

New Orleans Flood Analysis

About New Orleans

New Orleans, Lousianana is without a doubt one of the most famous US cities, known best for its exuberant carnival season, specifically it's city-wide celebration of Mardi Gras. But New Orleans is also famous for another reason: the many tropical hurricanes that batter the city and more notably, the widespread destruction that can accompany them.

New Orleans is located just off of the Gulf of Mexico, a tropical storm generating body of water. The high winds and low-pressure weather systems that accompany these storms cause tidal levels to rise and waves to form, resulting in a phenomena known as storm surge that causes violent flooding in low elevation coastal areas.

As a response to these conditions, New Orleans has overtime constructed levees surrounding the city to protect from the rising tides and flooding. Additionally, the city employs 23 pump stations that pump rainwater runoff and floodwater into the surrounding water bodies. Unfortunately, this system hasn't always been successful.

About the Project

Using our skills as cartographers, we aim to examine the city and the risk posed by future hurricanes to provide a tool for potential damage mitigation and emergency response development. With the onset of global warming causing more extreme weather events around the world, it becomes increasingly important to equip cities like New Orleans with tools to mitigate and respond to these natural disasters which may become more frequent and intense with time.

Team Members



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Senior in Geography	Student in Geography	Senior in Geography	Student in Geography	Senior in Geography



Hurricane Damage

Hurricane Katrina (2005)

In 2005, the city was hit by Hurricane Katrina, a large category 3 hurricane. When Katrina made landfall on New Orleans, it flooded 80% of the city within 24 hours, up to 30 feet above sea level in some areas, by overtopping levees and subsequently eroding the ground beneath on the backside.



Hurricane Ida (2021)

In 2021, New Orleans was hit by Hurricane Ida, another massive hurricane similar in nature to Katrina. And as you can see the damage is similar after 16 years. These are two of the most devastating hurricanes that have hit New Orleans, and the city has been hit by many more, all causing flooding.

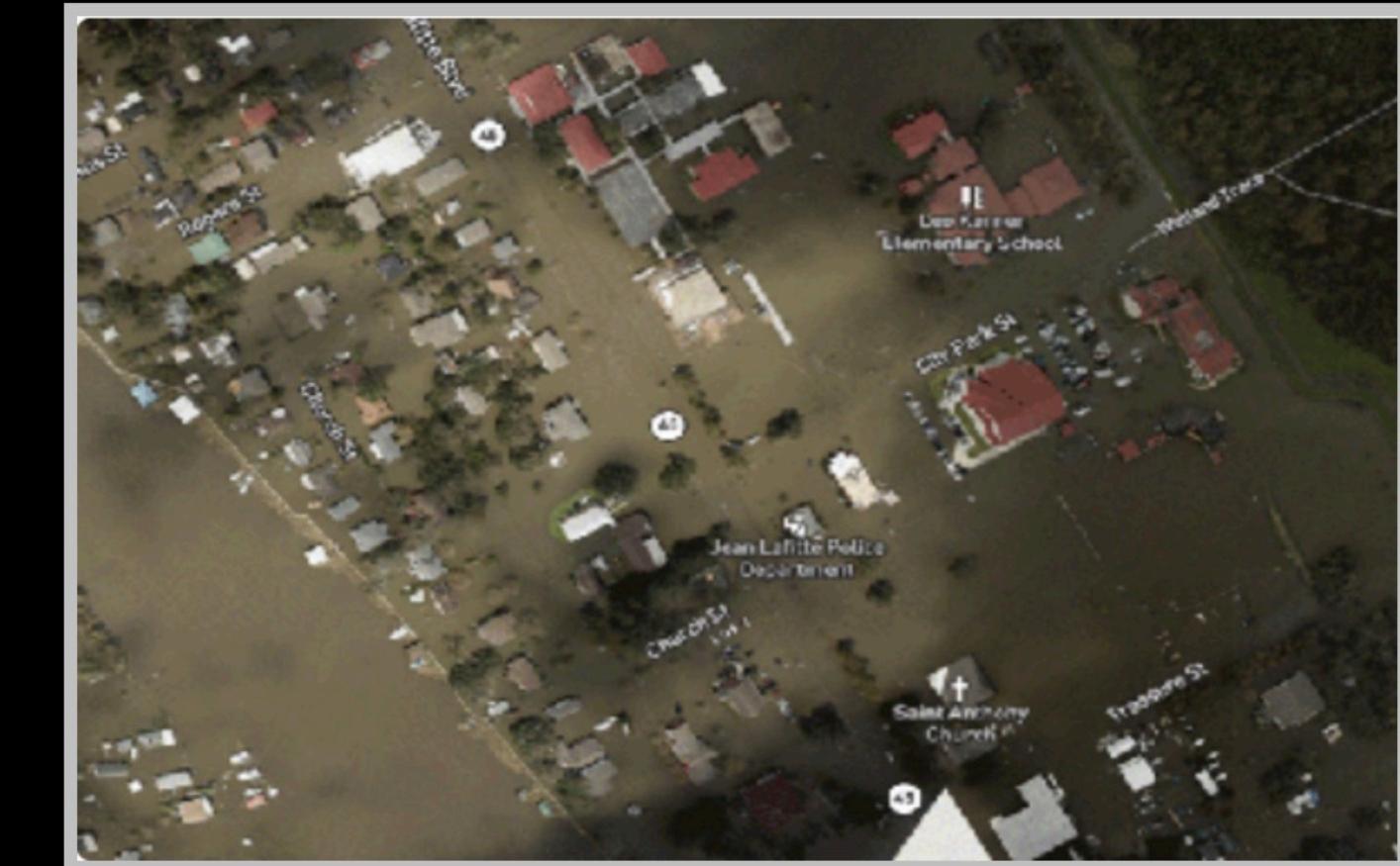
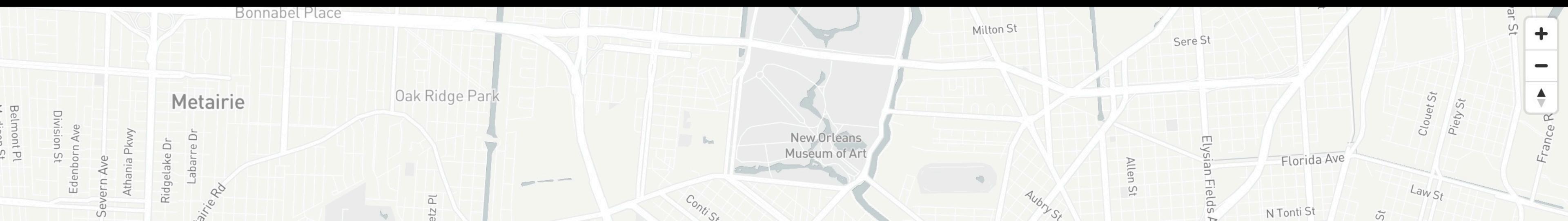


Image attribution links

[Hurricane Ida Images](#)

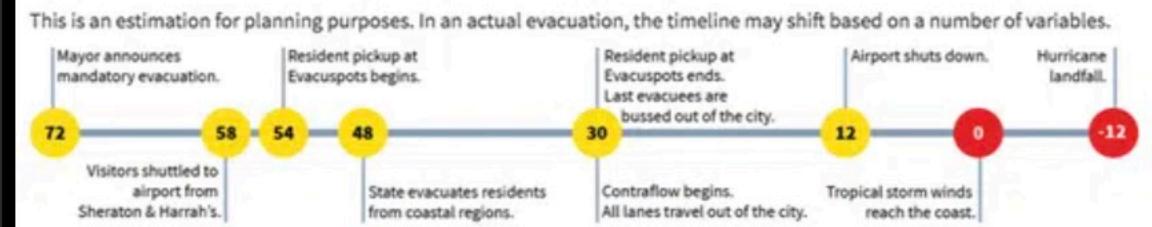
[Hurricane Katrina Images](#)



What happens in an emergency?

If a hurricane is near, the city has developed a timeline of steps to take to help residents evacuate or bunker down and get shelter.

72-hour Evacuation Timeline



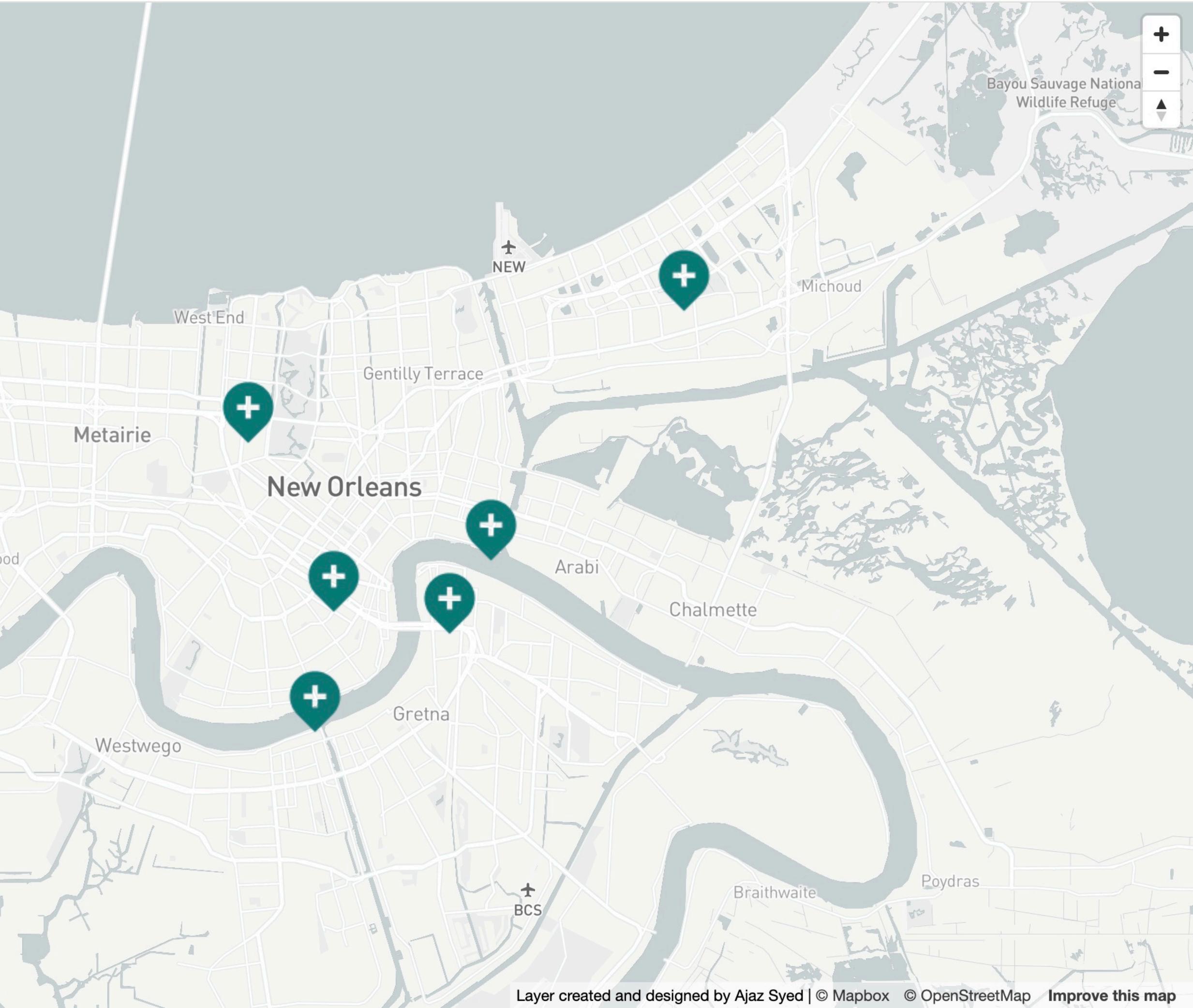
72-hour Evacuation Timeline

For the plan, the city has laid out various pick up points and safety shelters that can be used for residents to stay in and protect themselves against the hurricane. These spots are laid out across the city but majority of them are in more populated areas. The two major spots are the Mercedes-Benz Stadium and Smoothie King Center.

Demographics Comparison

Population By Block (2020)

We can see that areas along the coast of New Orleans consist of a higher volume of residents. This is common in most cities along water. Now the unfortunate part is that these areas



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Average Income By Block (2019)

Areas that are south of the coast have a higher income, this might be because it is safer and nicer. Whereas areas along the coast, have more people of various incomes, which make the average less.

Areas with a smaller average income, have residents who are less likely to get up and leave their home everytime a major hurricane hits the city. These areas should be the focus for the New Orleans preventative measures.

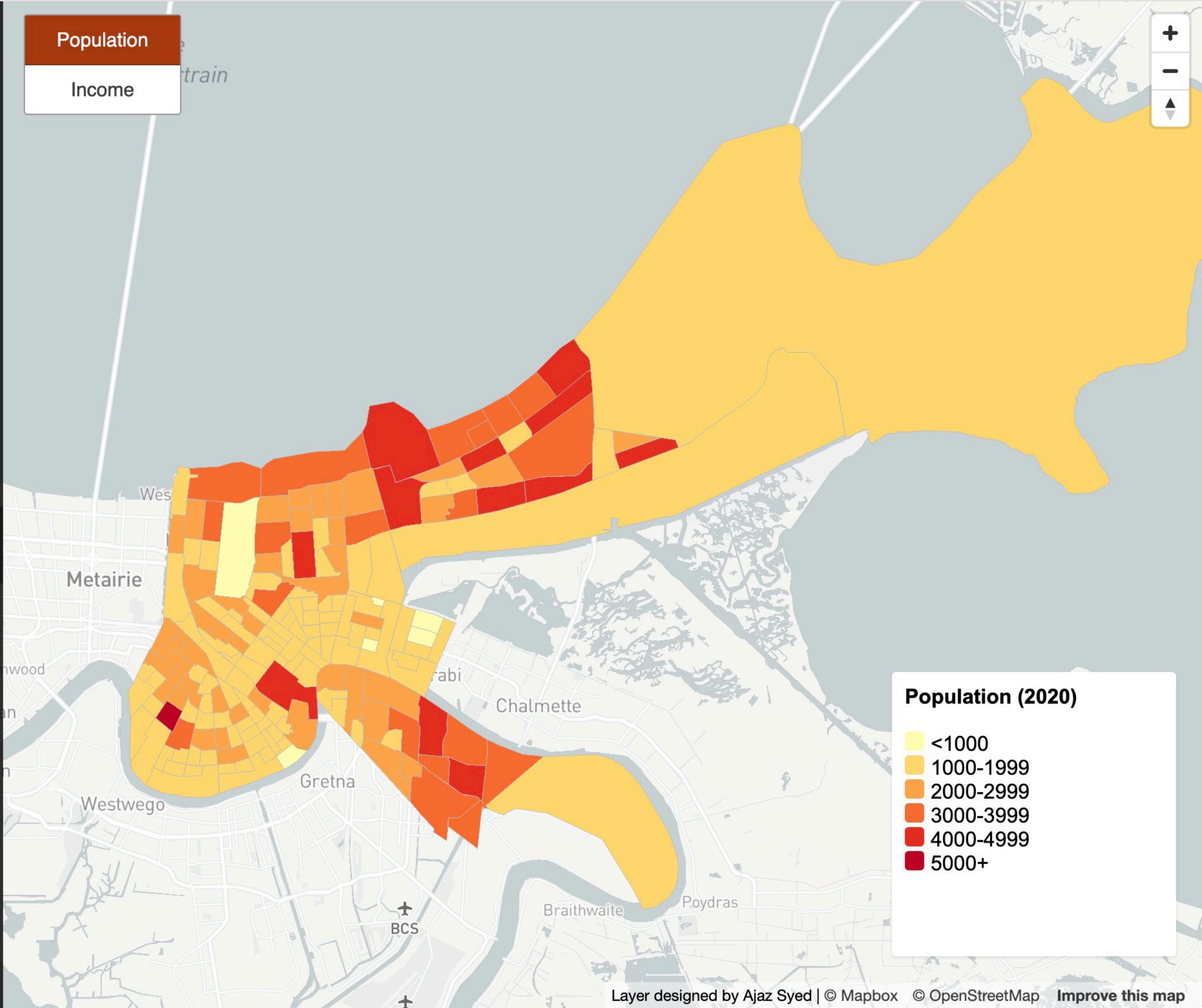
Flood Risk

Risk Zone Development

Before Hurricane Katrina devastated New Orleans, city models estimated flood levels could reach up to 18 feet (5.5m) above sea level, and afterwards it was proven they could reach up to 30 feet (9.1m) above.

Low risk plots are designated as those above 9m where the highest Katrina floodwaters were unable to touch and likely have not been damaged due to past flooding, but could be damaged by even larger future storms.

Moderate plots lower than 9m above sea level are designated where it has been proven possible flood damage can occur via Katrina's record flood



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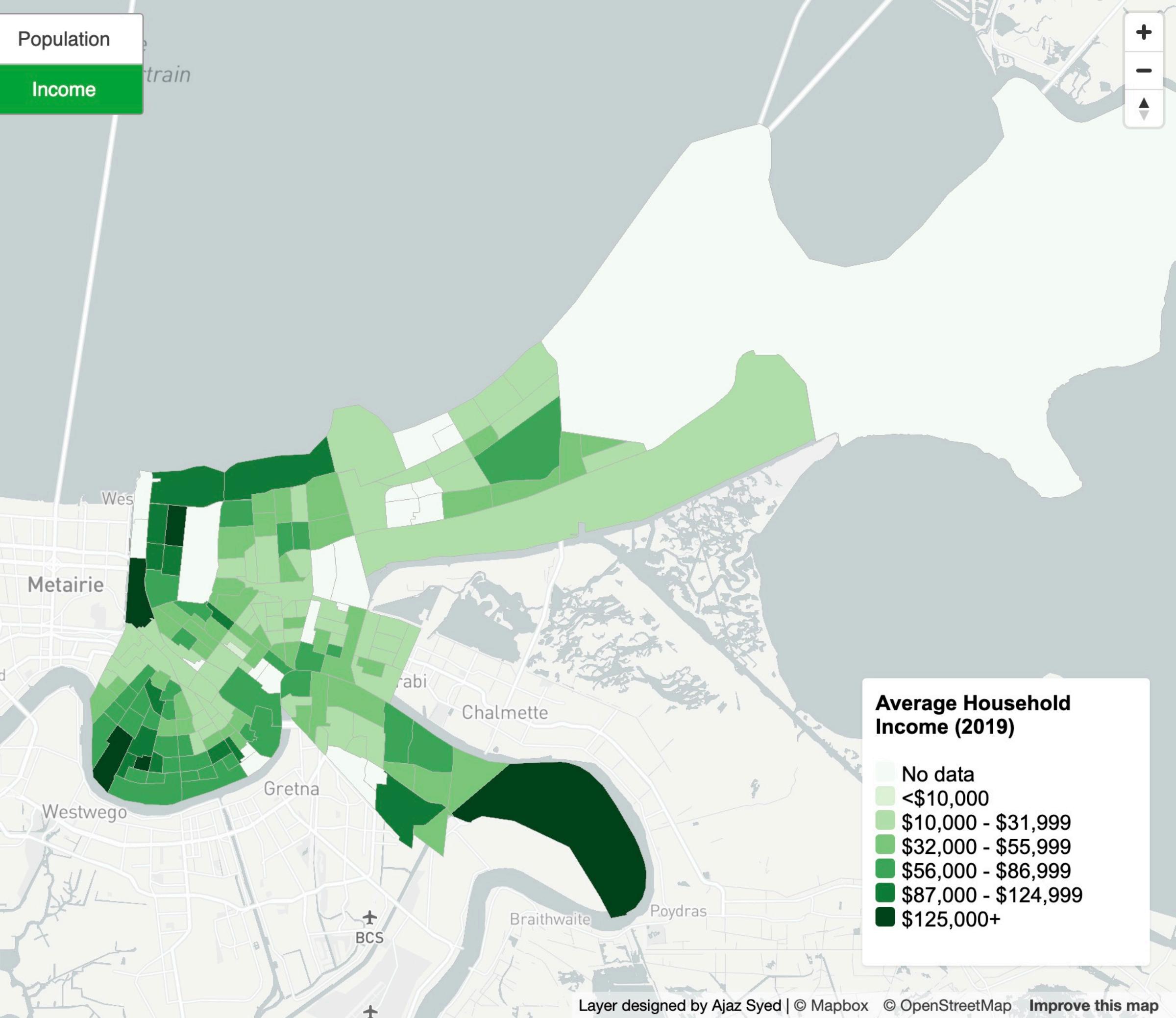
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Moderate plots lower than 9m above sea level are designated where it has been proven possible flood damage can occur via Katrina's record flood levels, but is unlikely without a significantly large storm.

High risk plots lower than 4m above sea level are designated where it is almost certain that damage will occur if the levees are overtopped, and damage is likely from typical flooding events.

Severe risk plots designated as those within 1m of sea level, where any nearby flooding will cause damage, even if floodwaters are not able to fully overtop levees.

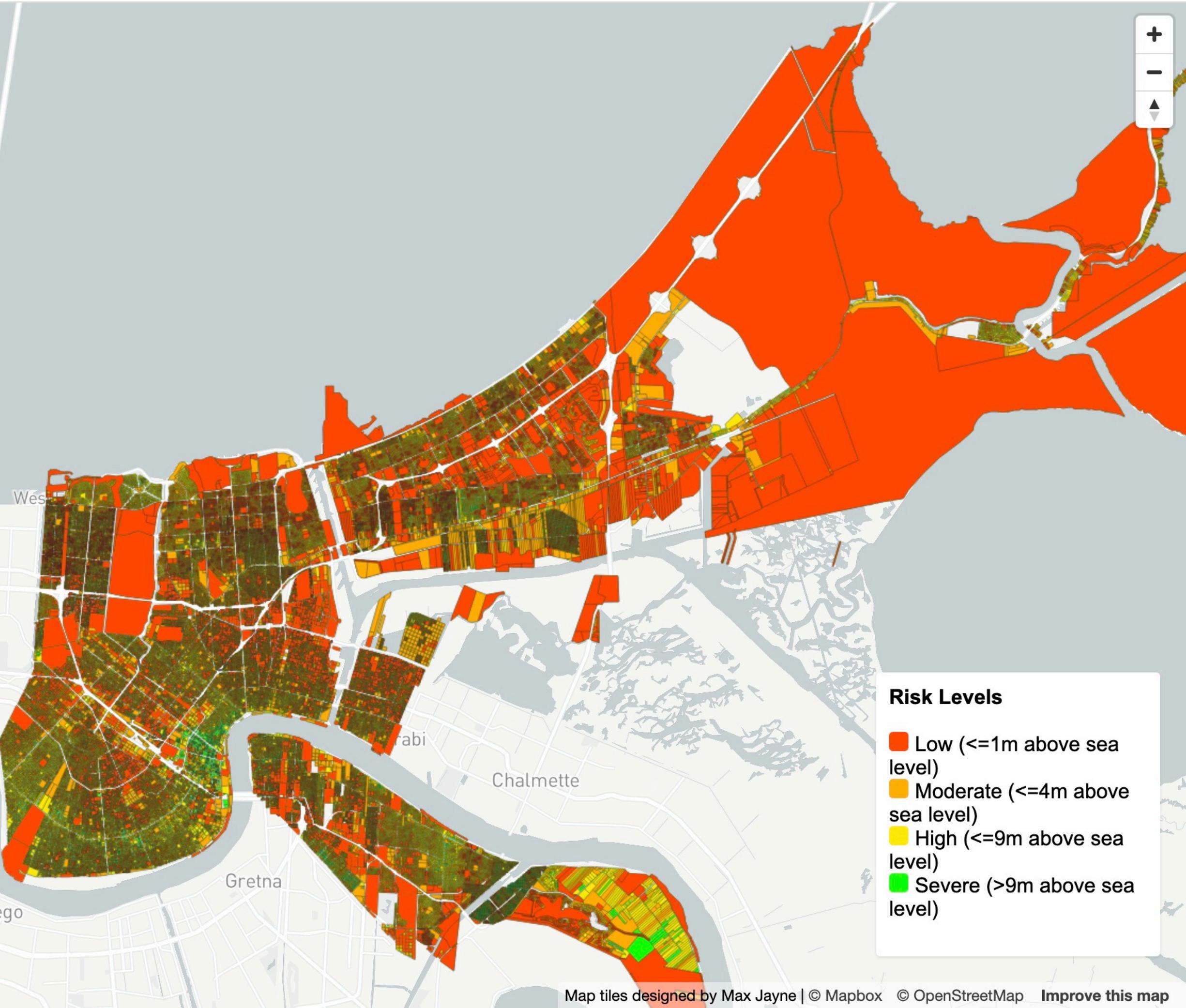
Current Situation

Wetlands Erosion

Louisiana, more specifically New Orleans, has seen a lot of beach erosion as well as wetlands shrinking over the past century. This leads to additional flooding to the city as it is easier for excess water to encroach the land and no place to go with limited wetlands.

Hurricane Damage Risk Reduction Plan

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Sorrento

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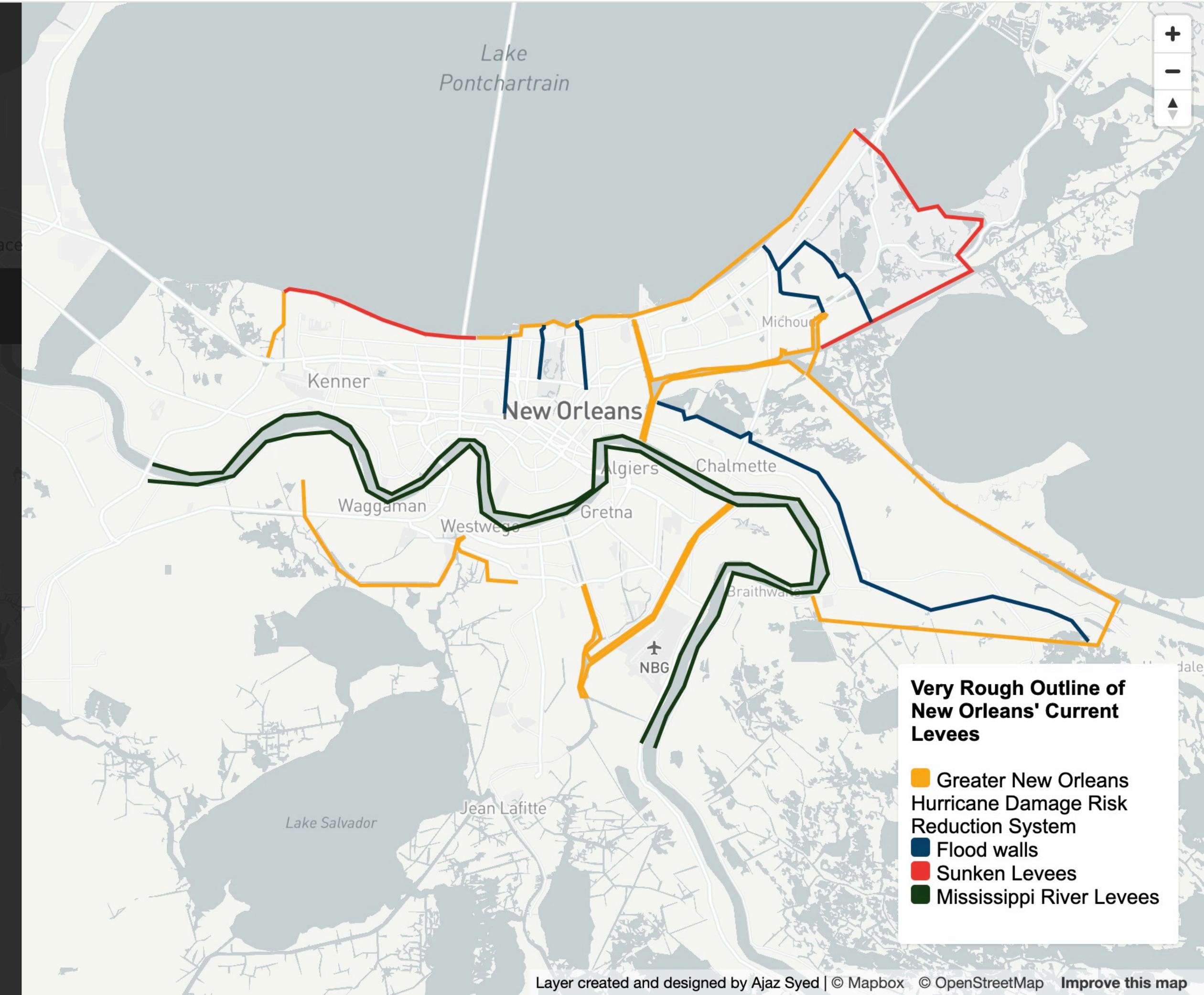
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Hurricane Damage Risk Reduction Plan

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This year, New Orleans completed a \$14.5 billion storm drain risk reduction program. This consists of new floodwalls and levees, as well as floodgates, surge barriers, and pump stations. This covers from the east to the west as well as Algiers Canal. The map shows only a rough outline of the current levees and floodwalls structure, but in terms of a solution this is only temporary.



Conclusion



[From Wikimedia](#)

People may wonder why anyone would build a city on ground that is below sea level?

Well initially it wasn't.

The sediment carried along the Mississippi river was deposited into the gulf and over time the sediment just piled up and formed a new land, which is New Orleans.

As New Orleans population grew, so did the demand for land, so engineers essentially made drains to pump out the water in the swamplands, which in return dried the land so that people could live on it, but it removed water below the surface which caused air pockets and the soil at the surface started sinking to fill those air pockets.

The pumps that help New Orleans from filling up with water take sediment out of the ground with the water. Normally, the sediment would continually be replaced by the flooding Mississippi River.

However, humans have stopped the sediment deposit process by:

- 1) Building dams upriver that trap sediment
- 2) Building walls around the river to keep it from flooding and depositing more sediment.

They should focus on the restoration of the wetlands and use natural cushions to prevent the flooding, especially along the coast.