2017 Preliminary FEMA Flood Maps
Old Orchard Beach Town Council Meeting

Old Orchard Beach, Town Hall
July 18, 2017

RANSOM
Consulting
Engineers
and Scientists

Overview

- Potential impacts of inaccurate Flood Insurance Rate Maps (FIRM)
  Why is appealing important?

- Potential deficiencies in FEMA's analysis and mapping / Appeal Criteria

  Correctness is a matter of degree.

- Strategy for Appeal, Working with FEMA

  Dirty Mop Analogy

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Potential Impacts of Inaccurate FIRM

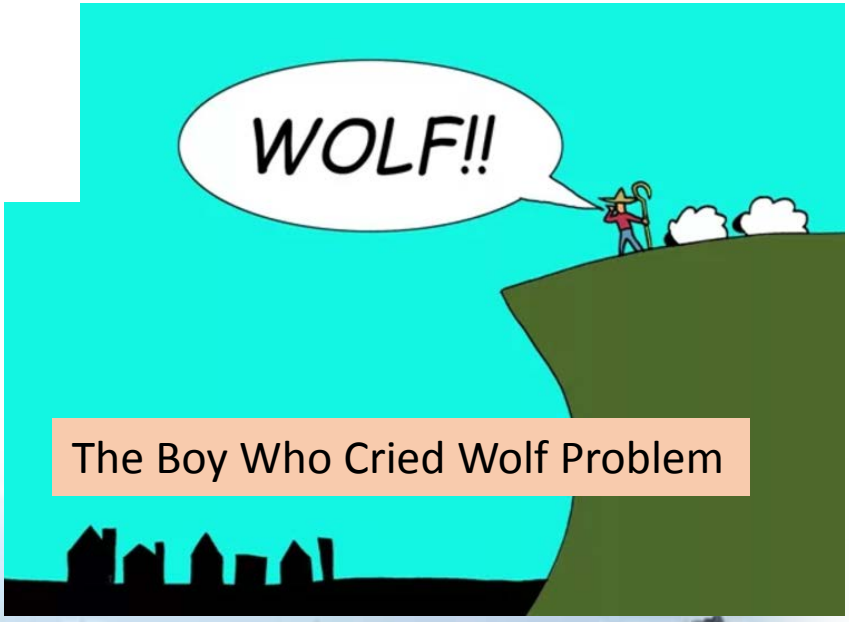
- In accuracies in the FIRM tend to overstate the flood risk (i.e the 1% chance hazard)

Table 7-4. Sample NFIP Flood Insurance Premiums for Buildings in Zone V with Obstruction Below the Lowest Floor; $250,000 Building/$100,000 Contents Coverage

Floor Elevation above BFE	Reduction in Annual Flood Premium	Annual Premium	Savings
0	0%	$ 10,071	$ 0
1 foot	22%	$ 7,901	$ 2,170
2 feet	40%	$ 6,056	$ 4,015
3 feet	50%	$ 5,076	$ 4,995
4 feet	54%	$ 4,591	$ 5,480

Direct cost to property owners

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.



The Boy Who Cried Wolf Problem

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Potential Impacts of Inaccurate FIRM

- In accuracies in the FIRM tend to overstate the flood risk (i.e the 1% chance hazard)

"Location within the flood zone with 100-year return interval lowers the average property's value by 7.8%"

- Bin, Okmyung; J.B. Kruse, C. E. Landry, 2008. "Flood Hazards, Insurance Rates and Amenities: Evidence from the coastal Housing Market", Journal of Risk and Insurance

Community	Annual Property Tax (%)
Kittery	1.605
Wells	1.006
Kennebunkport	0.828
Saco	1.942
Old Orchard Beach	1.546
Scarborough	1.592
South Portland	1.770
Harpswell	0.640

What is the cost to the community in terms of Tax Revenue?

Assuming an average property tax rate of $13 per $1,000 of assessed value:

Placing **$50,000,000 of property** into the 100-year flood will reduce community tax revenue by about **$50,000 PER YEAR!**

What is the total assessed value of property these new maps would incorrectly place within the flood zone in your community?

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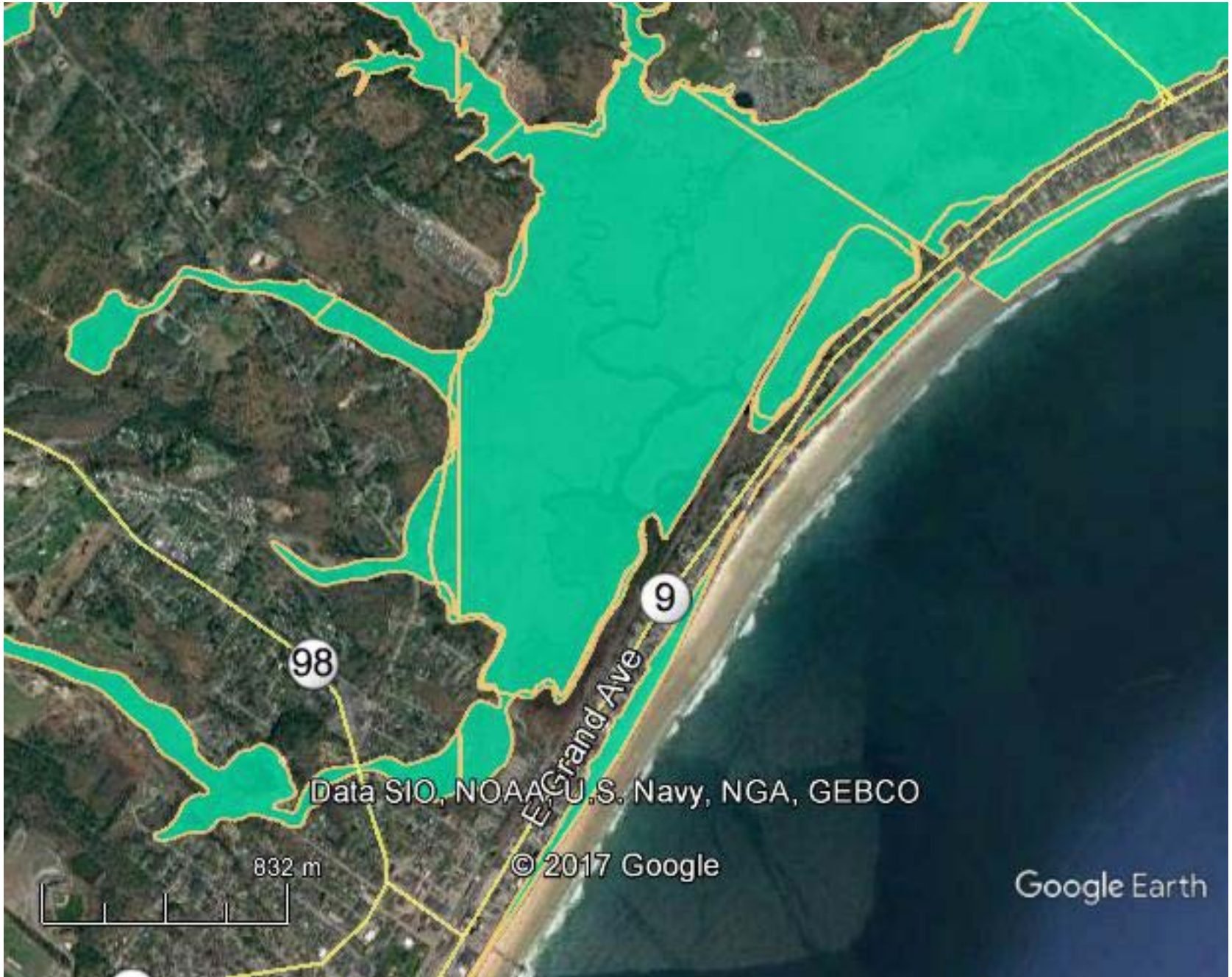
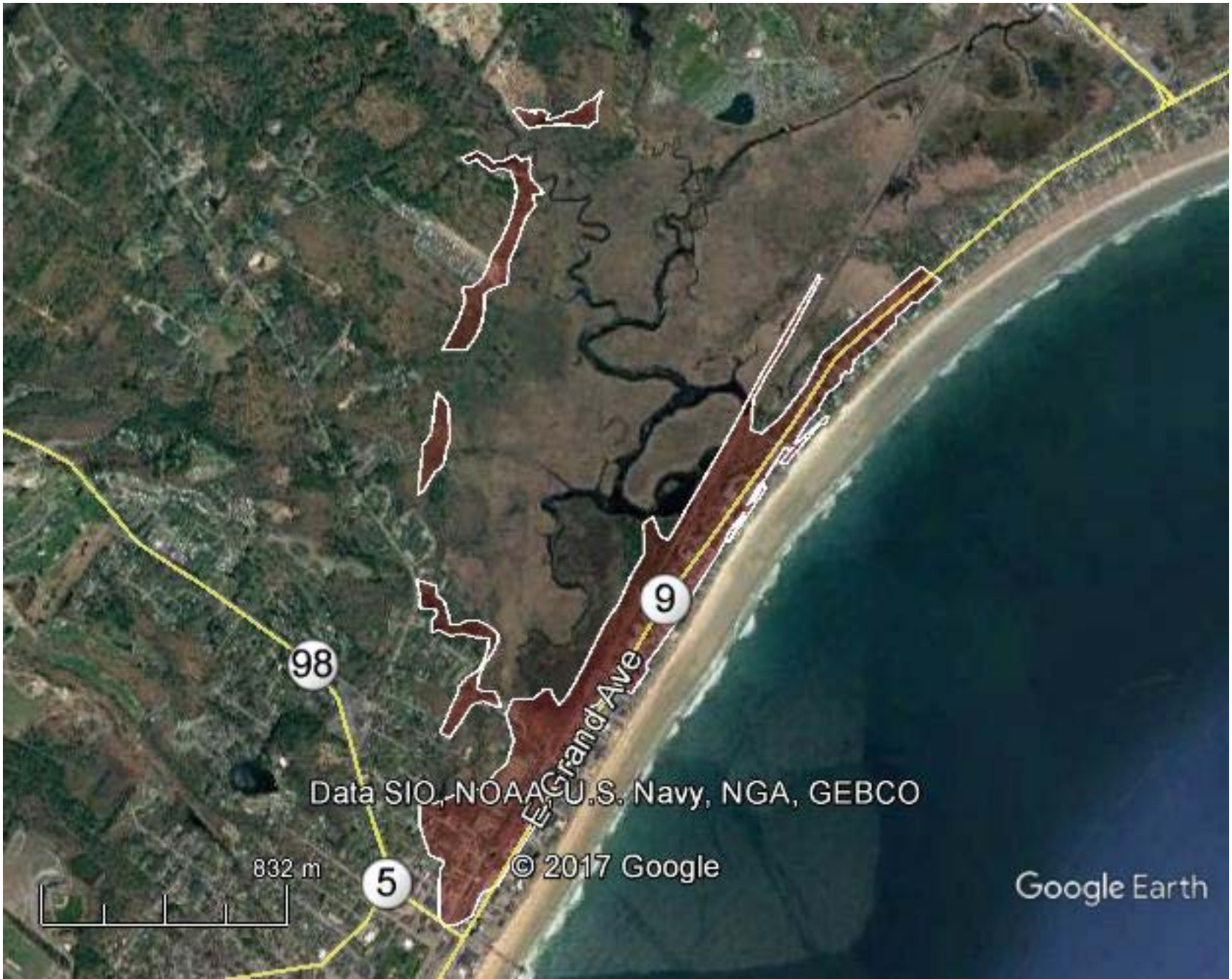
Existing Zone (approximate Q3 data)



FEMA preliminary zone

Approximate New area in zone



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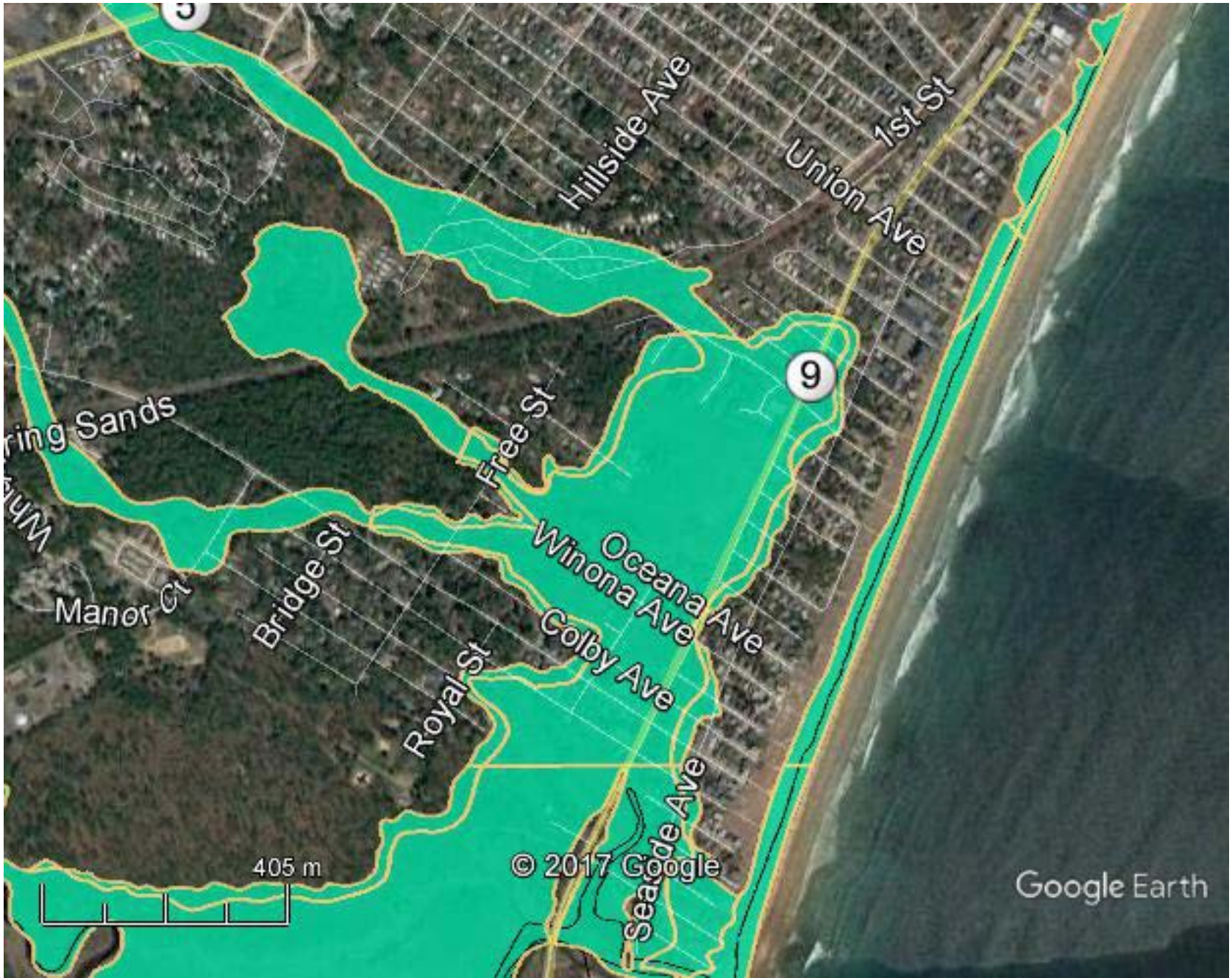
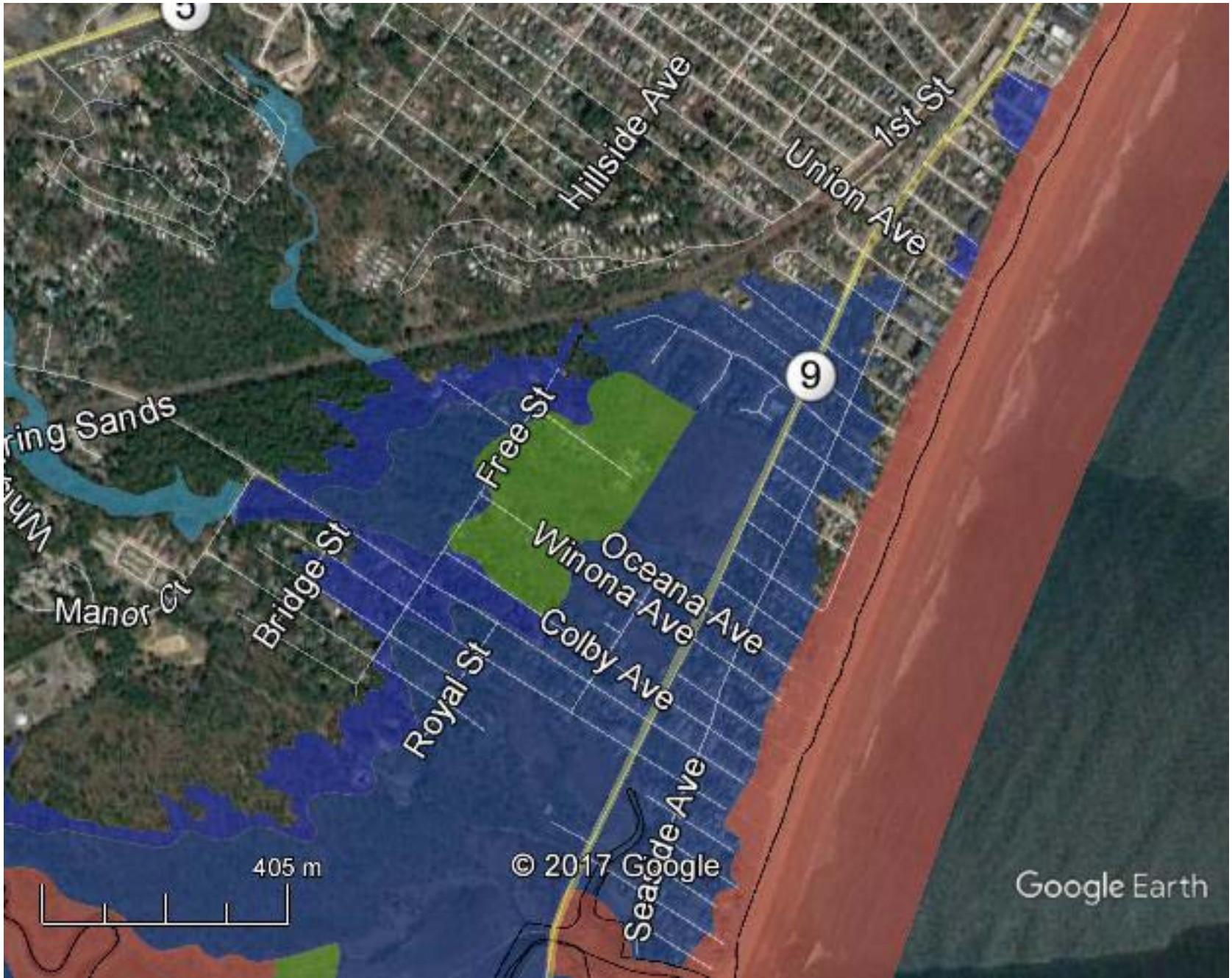


FEMA preliminary zone



Approximate New area in zone

Potential Deficiencies

What's in a BFE?

- Still Water Elevation (SWEL) - The SWEL has been determined from gauge data analysis that is described in a report prepared FEMA's contractor.
- Wave setup - The wave setup is calculated using the Direct Integration Method (DIM). The DIM determines the wave setup from a representative transect slope, deep water wave height, and deep water wave period. In some cases, if there is a structure present or a steep slope at the shoreline FEMA computes an "additional wave setup" that gets added to the result from DIM
- Total Water Level (TWL) – The TWL is the sum of the SWEL and the wave setup. The TWL may be used to set the BFE in places where the wave hazard is negligible.
- Wave run-up -Various methods are used to calculate the wave run-up depending on the shoreline type and slope. The wave run-up height is added to the SWEL (without the wave setup) to determine the BFE in cases where run-up is the dominant hazard. This is typically the case on steep shorelines. If the run-up elevation is more than 3 feet above the top of the structure or steep shoreline crest the BFE is set to 3 above the crest elevation. If the run-up is higher than the crest of a structure crest or crest of a steep slope FEMA may delineate a wave overtopping zone or wave splash zone that extends landward.
- Controlling Wave Height. The controlling wave height is determined by the WHAFIS model. The 70% of the Controlling wave height is added to the TWL to determine the BFE in locations where the overland wave crest envelope dominates the hazard. This is typically the case on flatter shorelines.

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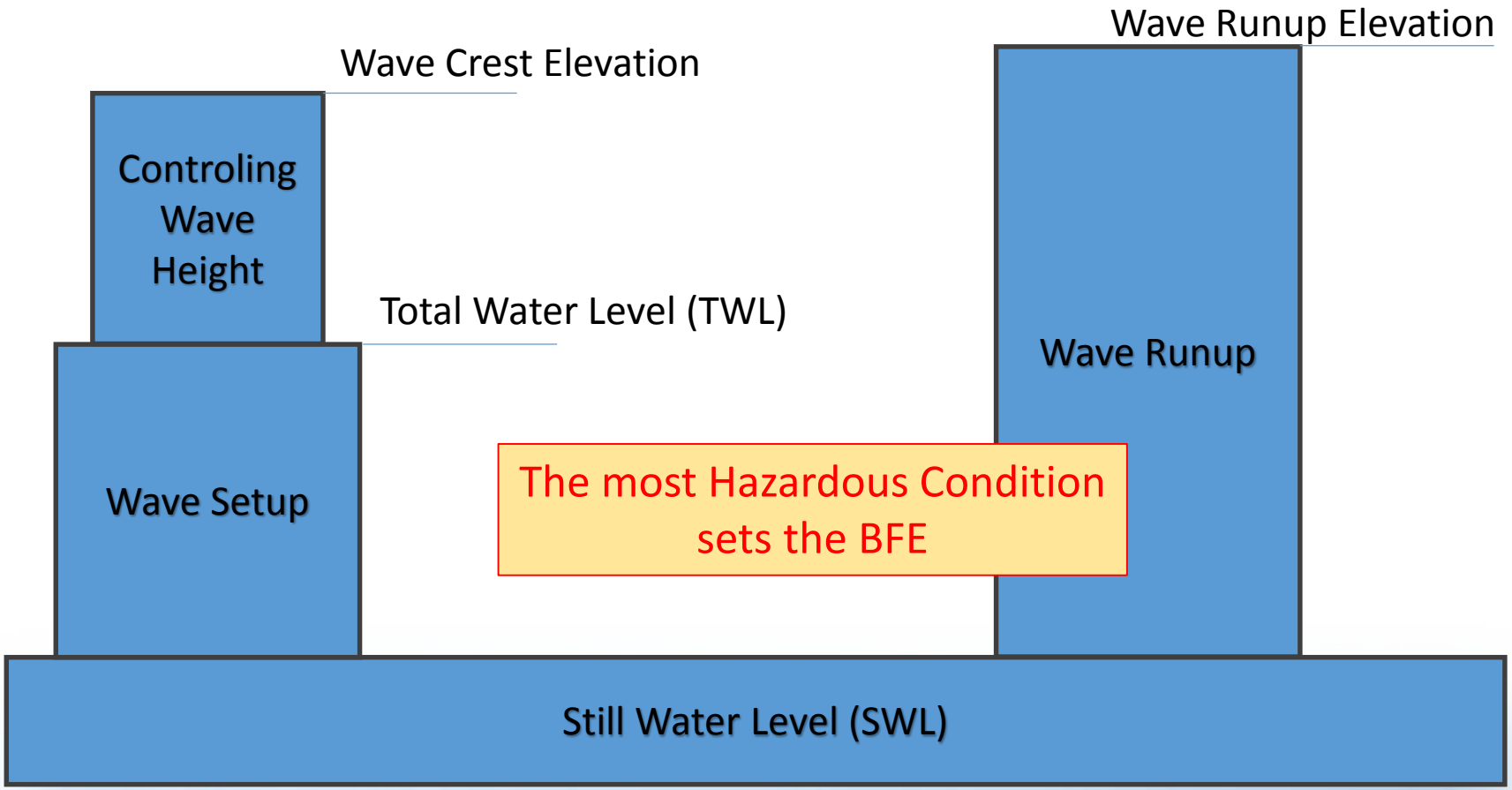
Potential Deficiencies

What's in a BFE?



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Potential Deficiencies

What's in a BFE? Wave Runup Hazard

Kennedy, Layne. 2010. September 4, 2014. http://laynekennedy.blogspot.com/2010_10_01_archive.html

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Potential Deficiencies

What's in a BFE? Overland Wave Hazard

BFE

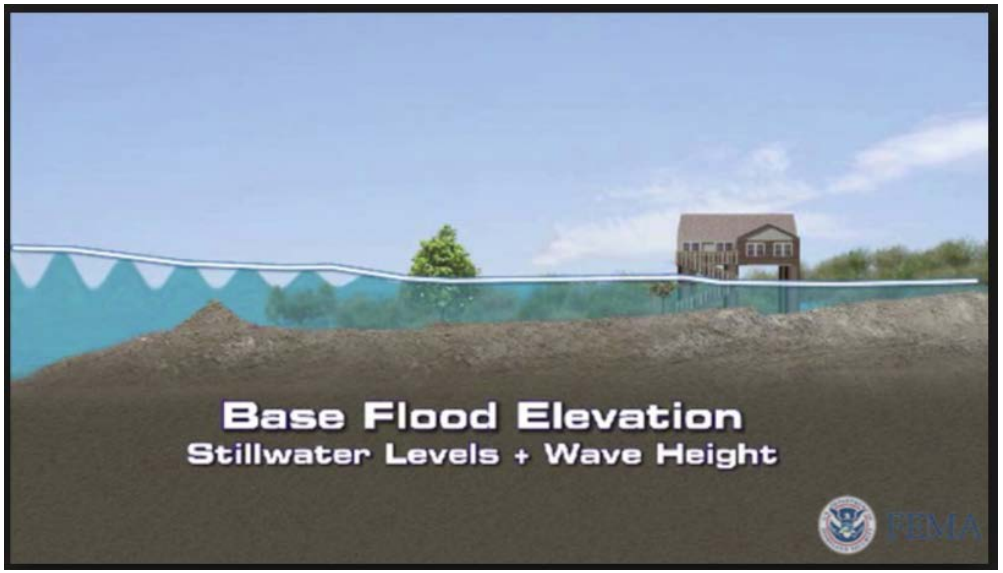
Wave Crest Elevation

Controling Wave Height

Total Water Level

Wave Setup

Still Water Level (SWL)



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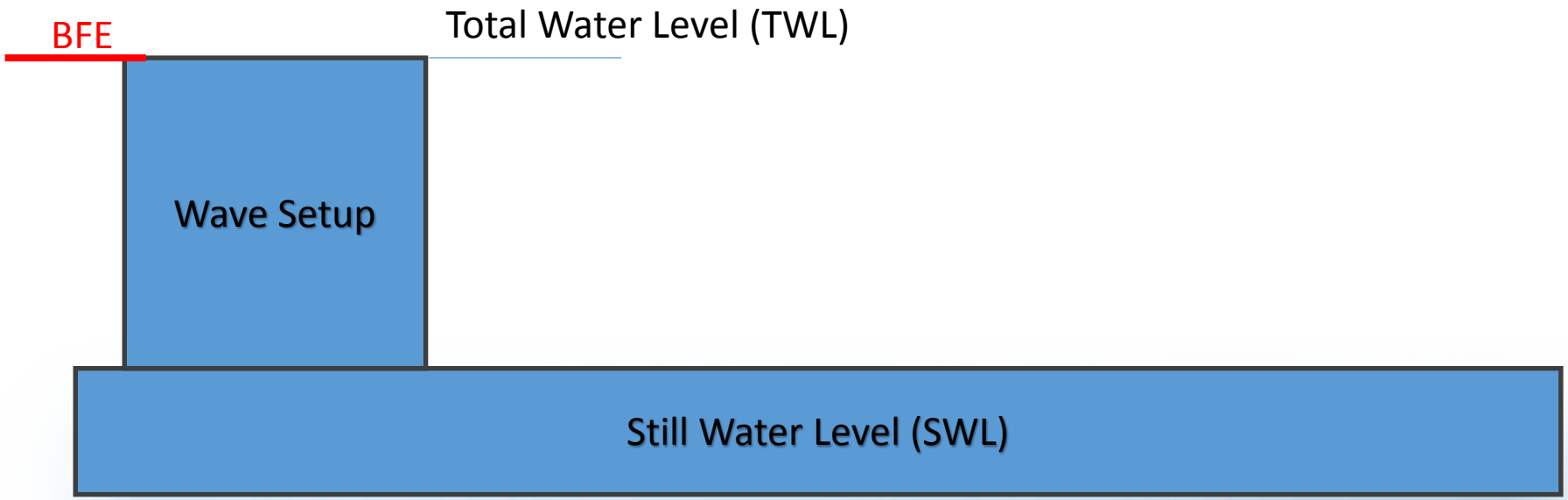
Potential Deficiencies

What's in a BFE? Negligible Waves

e.g. in sheltered estuaries, but how to determine wave setup if waves are negligible? Doesn't make physical sense. Scientific deficiency.



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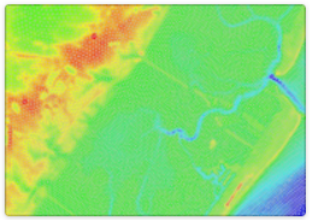
Potential Deficiencies

Analysis FEMA used for Region II (New York + New Jersey)

http://www.region2coastal.com/resources/coastal-mapping-basics/



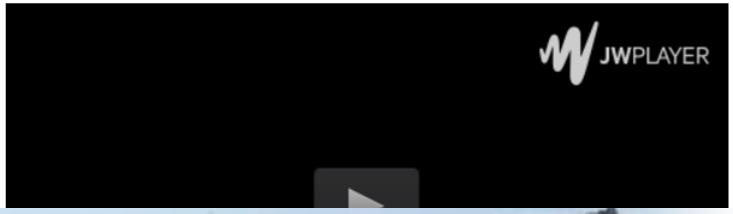
A mesh, or high resolution grid, developed when modeling storm surge

COASTAL STORM SURGE ANALYSIS

Coastal flooding is usually caused by coastal storms, including tropical storms, hurricanes, and nor'easters. *Storm surge* is the amount of water, combined with the effect of normal tides that is pushed towards the shore during a storm. The height of the storm surge is driven by many variables, such as the strength and size of the storm, and the speed and direction in which the storm moves. Using information about historical storms that have affected the area, a representative set of storm events are identified and then modeled.

Storm surge analyses for FEMA coastal flood studies are often performed using the ADCIRC (ADvanced CIRCulation) model in conjunction with the Simulating Waves Nearshore (SWAN) model. Once complete, the storm surge analysis will result in the development of **stillwater elevations** for the 1%-annual-chance flood event.

Get more information on storm surge in the Storm Surge Analysis video at FEMA.gov and the Storm Surge GIS Data fact sheet. You can also access data and summary reports for the storm surge analysis used to prepare the New Jersey/New York coastal flood study on the Find Preliminary FIRM Information page.



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Potential Deficiencies

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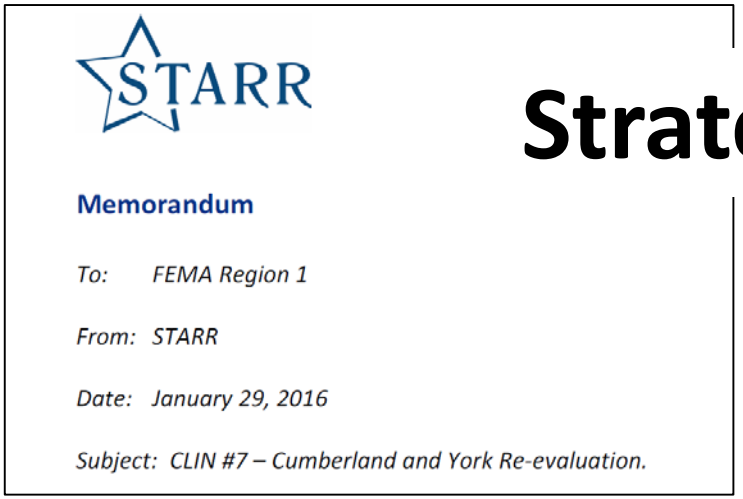
Strategy for Appeal



STARR

Memorandum

To: FEMA Region 1

From: STARR

Date: January 29, 2016

Subject: CLIN #7 – Cumberland and York Re-evaluation.

Can we get FEMA to do some of the work?

There is precedent.

"2009 - Preliminary FIRMs & Community-Submitted Data: In 2009, the 2006 coastal updates were released to the communities through the issuance of Preliminary FIRMs. In accordance FEMA's regulatory due process requirements, a 90-day Appeal Period was initiated for both counties. During this Appeal Period, several communities submitted additional data contesting the updated BFEs. This community-submitted data were largely based on newly established initial wave conditions developed from STWAVE, a two-dimensional wave transformation model."

"2012 - Risk MAP TO8: Under the coastal engineering analysis scope for Risk MAP FY11 TO8, STARR was tasked to complete the analysis for all transects with no community-submitted data using STWAVE. The intention of this effort was to have a consistent methodology for all transects within both" counties. "

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Dirty Mop Analogy

FEMA gave us a dirty with some spills on it

= 2017 Preliminary FIRM

We want a clean floor

= Accurate FIRM

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Dirty Mop Analogy

FEMA used these tools to clean the floor for Region I

Broom = DIM method for wave setup

Dirty mop water = Separated SWL + wave setup approach

Dirty Mop Analogy

+

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You can try to clean a floor with a broom and a bucket of dirty water, and you may get it a bit cleaner, but it the broom doesn't absorb water or ring out very well, and you'll end up spreading a lot of the dirt around.

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Dirty Mop Analogy

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A mop and a mop bucket work together like coupled 2D modeling of waves and storm surge to really clean the floor

We need to dump out the dirty water, fill the bucket with come clean water, and use the right tools for the job in order to get accurate FIRMS!

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Questions
&
Discussion

How can we help OOB support this effort?

Thank you for joining us today.