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Lab 2 Write Up

The following report will provide an assessment of potential flood hazards related to the City of Galveston, Texas, as the city was identified as high risk of flood vulnerability. In assessing the city's ability to react to flood hazards, primary routes of travel, as well as the availability of fire stations, hospitals, and homeless shelters were visualized in Figure 1. The location and number of these facilities is important to understand during a flooding event, as fire stations and hospitals are important to life saving during an emergency event. Homeless shelters are a source of shelter during emergencies, with the ability to marshal available resources to house and feed a displaced population. Primary routes of travel within the study area provides insights into potential egress routes during an emergency, and any potential bottlenecks in egress. The primary routes of travel were derived from the Galveston Central Appraisal District shape files repository. The City of Galveston does not have a repository for fire stations, hospitals, and homeless shelters, so open-source research was conducted to locate sites. The homeless shelter locations were derived from the Homeless Shelter Directory; hospitals and fire stations were derived from open-source research.

As seen in Figure 2, the flood risk to the City of Galveston is extensive. The FEMA flood hazard data shows that much of the city within its boundaries would be inundated by a 100-year flood event, leaving relatively few areas within the city untouched by flood waters. It is important to note that there is a 1% chance of this event taking place every year. It is likely that the proximity to the Gulf of Mexico, combined with the lack of elevation contribute to the higher likelihood of an extensive flooding event. In the event of a 100-year flood, much of the emergency services and shelters would be directly affected.

It is important to recognize the relationship between flood hazard and the vulnerability of the local population in this event. As seen in Figure 3, much of the vulnerable population is located along the northern half of the city, centered around much of the homeless shelters and hospitals. This population has access to a primary road which can be used for evacuation. It should be noted that much of the local population would experience similar risk to a 100-year flooding event across all spectrums of vulnerability. Much of the difference lies in the presence of a 500-year flood, where much of the

affected area is populated by more vulnerable populations who may not have the means to egress prior to a flooding event taking place.

In Figure 4, we see a more detailed view of flood risk to what is identified as a more vulnerable population. With just the 100-year flood risk occupying much of this space, and the affected area from a 500-year flood affecting all but small pockets of safe space to shelter, it is important to build an emergency response plan that is tailored to this widespread flood hazard. While much of the emergency services would be affected by these flooding events, preparation is key, and location of these services is even more important. The City of Galveston should take a proactive approach to evacuating the city in the event that a potential 100-year flood event or worse is known of in advance. Given their location within the population of vulnerable individuals, shelters should be used as central meeting points for those who have limited means to evacuate prior to an event, allowing for the city to pinpoint available resources to assist with evacuations. It should be stated, and is shown in Figure 4, that evacuation prior to the event is paramount, as much of the primary means of evacuation will be inundated by flood waters, and is made worse by the limited means of evacuation to the mainland. As a last resort, the response organizations should use identified areas of minimal flood risk to set up shelter space.

Appendix

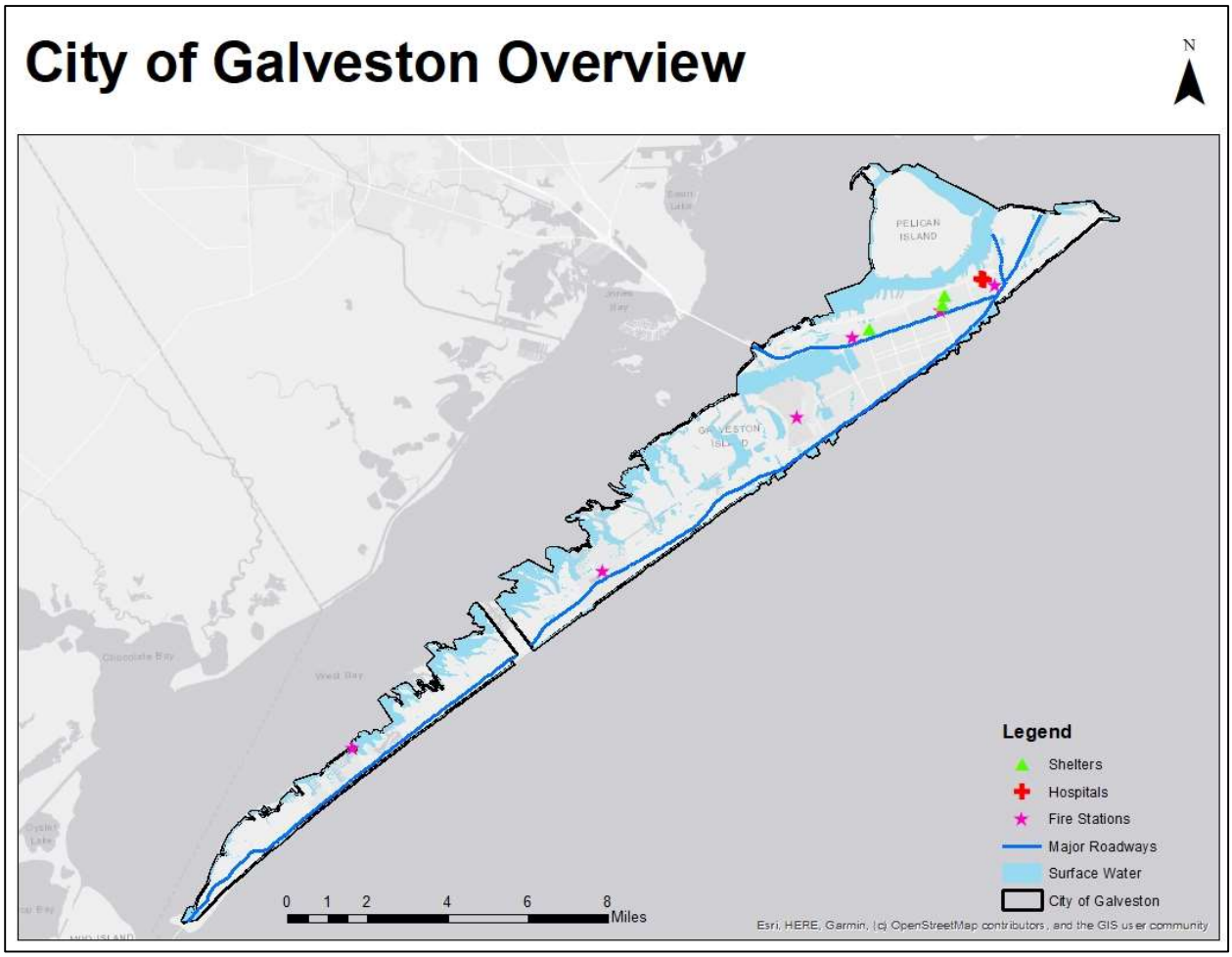

Figure 1 An overview of the City of Galveston primary roads and emergency services (Galveston Central Appraisal District, 2021)(Homeless Shelter Directory) (US Census, 2020)

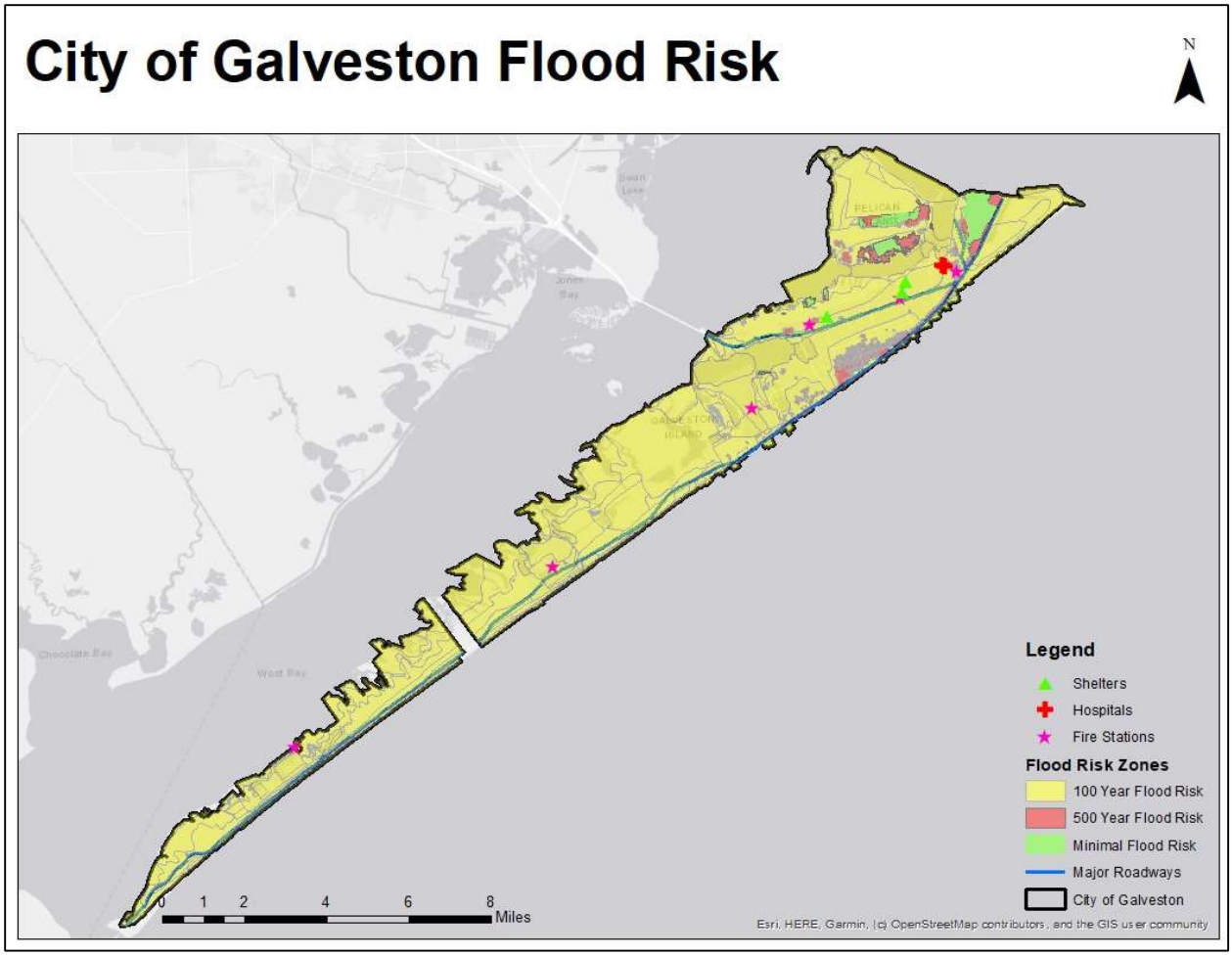

Figure 2 An overview of FEMA flood risk to the City of Galveston (FEMA, 2019) (Galveston Central Appraisal District, 2021) (Homeless Shelter Directory) (US Census, 2020)

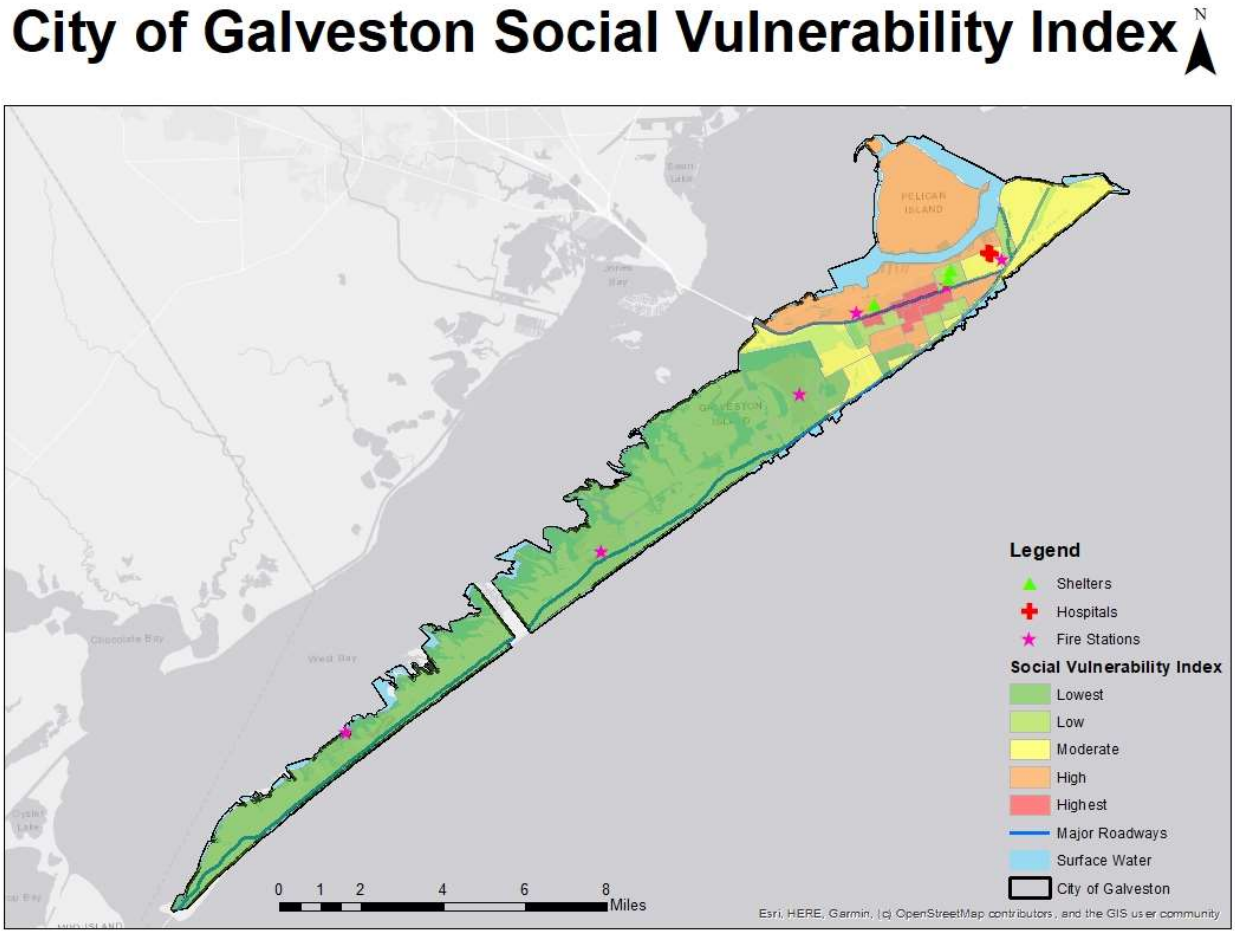

Figure 3 City of Galveston Social Vulnerability Index assessment (CDC, 2018) (Galveston Central Appraisal District, 2021)(Homeless Shelter Directory)(US Census, 2020)

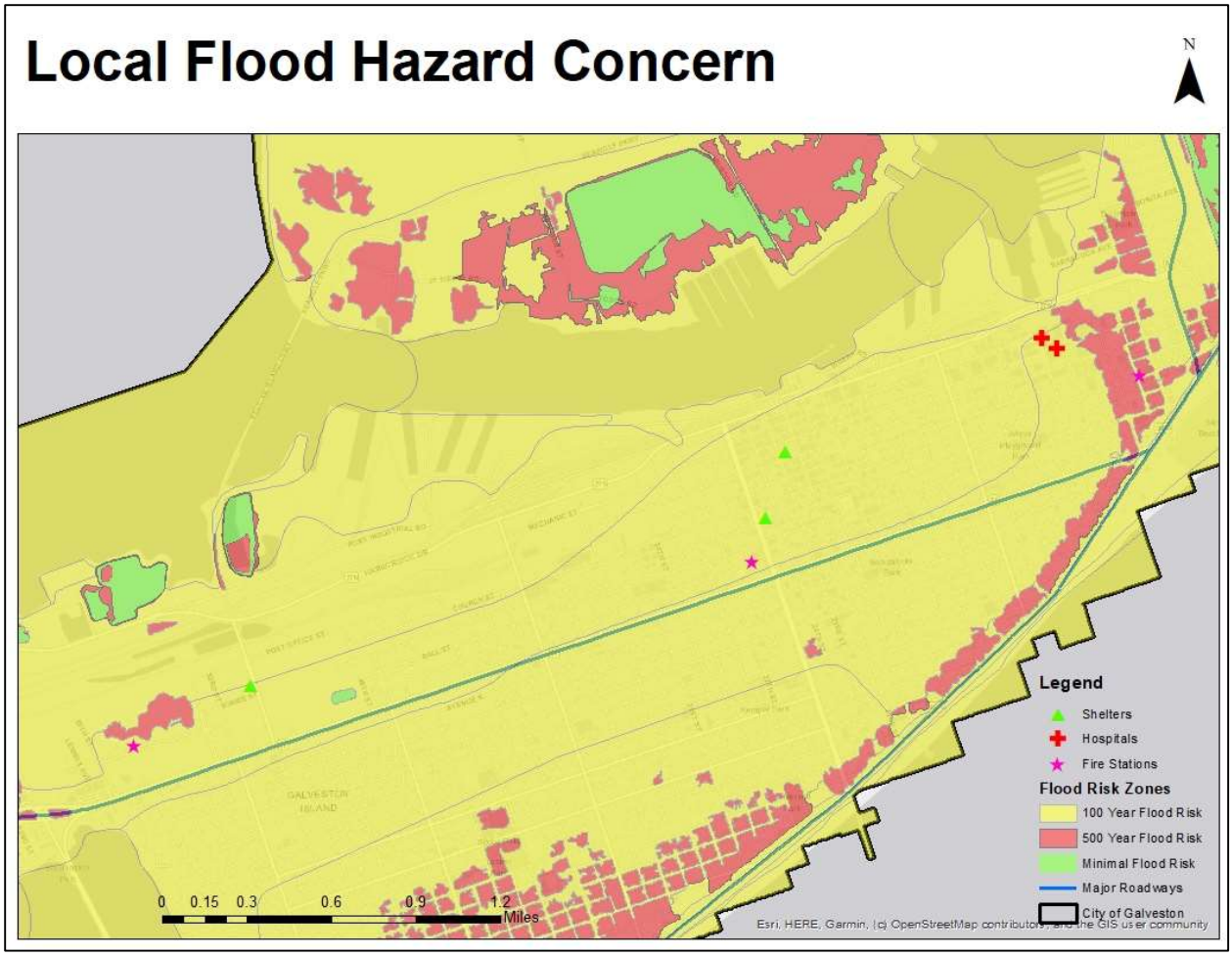

Figure 4 Indications of flood risk to vulnerable populations as well as risk to primary means of evacuation (FEMA, 2019) (Galveston Central Appraisal District, 2021)(Homeless Shelter Directory)(US Census, 2020)

References

CDC. “CDC/ATSDR SVI Data and Documentation.” Centers for Disease Control and Prevention. Centers for Disease Control and Prevention, April 28, 2021. https://www.atsdr.cdc.gov/placeandhealth/svi/data_documentation_download.html.

FEMA. “National Flood Hazard Layer,” 2019. https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd.

“Galveston Central Appraisal District Shape Files.” Galveston Central Appraisal District, April 12, 2021. http://www.galvestoncad.org/index.php/Shape_Files.

“Homeless Shelter Directory.” Galveston Homeless Shelters and Services - Galveston TX Homeless Shelters. Accessed May 5, 2021. https://www.homelessshelterdirectory.org/cgi-bin/id/city.cgi?city=Galveston&state=TX.

US Census. “2020 Tiger/Line Shapefile,” 2020. https://www.census.gov/cgi-bin/geo/shapefiles/index.php?year=2020&layergroup=Roads.