Appendix E

Coastal Storm Impact Analysis

Beach Lane, Wainscott, NY

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1. Executive Summary

During a meeting of the Environmental Subcommittee of the Wainscott Citizens Advisory Committee (WCAC) meeting held on November 13, 2017, FCC presented an Historical Beach Profile Analysis of the beach at the end of Beach Lane in Wainscott, NY. In response to the presentation committee members expressed a desire for FCC to provide further evaluation of impacts immediately following coastal storms in the area, specifically Superstorm Sandy and Nor'easters.

The committee provided two U.S. Geological Survey (USGS) reports on coastal storm impacts and requested that FCC evaluate the Beach Lane, Wainscott, NY region in the context of these two reports:

1. USGS, 2014, Hurricane Sandy: Observations and Analysis of Coastal Change
2. USGS, 2015, National Assessment of Nor'easter- Induced Coastal Erosion Hazards: Mid- and Northeast Atlantic Coast

These reports evaluated the shoreline with a model based on three different post storm shoreline conditions.

1. **Collision:** when the combination of storm surge and wave run-up erode the face of the dune but do not breach it.
2. **Overwash:** when the combination of storm surge and wave run-up overtop the dune in some but not all areas, leaving portions of the dune intact.
3. **Inundation:** when the combination of storm surge and wave run-up completely overtop the dune leaving little or no dune intact.

FCC findings are that in the area at and immediately adjacent to Beach Lane, Superstorm Sandy resulted in dune collision with minor dune impacts to the dune structure. Overwash occurred at Beach Lane due to low or no dune in the ~50-foot-wide road right of way. There was no inundation from Superstorm Sandy. Impacts from Nor'easters are modeled to be less than or similar to the specific results of Superstorm Sandy.

2. Location of Study Area

The location of the subject analysis is the southern terminus of Beach Lane, in the hamlet of Wainscott. Wainscott is located within the Town of East Hampton in Suffolk County, NY. Beach Lane is fronted to the south by the Atlantic Ocean, and to the east and west by developed residential properties and some agricultural land.

Figure 1: Location map for Beach Lane, Wainscott

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3. USGS- Hurricane Sandy Report: Evaluation

Evaluation of the *USGS, 2014, Hurricane Sandy: Observations and Analysis of Coastal Change* report and supporting USGS oblique photographs with reference to the Beach Lane, Wainscott, NY region has identified the following: In the immediate vicinity of Beach Lane there was some dune collision in the areas that had dunes adjacent to the Beach Lane access. The dunes east and west of Beach Lane remained more or less intact after Superstorm Sandy. This dune collision resulted in relatively minor losses to the dunes immediately adjacent to Beach Lane access when compared to the impacts Sandy had on other areas in the region. Surge from Superstorm Sandy did overwash directly at Beach Lane, where there was low or no dune fronting the area.

Superstorm Sandy impacted the Long Island area beginning on October 29th, 2012 extending until October 30th, 2012. The combination of high winds, waves, and tide surge pounded the coastline over three tidal cycles. The storm had sustained winds of 40 to 60 mph with gusts up to 90 mph. Waves and tides recorded during the storm exceeded all recorded storms in the last 20 years, including the 1992 northeast storm. The maximum wave height during Superstorm Sandy was approximately 32 feet at NOAA Buoy 44025 30 NM south of Islip, NY and the storm surge was approximately 5.6 feet above mean sea level at Montauk, NY. Superstorm Sandy was ranked as a 1 in 25-year storm in Montauk by the US Army Corps of Engineers. However, Sandy was a much more intense storm further west, registering up to a 1 in 200-year storm in New York City.

The large storm surge and wave heights that occurred with Superstorm Sandy led to inundation of the beach allowing for direct wave contact with the toe of the dune in the Beach Lane area. This wave impact resulted in dune collision characterized by loss to the toe of the dune. In the case of the immediate vicinity of Beach Lane, this dune collision resulted in loss to the toe of the dune but did not remove, overwash, or inundate the dune structure. This can be seen in Figure 2 a USGS oblique aerial photo taken on November 5, 2012 several days following Superstorm Sandy.

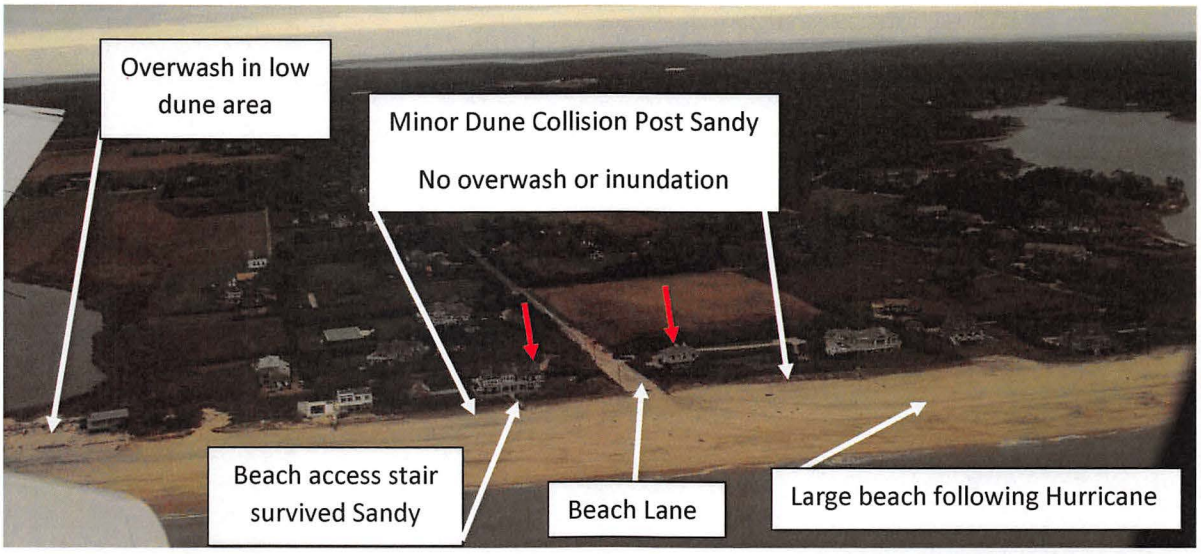

Figure 2: USGS aerial photo from November 5, 2012 post Superstorm Sandy.

In Figure 2 it can also be seen that the dunes immediately adjacent to Beach Lane did suffer some loss but the dune structure remained largely intact. Figure 2 also identifies a large wide beach following Superstorm Sandy. When the conditions of the post Superstorm Sandy beach identified in Figure 2 are compared to the USGS pre-Superstorm Sandy photos from the Beach Lane Region taken on May 20, 2009 (Figure 3) the relatively minor dune loss in the Beach Lane area can be seen in greater detail. The pre-Sandy dune was robust with the exception of the area fronting Beach Lane. These dunes resisted overwash and inundation during Sandy.

Figure 3: USGS aerial photo from May 20, 2009 pre Superstorm Sandy.

The small area at Beach Lane (~ 50 feet) was overwashed due to the low/no dune condition (Figure 4). During Superstorm Sandy there was some sand transported by the waves and storm surge approximately 300 ft. from the seaward end of the parking area north on to Beach Lane. This is a result of the lack of a dune or flood barrier at the seaward the terminus of Beach Lane. In this area elevation of the parking lot and Beach Lane is equal to the elevation of the backshore of the beach. Therefore, since there is no flood and erosion protection above beach level at the lot, and Beach Lane itself is very flat, the storm surge and waves from Sandy overwashed the beach and flowed directly into Beach Lane. Additionally, there was a dune overwash to the west of Beach Lane into Wainscott Pond. This was in an area that suffered from chronic erosion and had a low dune elevation prior to Sandy, which allowed for the overwash.

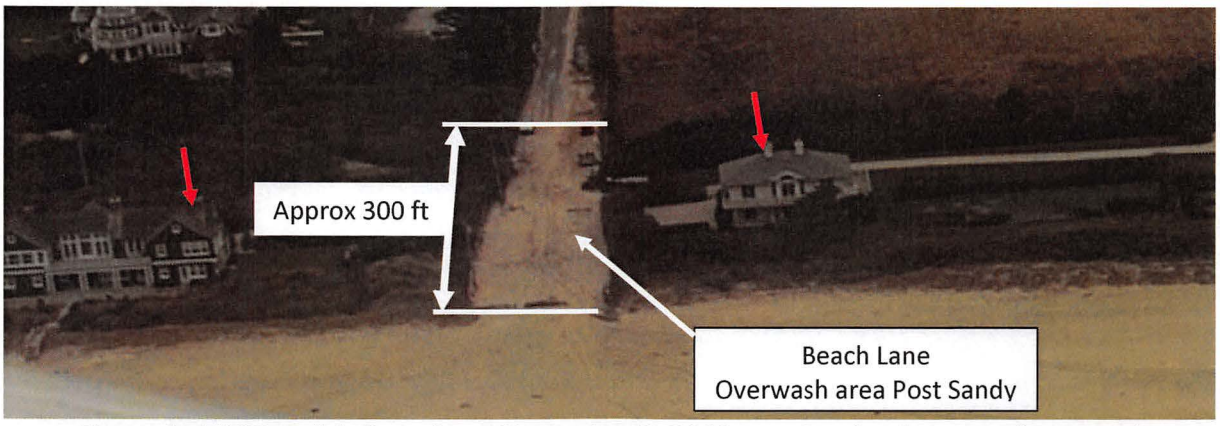

Figure 4: USGS aerial photo from November 5, 2012 post Sandy, close up of overwash.

4. USGS-Nor'easter Induced Coastal Erosion Hazard Report: Evaluation

The USGS report (*USGS, 2015, National Assessment of Nor'easter-Induced Coastal Erosion Hazards: Mid- and Northeast Atlantic Coast*) identifies the following three main responses to Nor'easter induced coastal erosion in a coastal setting:

Collision- wave action and storm surge inundate the beach and result in direct wave action at the toe of the dune that causes dune loss but the dune structure remains intact.

Overwash- wave action and storm surge inundate the beach and the dune and compromise the dune in an isolated region resulting in wave and sand transmission inland.

Inundation- wave action and storm surge completely inundate the region entirely, obliterating the dune resulting in massive regional flooding and sand transmission inland.

Comparison of the USGS storm classes (1, 2 & 3) and associated probability of collision, overwash, and inundation from Nor'easters are given in the Table below.

Description	Class 1	Class 2	Class 3	Sandy
Non- tidal Surge (m)*	.75	.90	1.38	1.7
Significant wave height (m)**	3.10	4.09	5.91	9.65
Dominant wave period (sec)**	14.81	14.81	13.79	14.81
^Probability of Collision %	42%	63%	81%	
^Probability of Overwash %	19%	33%	50%	
^Probability of Inundation %	4%	7%	12%	

*Montauk NOAA tide station 8510560
**Montauk NOAA Wave Buoy 44017
^Beach Lane, Wainscott, NY

The USGS model and application of that model to Beach Lane, Wainscott identifies that the likelihood of inundation in the Beach Lane area is relatively low even during large Nor'easter storms (4% to 12%). The threat of overwash was moderate (19% to 50%), and the likelihood of collision was high (42% to 81%).

These findings regarding Nor'easter storms agree well with the model results and actual field conditions observed during Superstorm Sandy.

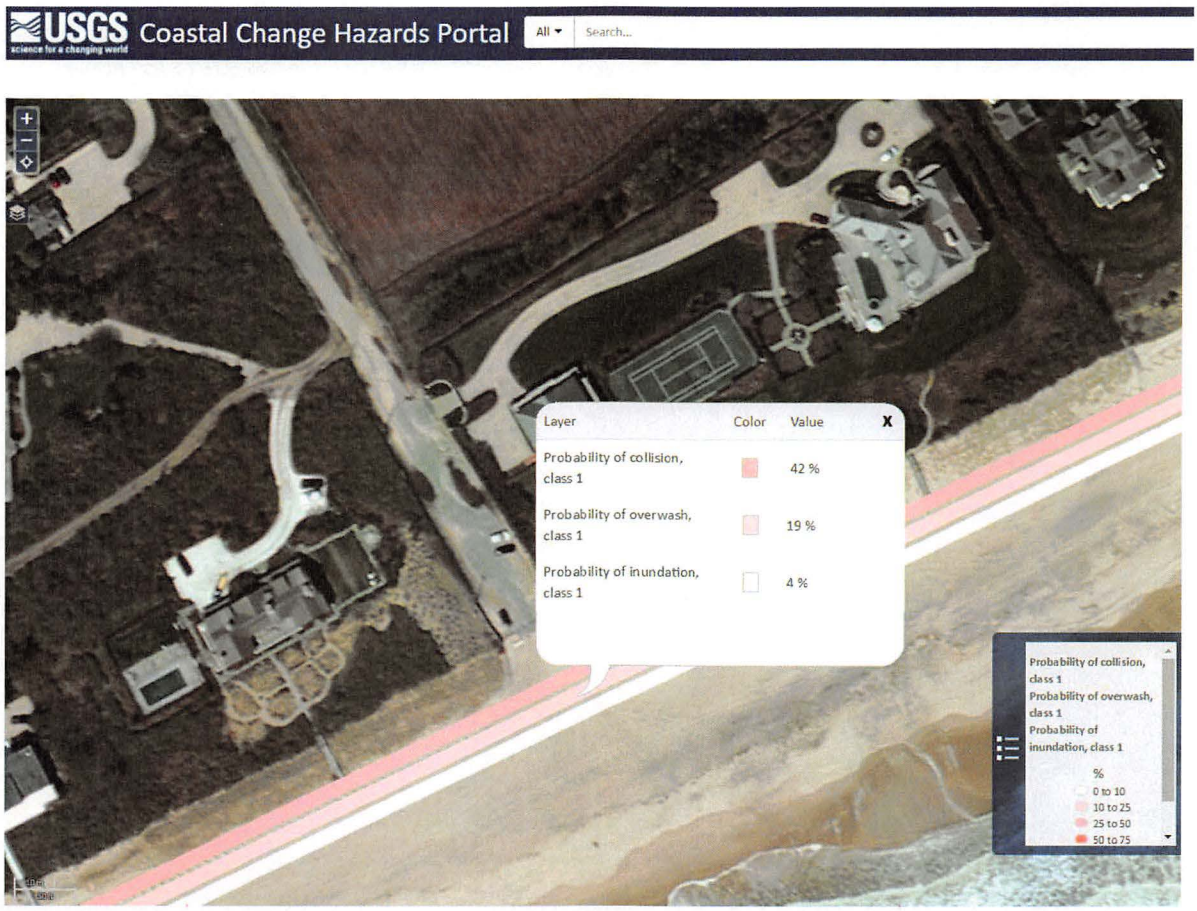

Figure 5: USGS Coastal Change Hazards Portal Class 1 percent probability of collision, overwash and inundation.

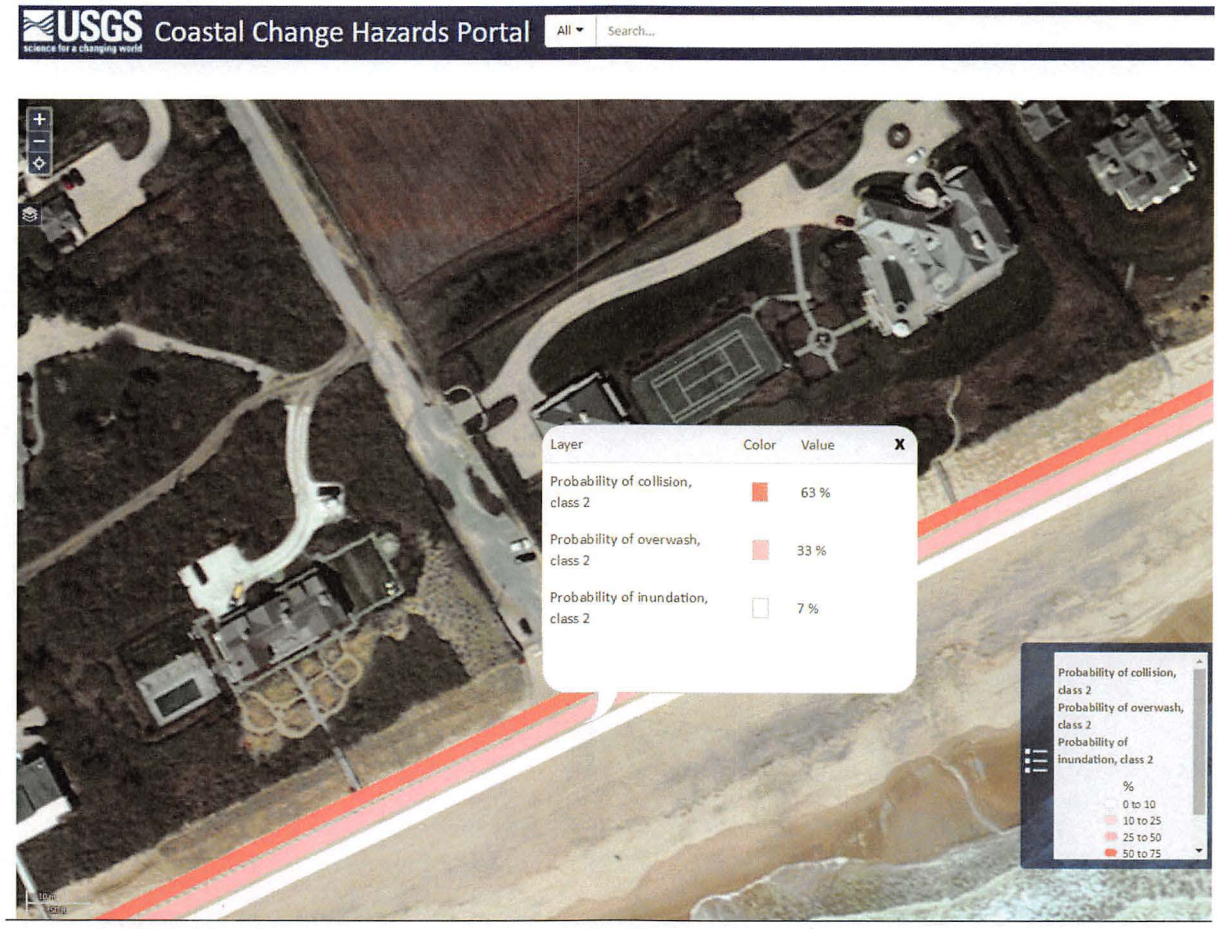

Figure 6: USGS Coastal Change Hazards Portal Class percent probability of collision, overwash and inundation.

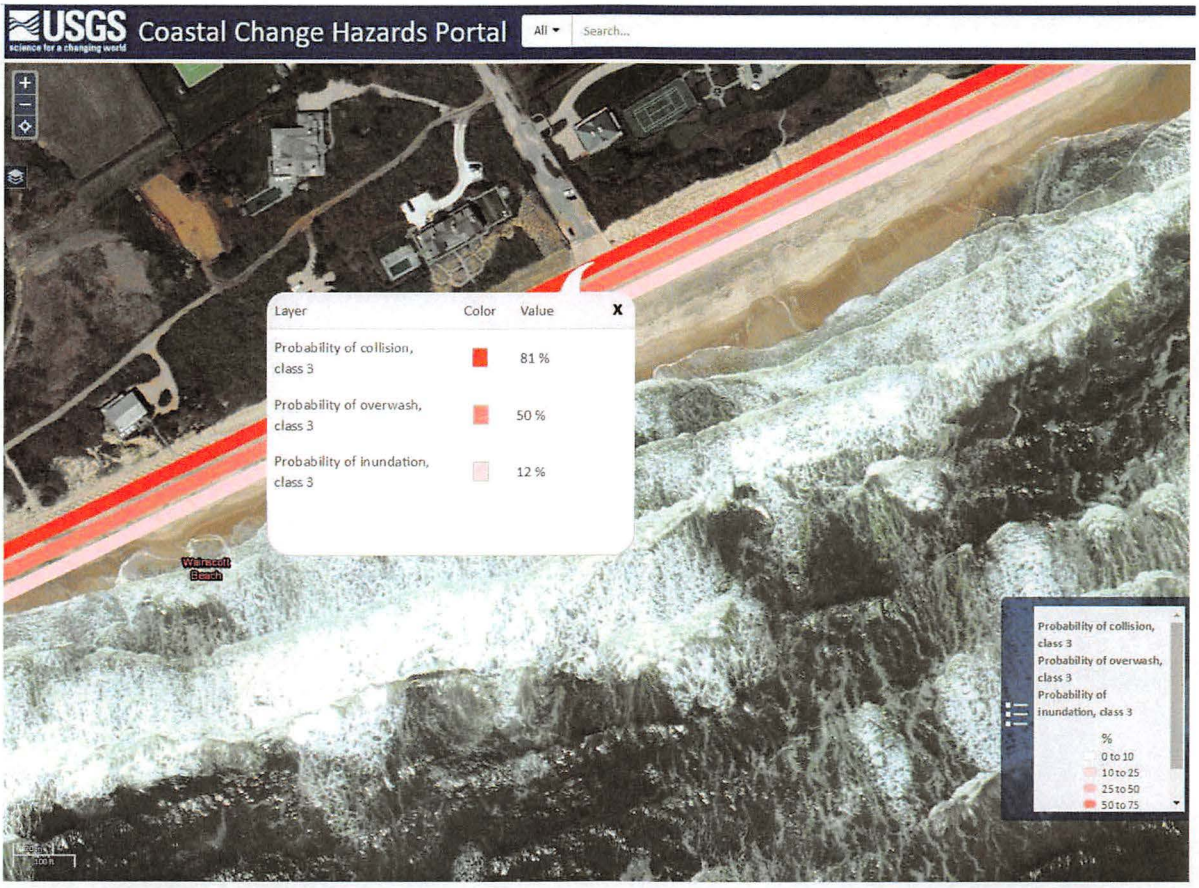

Figure 7: USGS Coastal Change Hazards Portal Class 3 percent probability of collision, overwash and inundation.

5. Conclusion

FCC has undertaken an evaluation of the two above referenced USGS reports. These reports catalog shoreline impacts according to three potential conditions:

1. **Collision:** when the combination of storm surge and wave run-up erode the face of the dune but do not breach it.
2. **Overwash:** when the combination of storm surge and wave run-up overtop the dune in some but not all areas, leaving portions of the dune intact.
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