Name _____

Laboratory Exercise: Hurricane Risk and Resilience for Staten Island, NY

PART 1. NYC Hurricane Vulnerability

What is the difference between risk and a natural hazard?

Define: Resiliency?

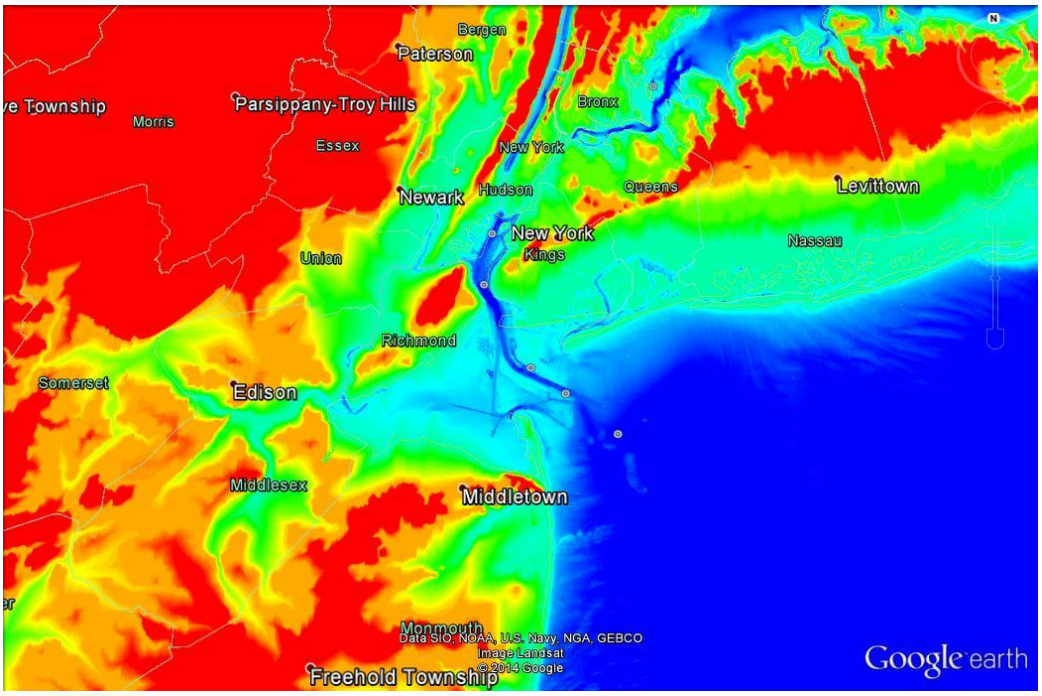

Figure 1. DEM of NYC Region Showing Right Angle in Coastline. Color scale goes from Red (40 meters above sea level and higher) to Blue (20 meters below sea level or lower). Map generated by the CUNY Interdisciplinary High-Performance Computing Center at the College of Staten Island. Base Image: 2013 Terrametrics; U.S. Navy NGA GEBCO; 2013 Google Earth.

Examine Figure 1. Why is NYC, particularly Staten Island, vulnerable for hurricane storm surge for a coast-normal hurricane into central to southern New Jersey?

Name _____

PART 2 : Staten Island – Hurricane Risk and Resiliency

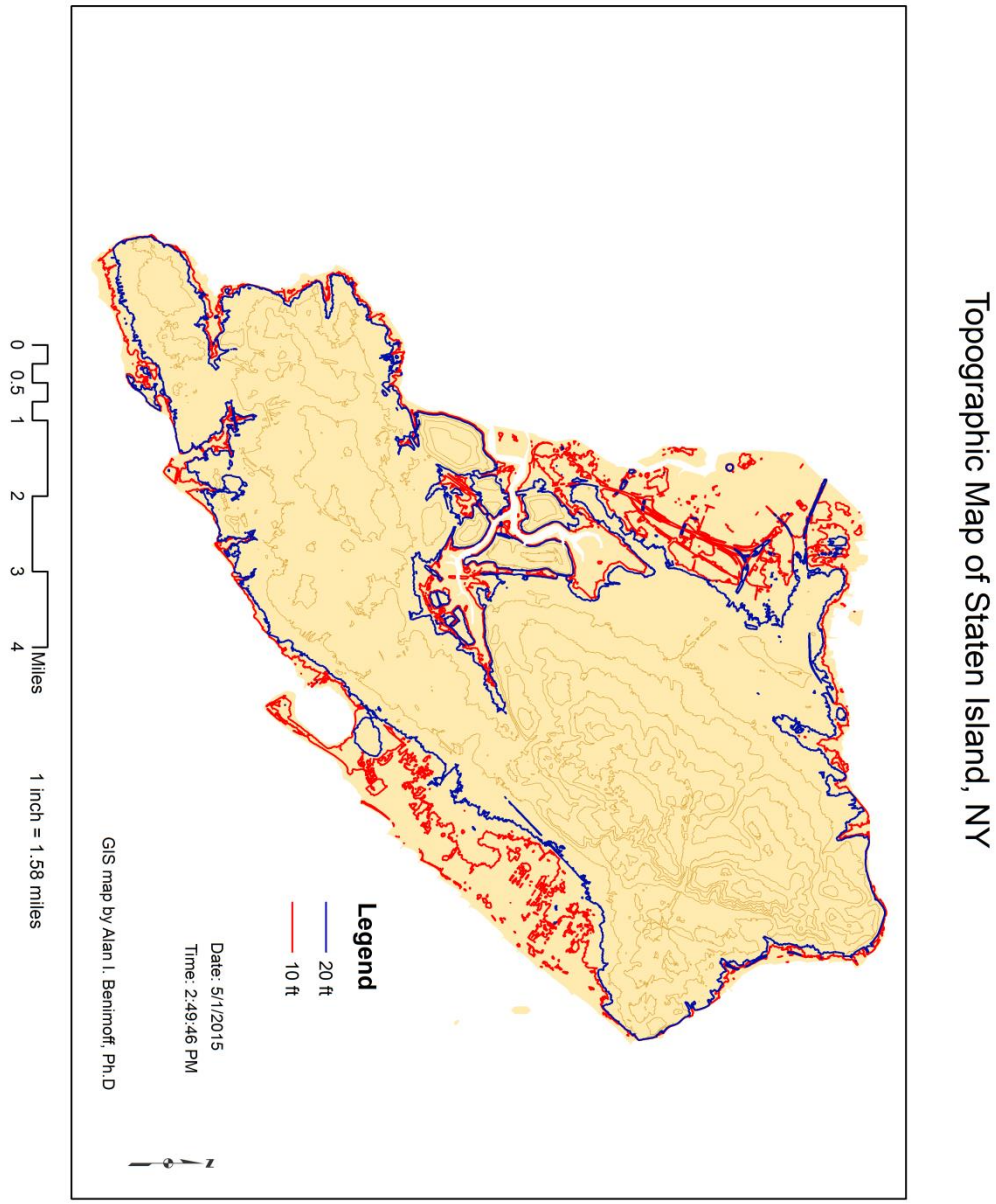

Figure 2 : Recent topographic map of Staten island showing the 10 ft (red) , the 20ft (blue) contour lines. The other contour lines (tan) are in 50 ft. increments.

Name _____

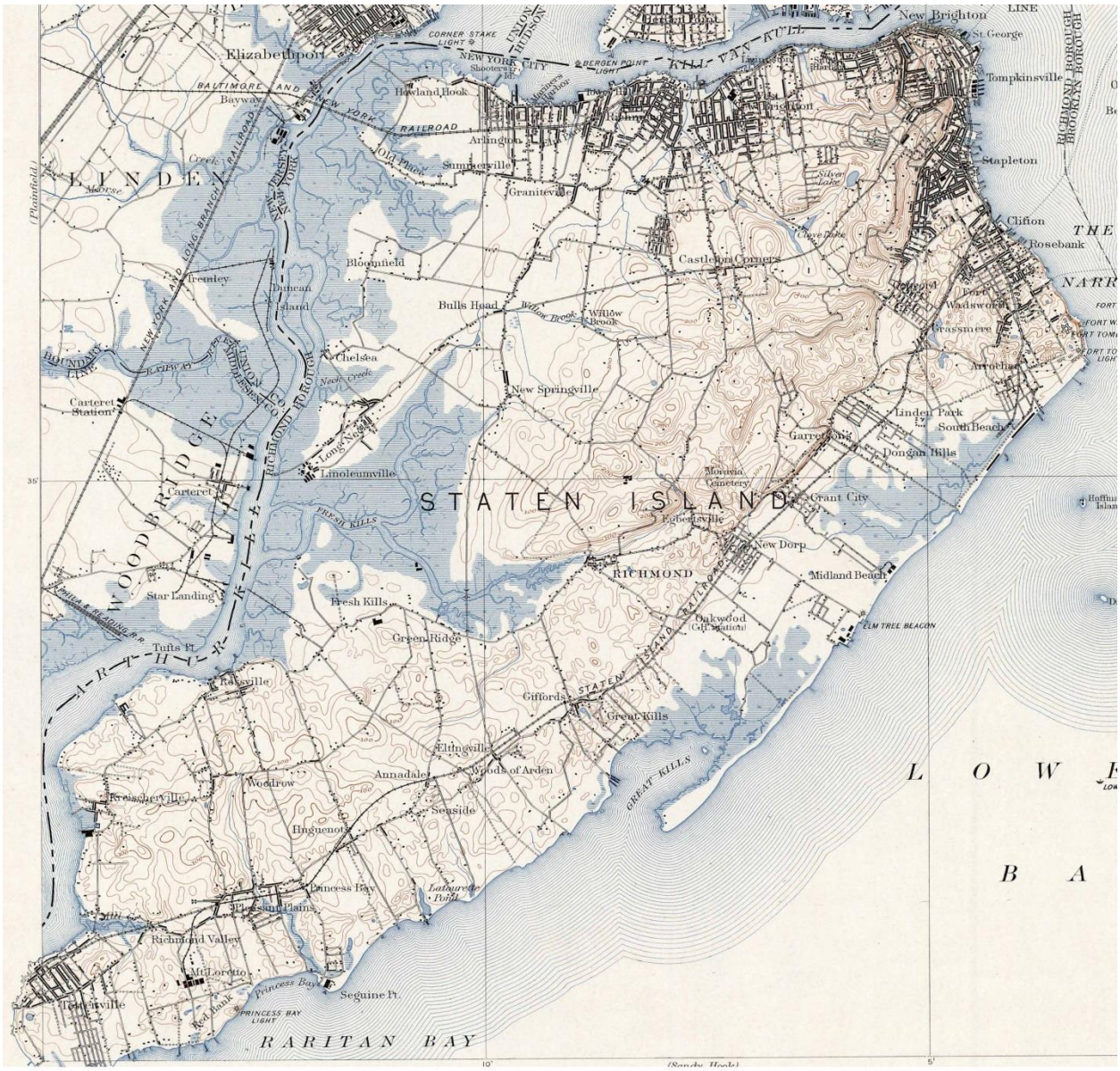

Figure 3. USGS Topographic map of Staten Island from 1902.

Name _____

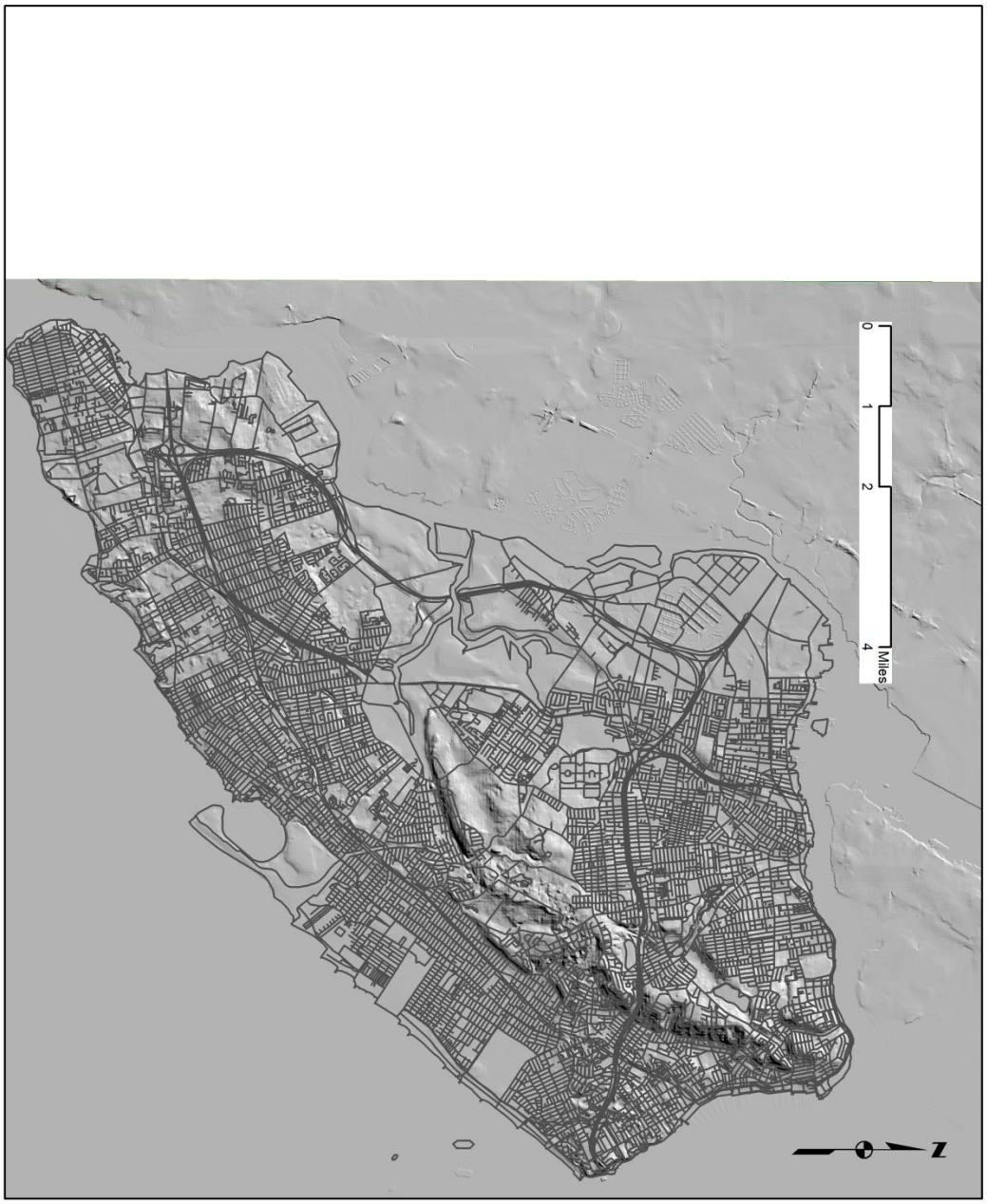

Figure 4. Lidar DEM of Staten Island.

Name _____

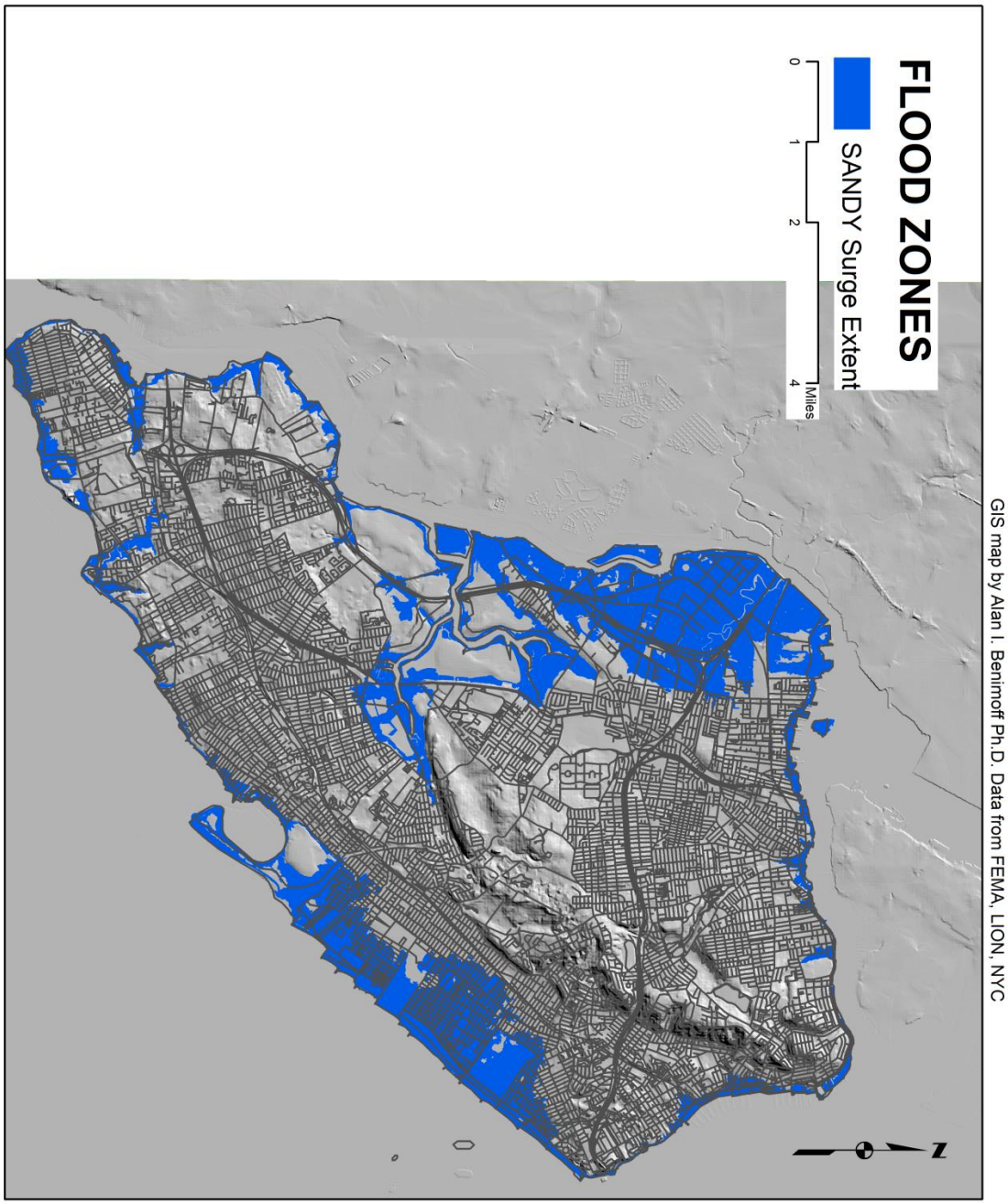

Figure 5. Lidar DEM of Staten Island with Sandy Storm Surge.

Name _____

Refer to Figures 2 and 3.

A) Which areas of Staten Island received the greatest surge extent from Hurricane Sandy? Why?

B) Compare and Contrast the surge extent on the North shore with the South Shore.

Use the FEMA damage Assessment Maps (Figures 6 and 7.) and the figures s 2, 3, 4 and 5. Explain the distribution of damaged and destroyed buildings after Hurricane Sandy.

Name _____

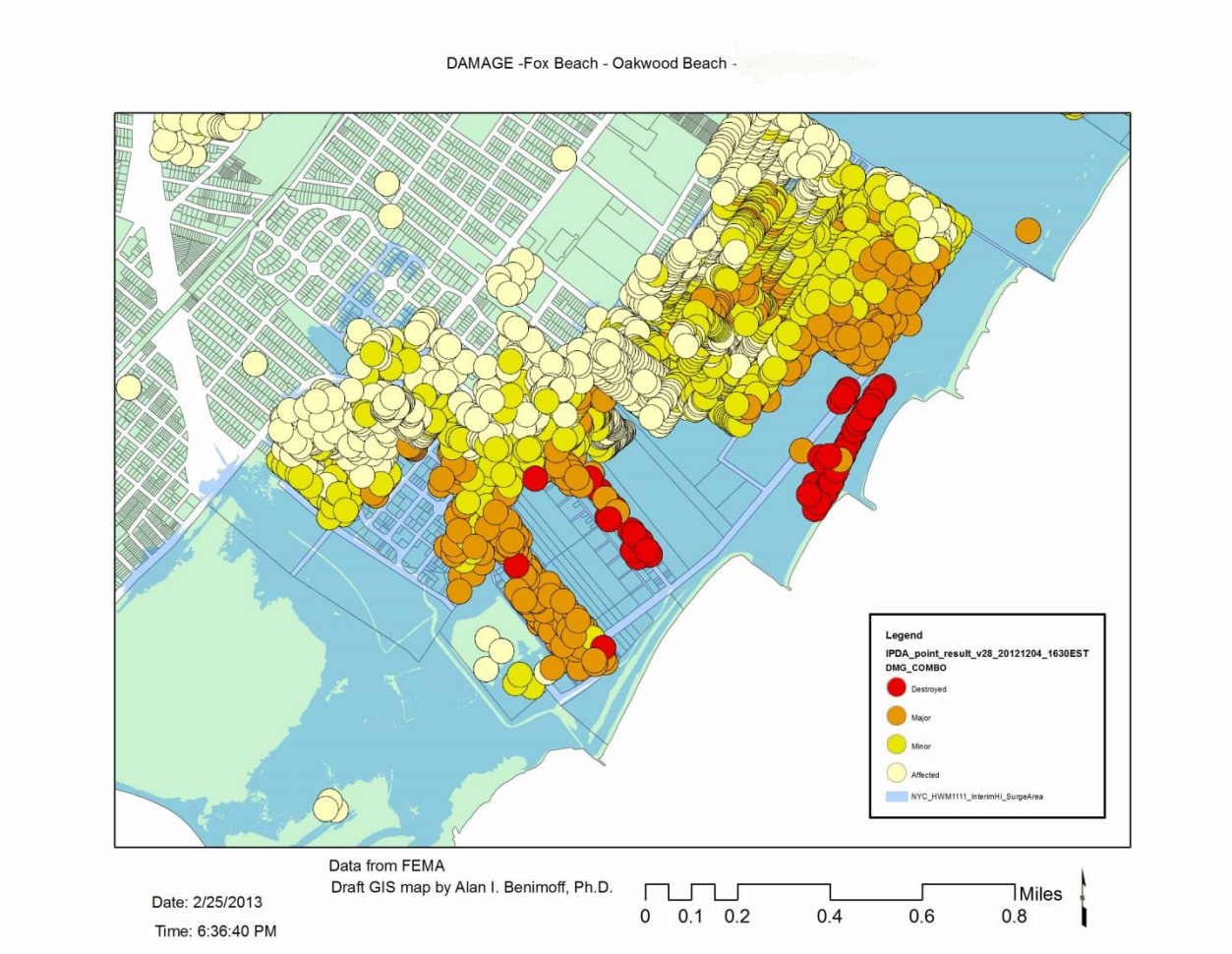

Figure 6. Map of Fox Beach – Oakwood Beach showing FEMA damage assessments

Name _____

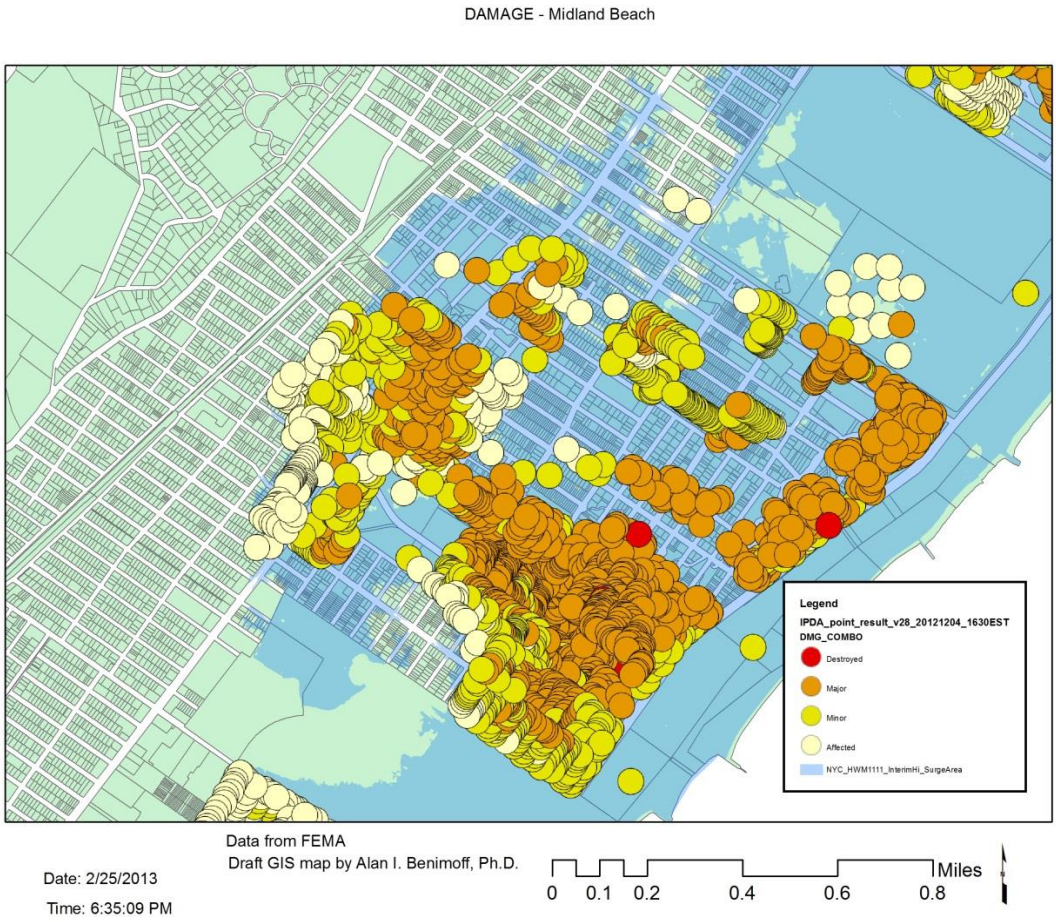

Figure 7. Map of the Midland Beach Area showing FEMA damage assessments for Sandy.

Name _____

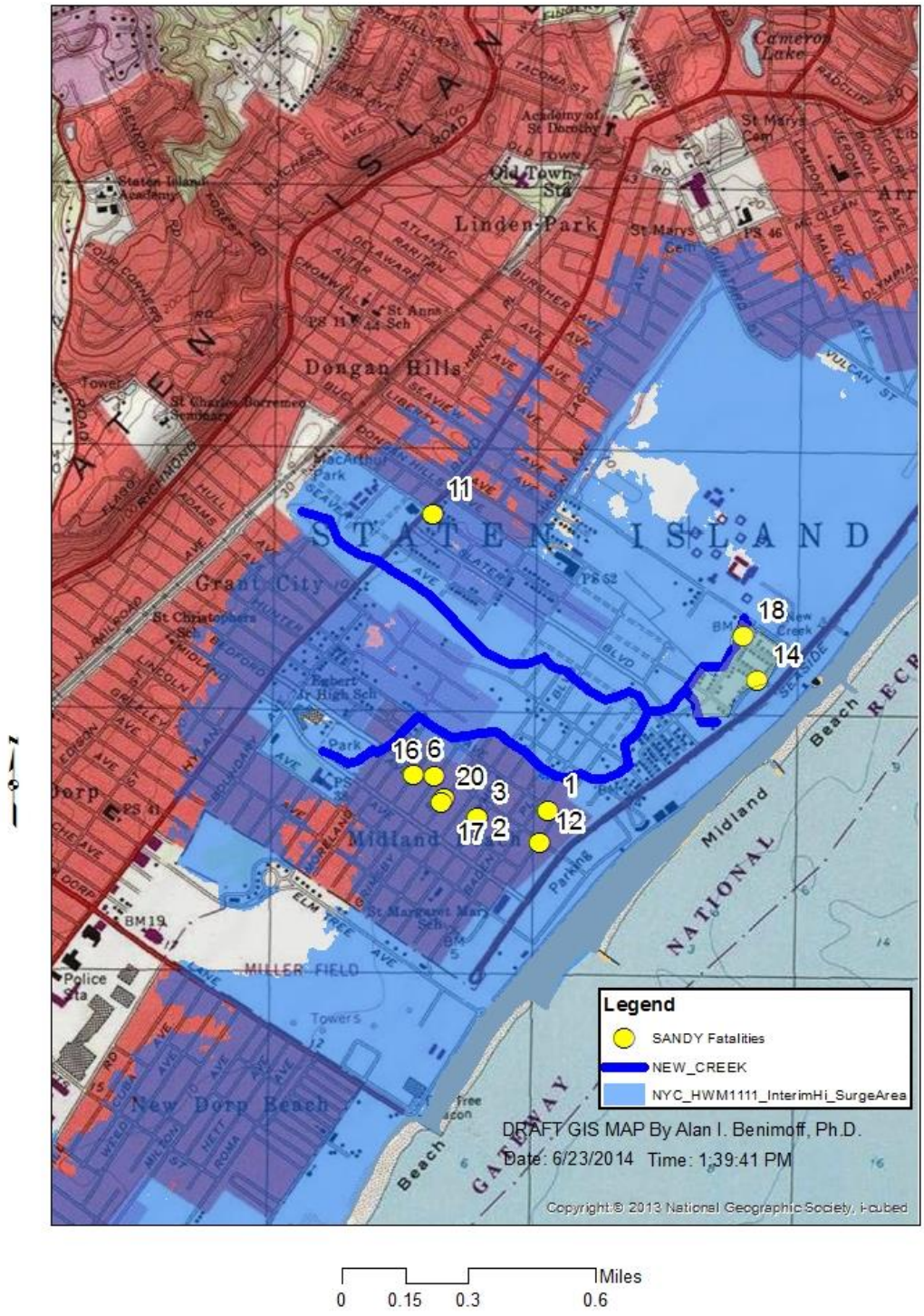

Figure 8. Map showing some Sandy fatalities and Sandy storm surge extent.

Name _____

Refer to Figure 3. Why do you think there were 11 of the 23 fatalities in this area?

Why did the storm surge extend to the railroad in Grant City?

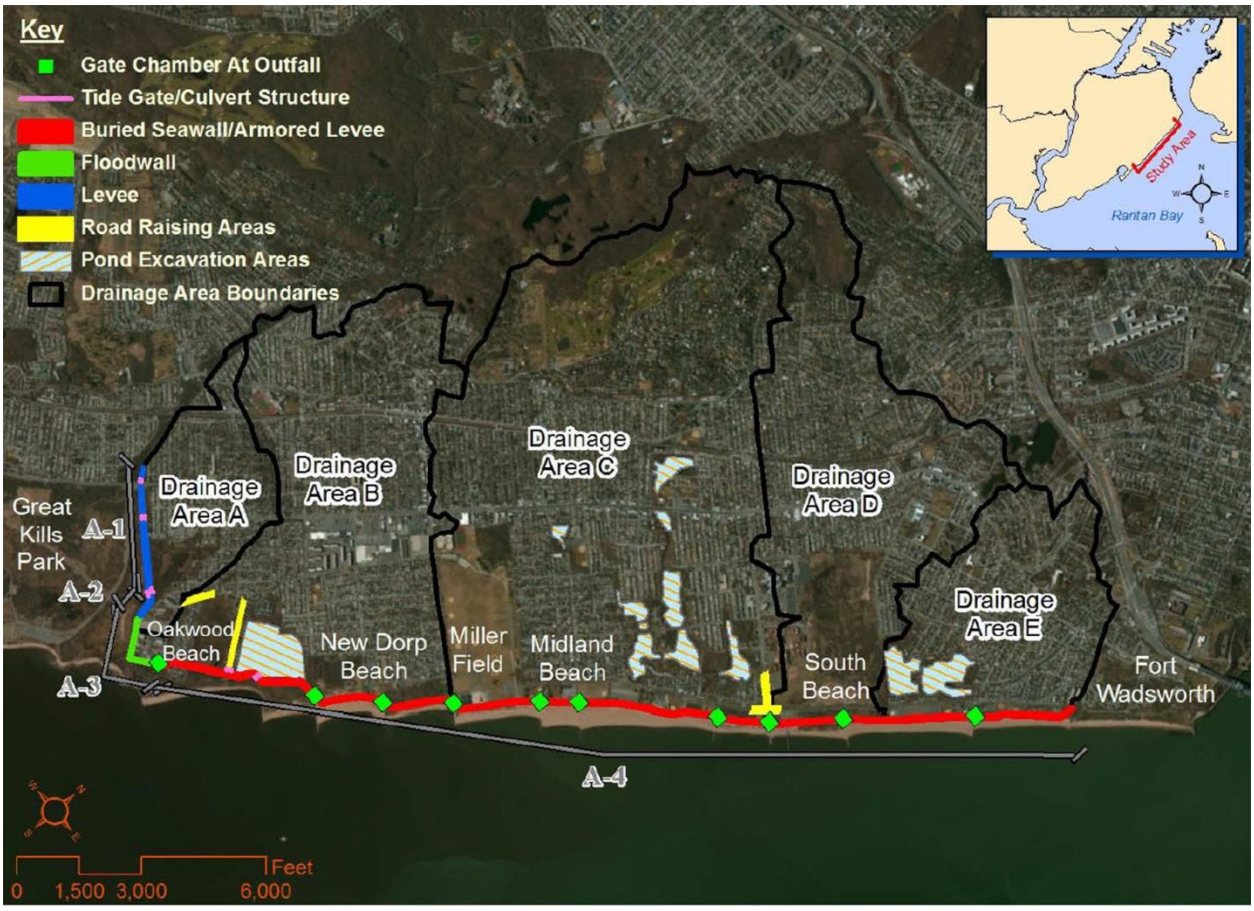

Figure 9 U.S. Army Corps of Engineers proposal for a Sea Wall with a boardwalk on top.

Name _____

Since Superstorm Sandy, the evacuation zones have been updated. Figure 10 shows the 3 pre-Sandy hurricane evacuation zones and figure 11 shows the post Sandy evacuation zones.

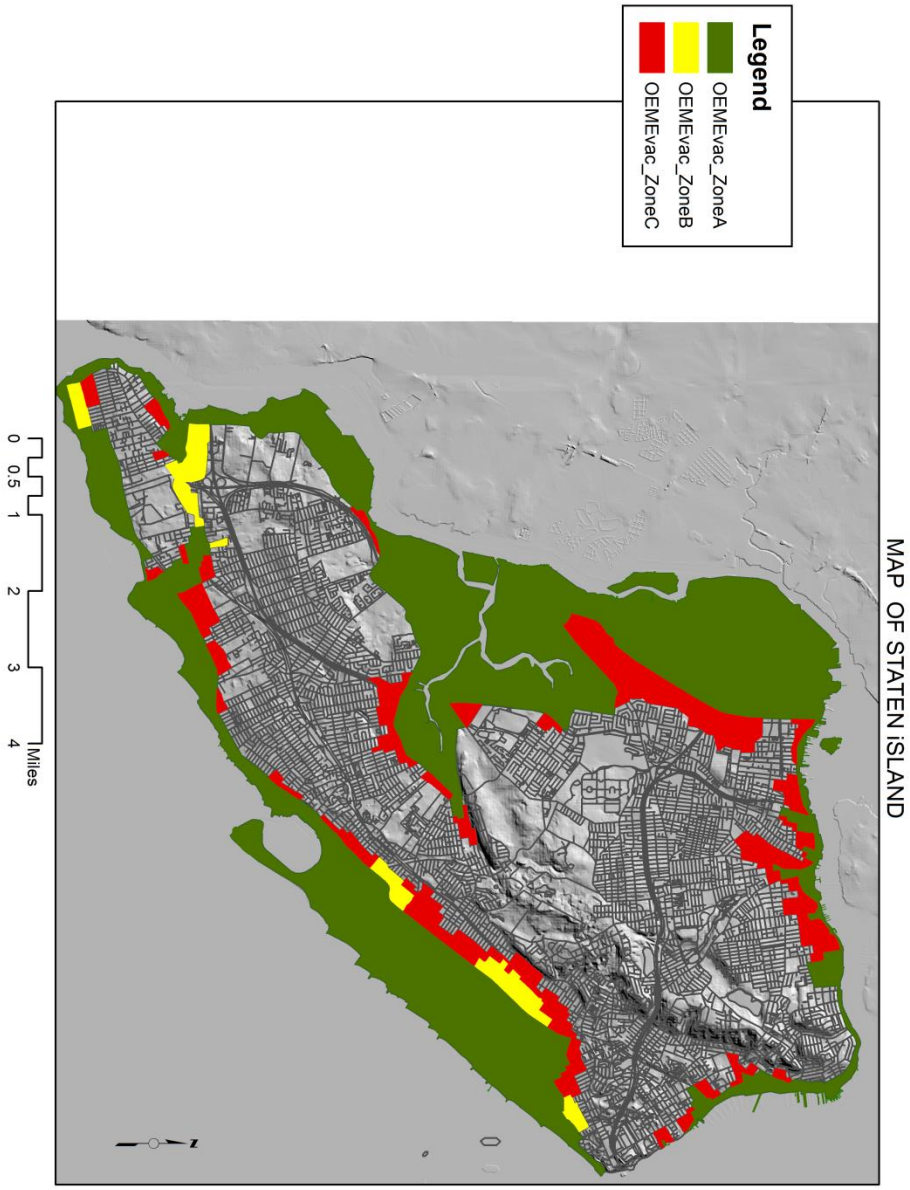

Figure 10 DEM showing the 3 Pre-Sandy hurricane evacuation zones(NYC OEM).

Name _____

Visit http://maps.nyc.gov/hurricane or see the map below for the new zones.

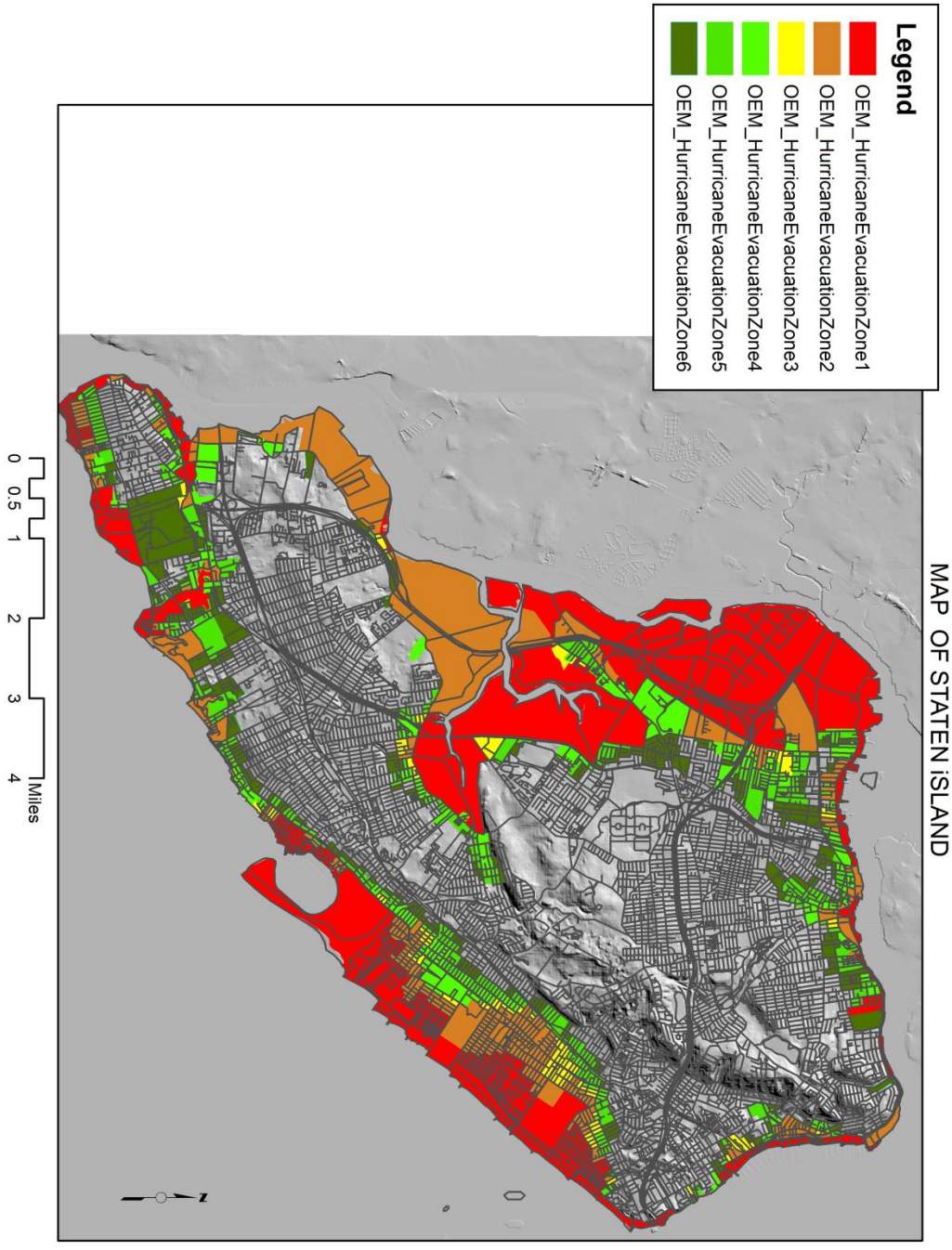

Figure 11 DEM showing the 6 new Post-Sandy hurricane evacuation zones(NYC OEM).

Name _____

Explain how the city chose these areas for evacuation and why some evacuation zones are much further inland than others.
PRE –Sandy

POST-Sandy

How have the zones on Staten Island changed?

What information (in addition to elevation) was considered when making these changes?

Name _____

PART 3. DEMOGRAPHICS:

Go to http://www.socialexplorer.com/

Explore data for Staten Island(Richmond County) , NY by changing the data. The map below shows 2010 population density/mi^2. You can change this for other years. How has the population density in these hurricane prone zones changed from 1900 to 2013.

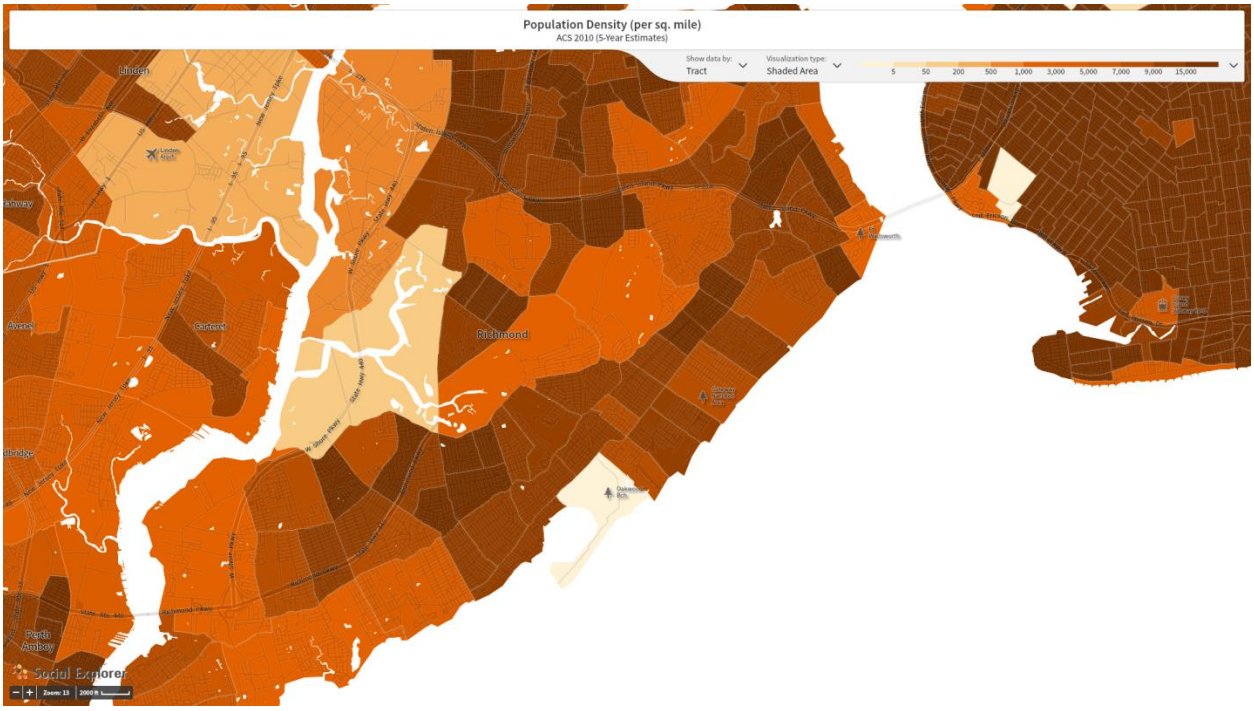

Figure 12 Example map from Social Explorer showing Population Density/ mi^2.

Name _____

PART 4: FINDINGS

Use all the available information in this exercise to describe the risk to Staten Island Residents.

What can be done in order to reduce risk? In terms of resilience what measures can be taken?

1. Is the U.S. Army Corps of Engineers proposal(Figure 9) for a seawall sufficient in terms of reducing risk to the south shore of Staten Island? Is the proposal addressing the issue of resilience?

2. Do you favor (1) hard stabilization (2) relocation or (3) re-zoning? Why?

Name _____

3. A recent proposal(see pdf of EIS draft scope of work) for coastal and social resiliency initiatives for the Tottenville shoreline calls for living breakwaters(Oyster reefs and dune projects). Provide comments on this document.