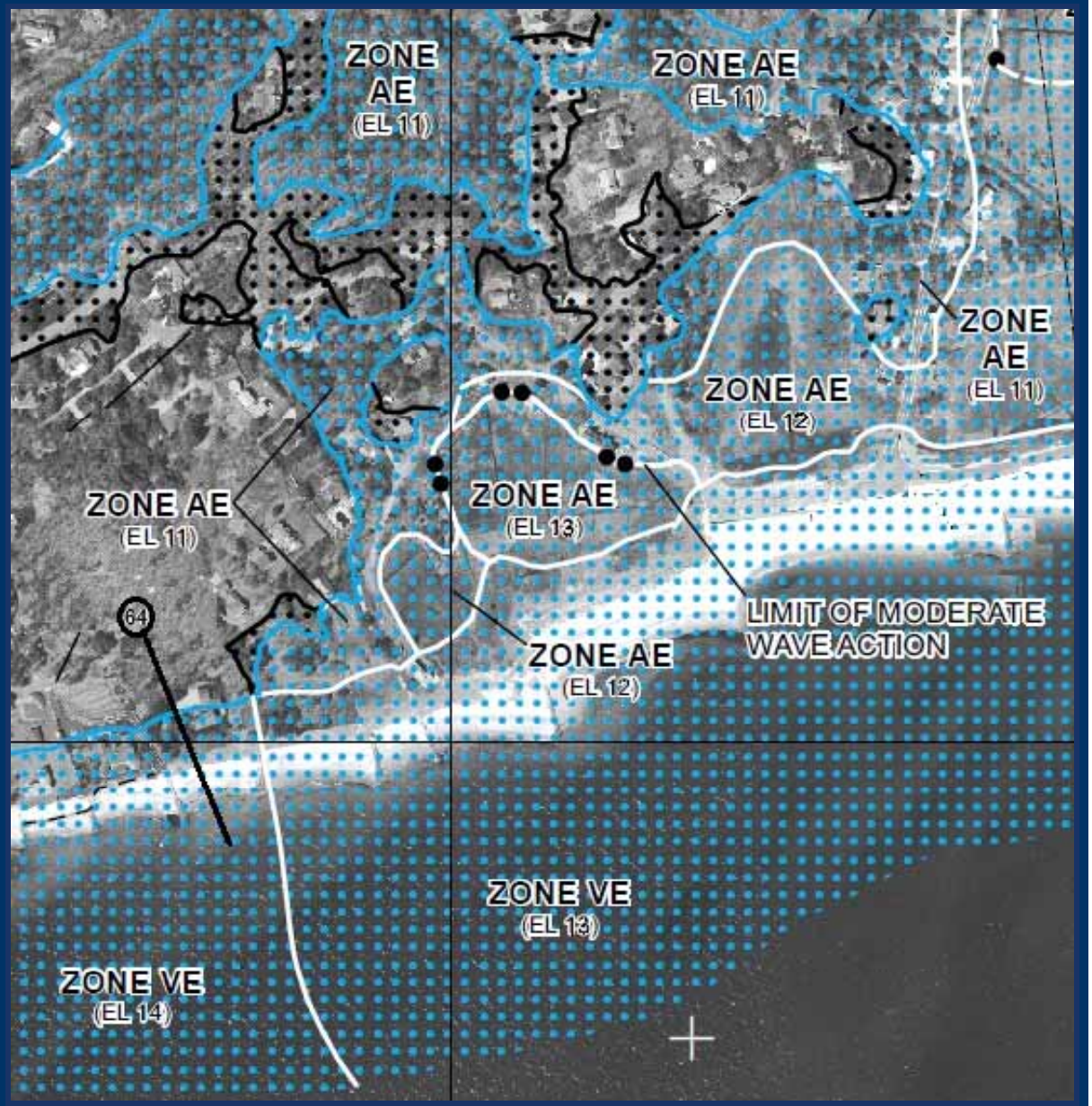


# Coastal A Zones



# General Points to Consider

- Maps are graphic representations of engineering data
- Detailed information generated only at specific transects
- Effective maps may not have all current techniques incorporated
- FIRMs do not take into account future conditions (erosion, sea level rise)



# *Impacts of Storms Extend Beyond Mapped Flood Zones on FIRMs*

- Storm of record can affect greater area than the mapped flood zones.
- More than half the buildings in NY City affected by Sandy were outside the mapped flood zones.
- 25% of all National Flood Insurance Claims are outside the mapped flood zones.

# Storm Damage

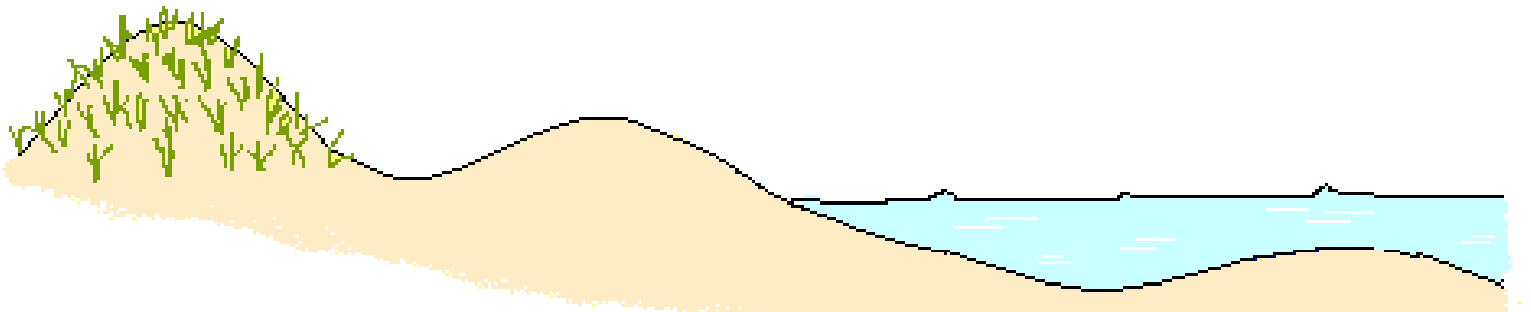
Nantucket

Plymouth

Salisbury

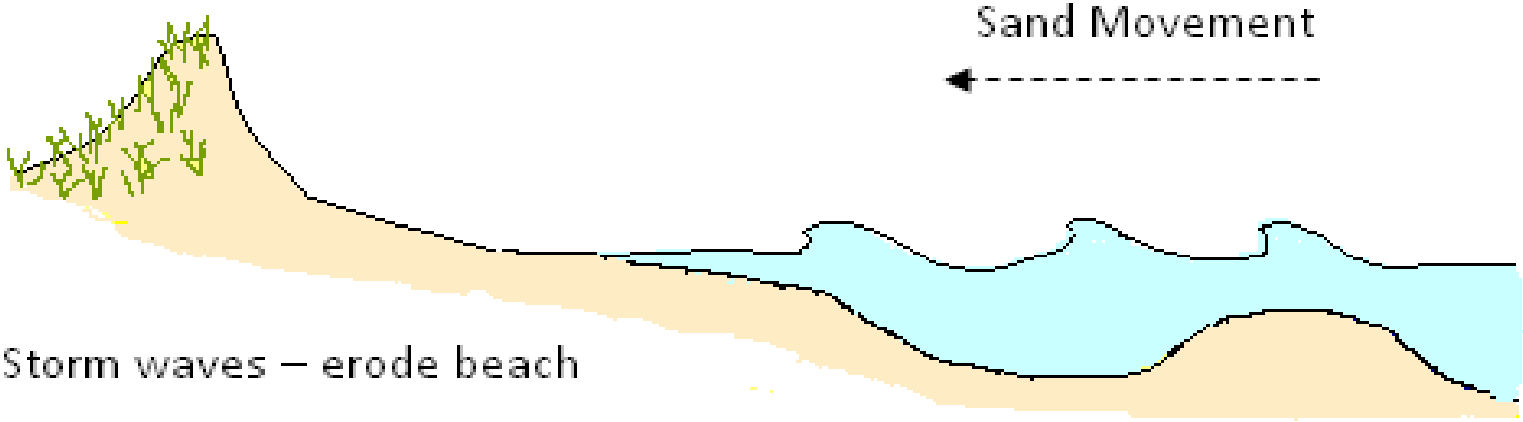
Hull

# *Function: Buffer Wave Action & Ability to Erode*



Low energy waves – build beach

Sand Movement



Storm waves – erode beach

Sand Movement

# Function: Sediment Supply

Scituate

Salisbury

Plymouth


Gosnold

## *Function: Ability to Erode, Shift, Move, Buffer Wave Action*

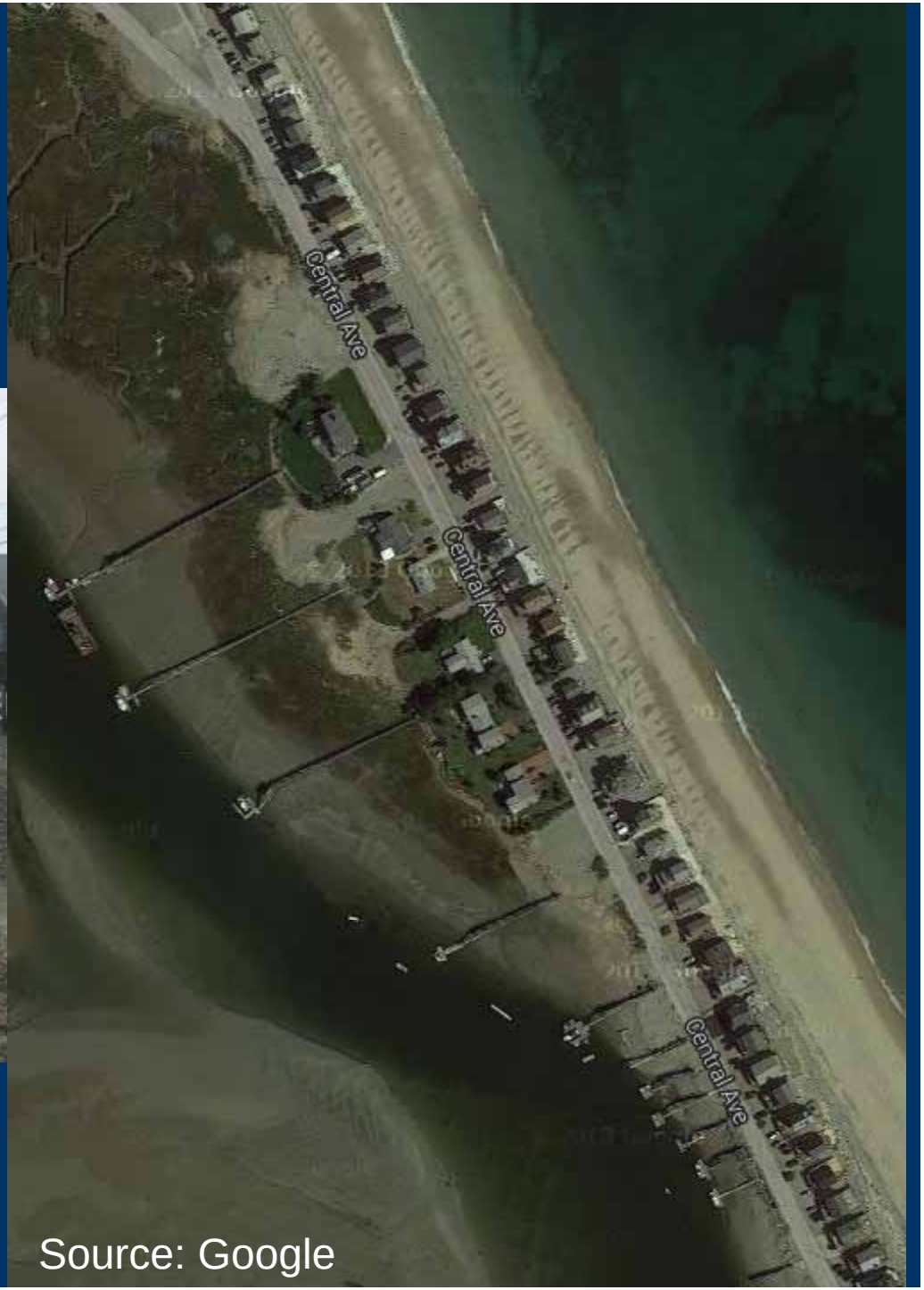
Scituate

Rockport

## *Friction Force Decreased*

# *Function: Ability to Move, Shift, Migrate, Transport Sediment*

Scituate
April, 2007

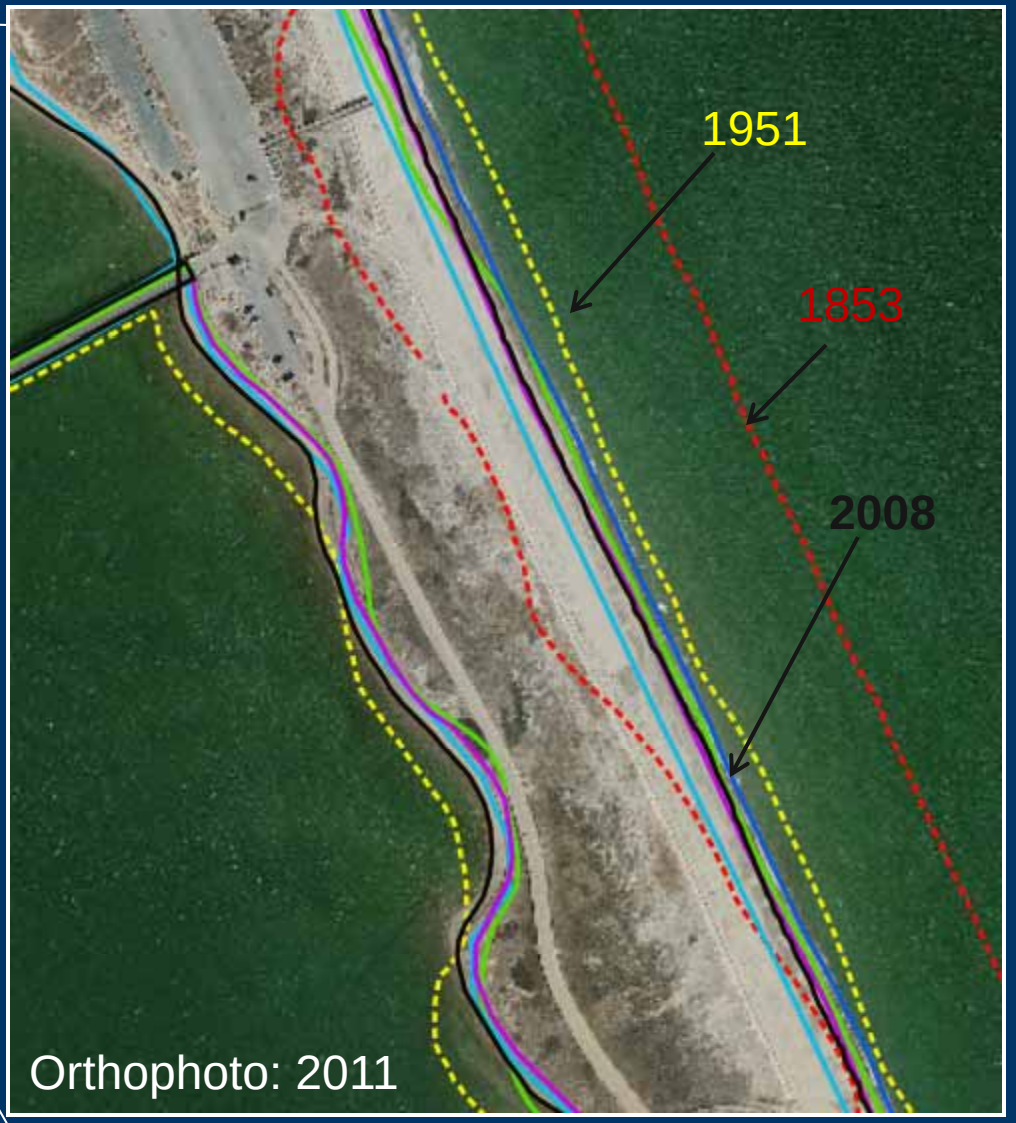



Source: Google

# *Functions: Erode, Shift, Move, Migrate Buffer Wave Action,*


Duxbury

Source: Google




Orthophoto: 2011

# Function: Buffer Flood Water

# Obstructions to Flow

# Reduced Floodplain Function


# Reduced Sediment Supply/ Increased Beach Erosion

# Damage Adjacent to Seawalls

# Impacts to Roads & Utilities


Hull


Westport


Oak Bluffs


Scituate

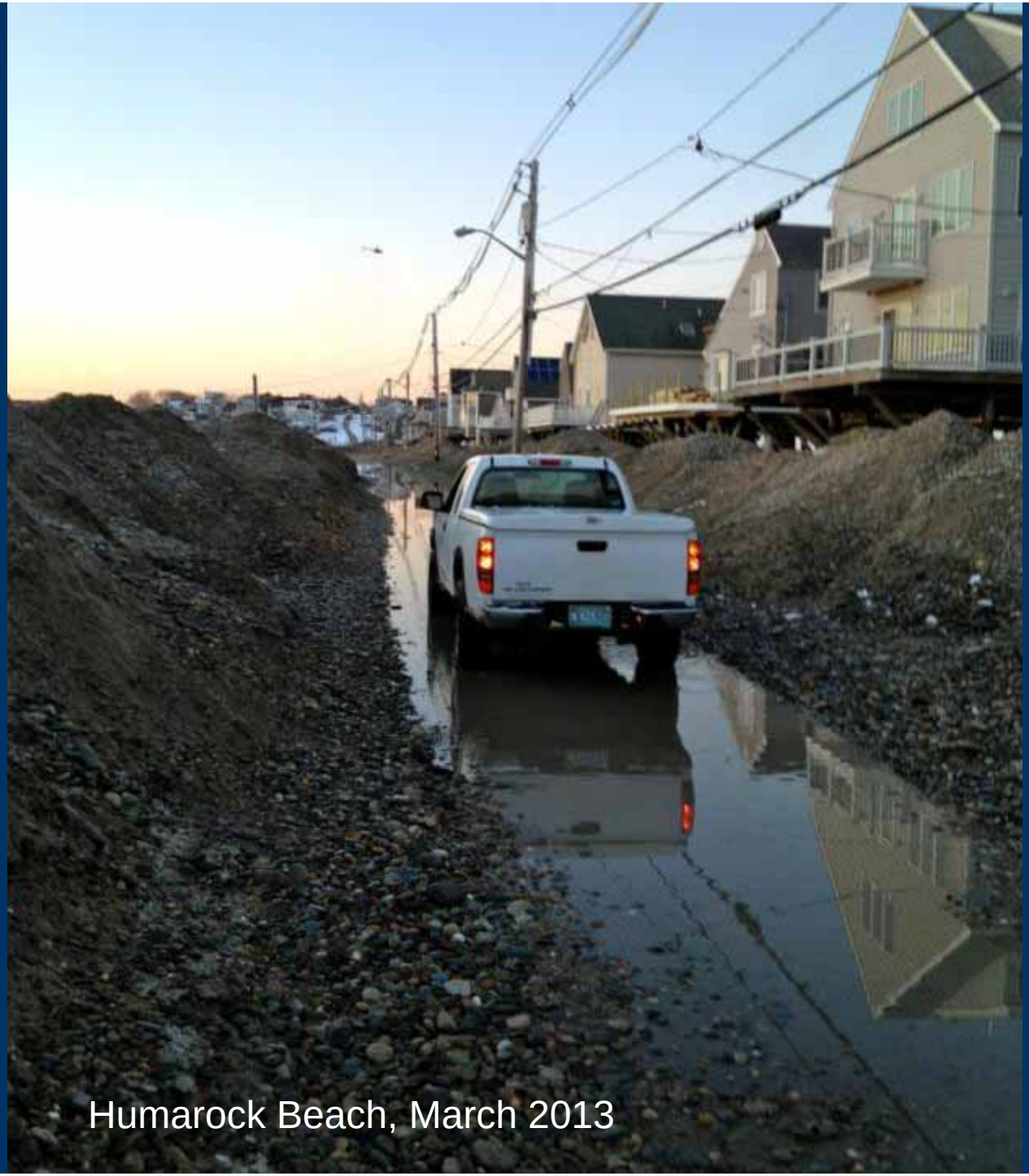
# Inundation/Moving Water




# *Impacts to Public Health & Safety*

# *Summary*

- 25% of all NFIP claims occur outside the mapped flood zones.
- Some types of land use are increasing damages to public infrastructure.
- Storm damages are increasing in lower frequency events.
- There are options to prevent this trend from continuing.



Humarock Beach, March 2013


Hull
W St
V St
U St
T St
S St
R St
Q St
Beach Ave
Cedar Ave