



5-5-2022

Evaluation of Staten Island's Wetland Services and Environmental Costs of Removal

Gracyn Cole
gracyn.cole@und.edu

Follow this and additional works at: <https://commons.und.edu/as-showcase>



Part of the [Geography Commons](#)

Recommended Citation

Cole, Gracyn, "Evaluation of Staten Island's Wetland Services and Environmental Costs of Removal" (2022). *Arts & Sciences Undergraduate Showcase*. 11.
<https://commons.und.edu/as-showcase/11>

This Poster is brought to you for free and open access by the College of Arts & Sciences at UND Scholarly Commons. It has been accepted for inclusion in Arts & Sciences Undergraduate Showcase by an authorized administrator of UND Scholarly Commons. For more information, please contact und.common@library.und.edu.

Gracyn Cole

GEOG 454, Conservation and Sustainable Use of Natural Resources

Introduction

- The Graniteville Wetland is a forested emergent wetland located in Staten Island, NY
- Wetlands form in places that naturally channel large amounts of water and are capable of large-scale water detention
- The Graniteville Wetlands are currently in danger after the New York City Council approved zoning variances granting permission to developers to replace 28-acres of wetlands with a BJ's Wholesale Grocery store, a gas station, and a parking lot capable of holding 835 cars⁵
- This study explores the value of the Graniteville wetlands in regard to flood water retention as well as the implications of developing this area

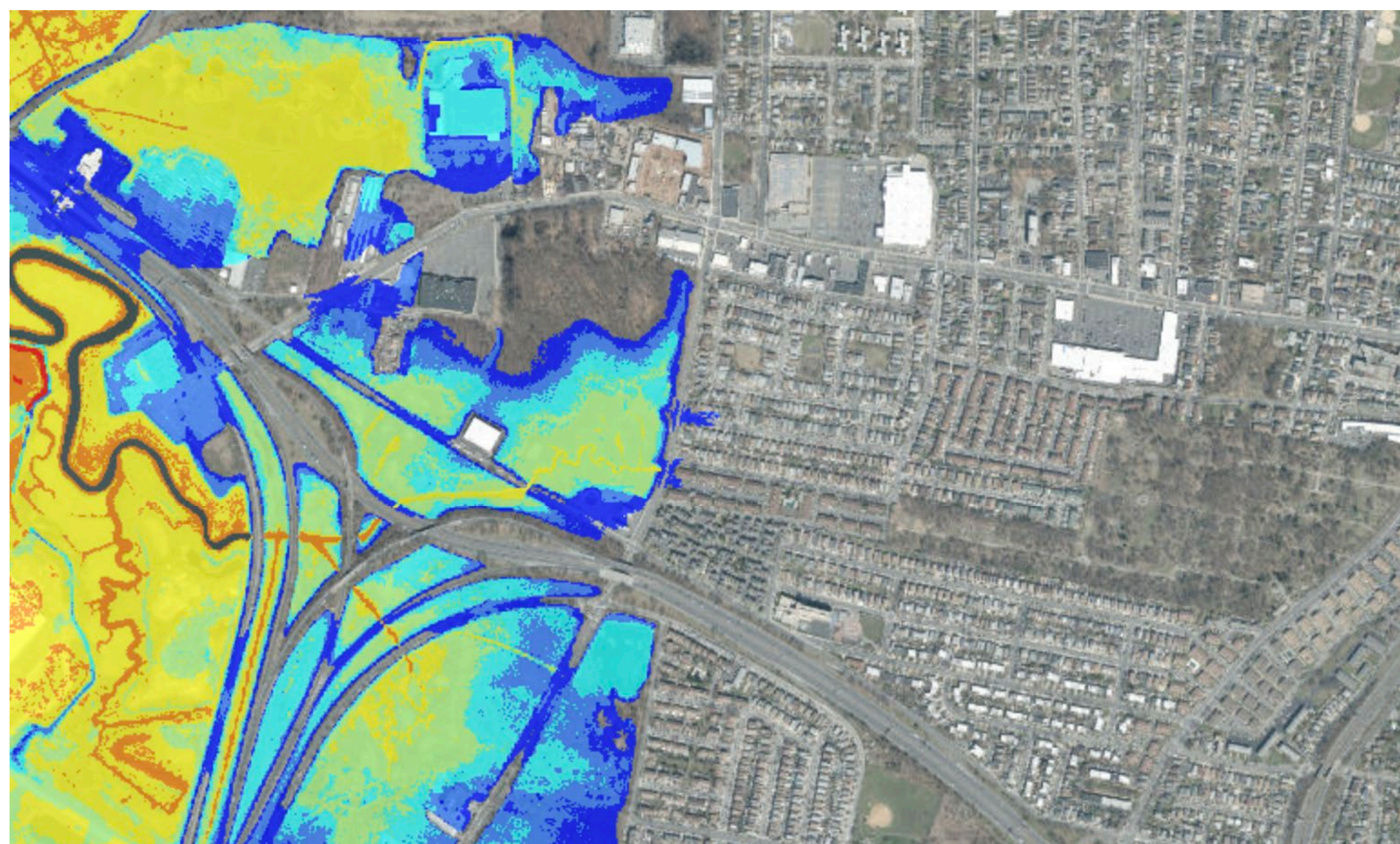


Figure 1. Base Flood Elevation Levels in the Graniteville Wetlands (NYC City Planning)⁴

Methods

- A literature review was conducted based on the specific benefits of the Graniteville Wetlands based on research done in the wetlands
- Data relating to water detention, geographical elevation, household proximity, population growth, and past natural event history were collected and reviewed
- Because wetlands provide environmental services that have economic value, a general valuation of floodwater detention was performed
- This valuation was conducted through projected mitigation costs released by FEMA
- The benefit of transfer method was also used to assign monetary value to the Graniteville Wetland services
- This was then weighed to the social and economic need for a BJ's Wholesale Grocery Store and gas station within a 1-mile radius of the project site

Results

- The Graniteville Wetlands are unique as it is an area that holds groundwater recharge and stormwater retention
- These services protect 1341 residencies⁶ in the surrounding area of Graniteville; based on the 1:3 house to resident ratio in Staten Island, this benefits approximately 4,023 people
- The 28-acres of wetlands provide 28 million gallons of water storage, and the 1800 trees within this area can remove up to 180,000 gallons of water per day²
- Based on the cross section of the landscape, the wetland is located in a basin area

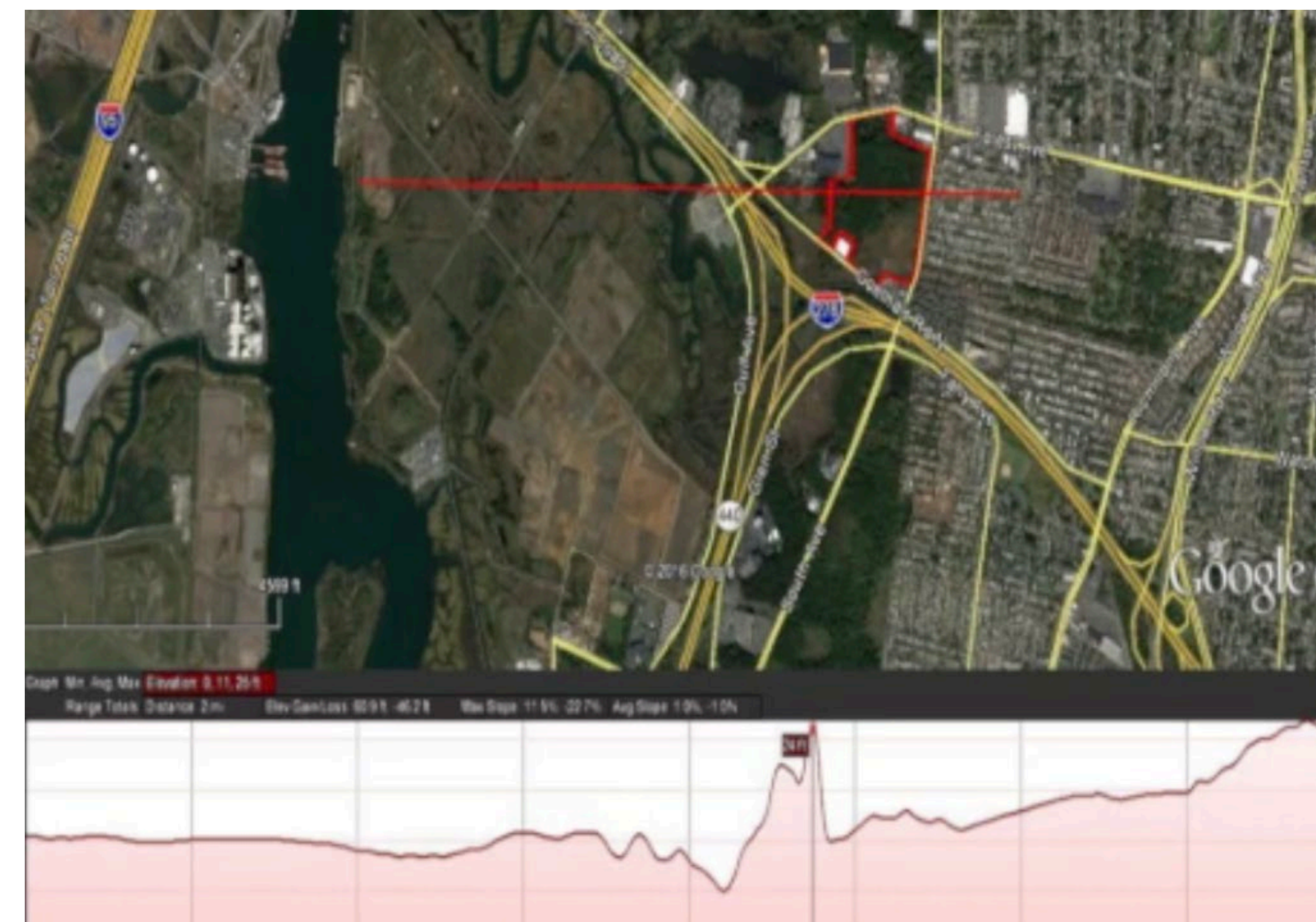


Figure 2. Cross Section of Old Place Watershed through the Graniteville Wetlands (NOAA)⁶

- The projected plans for development will raise the elevation of this basin by 15-20 feet converting it from a water basin to a watershed⁶. This added elevation coupled with additional wetland renovation in Old Place Watershed reduces the carrying capacity of the 1287-acre watershed by 22%
- This 22% reduction in carrying capacity has the capability to redirect 283,140,000 gallons of water into surrounding areas
- After Hurricane Sandy, water level data shows the importance of this carrying capacity to reducing water spread past South Ave



Figure 3. Flood Zone Area Inundated by Hurricane Sandy (FEMA)³

Results cont.

- Forested emergent wetlands are valued at \$235,799 per acre¹, making the Graniteville wetlands worth \$6,602,372 *this monetary does not represent physical value of the land but value needed to allocate for cost of benefit removal
- This wetland value provide surrounding residents directly impacted by wetland removal with the equivalent of \$4,923 in benefits
- Additionally, \$1 spent on mitigation processes = a \$4 return avoided loss
- In relation to social and economic need for a grocery store and gas station, within a one-mile radius of the project site, there are 9 grocery stores/markets and 4 gas stations. Within the Graniteville neighborhood and surrounding areas (population of ~19,000), there are 52 grocery stores/markets and 19 gas stations

Conclusions

- Removing 28 acres of the Graniteville Wetlands equals a loss of a water detention area capable storing 28 million gallons of water and removing up to 180,000 gallons of water a day
- Removing 28 acres of the Graniteville Wetlands will reduce the carrying capacity of the Old Place Watershed by 283 million gallons
- The added elevation needed to build the BJ's Wholesale, gas station, and parking lot will convert the areas to watershed redirecting the water into the Graniteville urban area
- Wetland benefits equates to \$4,923 for the 1341 residents in surrounding areas
- Considering the results of this evaluation as well as the additional benefits of wetlands such as water filtration, air purification, and habitats for wildlife, the removal of the Graniteville Wetlands would equal high economic losses for the residents in surrounding areas

Acknowledgements

I would like to thank Dr. Enru Wang for advising this project as well as Dr. Haochi Zheng for assisting the environmental valuation.

References

- 1) King, D. 1998. The Dollar Value of Wetlands. *National Wetlands Newsletter*. (last accessed April 29, 2022). https://nawm.org/pdf_lib/restoration_webinar/wetland_restoration_planning_110414.pdf
- 2) Naklicki, E. 2019. Graniteville wetland habitat wetland functions and/or values. *Thriving Earth Exchange*. (last accessed April 29, 2022). https://thrivingearthexchange.org/wp-content/uploads/2018/08/Graniteville-Wetland-Habitat-benefits_values.pdf
- 3) The New York Times. 2012. *A survey of the flooding in N.Y.C. after the hurricane*. The New York Times. (last accessed April 29, 2022). <https://www.nytimes.com/newsgraphics/2012/1120-sandy/survey-of-the-flooding-in-new-york-after-the-hurricane.html>
- 4) NYC City Planning Department. (n.d.). Staten Island [map]. NYC Flood Hazard Mapper: ArcGIS web application. (last accessed April 29, 2022). <https://dcp.maps.arcgis.com/apps/webappviewer/index.html?id=1c37d271fba14163bbb520517153d6d5>
- 5) Sottile, A. 2019. Vital staten island wetlands about to get a BJ's Wholesale Club. *Gothamist*. (last accessed April 29, 2022). <https://gothamist.com/news/vital-staten-island-wetlands-about-get-bjs-wholesale-club>
- 6) Stoffo, A. 2020. Carl Alderson from NOAA Confirms That Graniteville Wetland Saved The Community From Flooding During Hurricane Sandy and that the Community Will Be Flooded During The Next Big Storm. *Coalition for Wetlands & Forests*. (last accessed April 29, 2022). <http://www.sicwf.org/climate-change-and-flooding-part-1/>