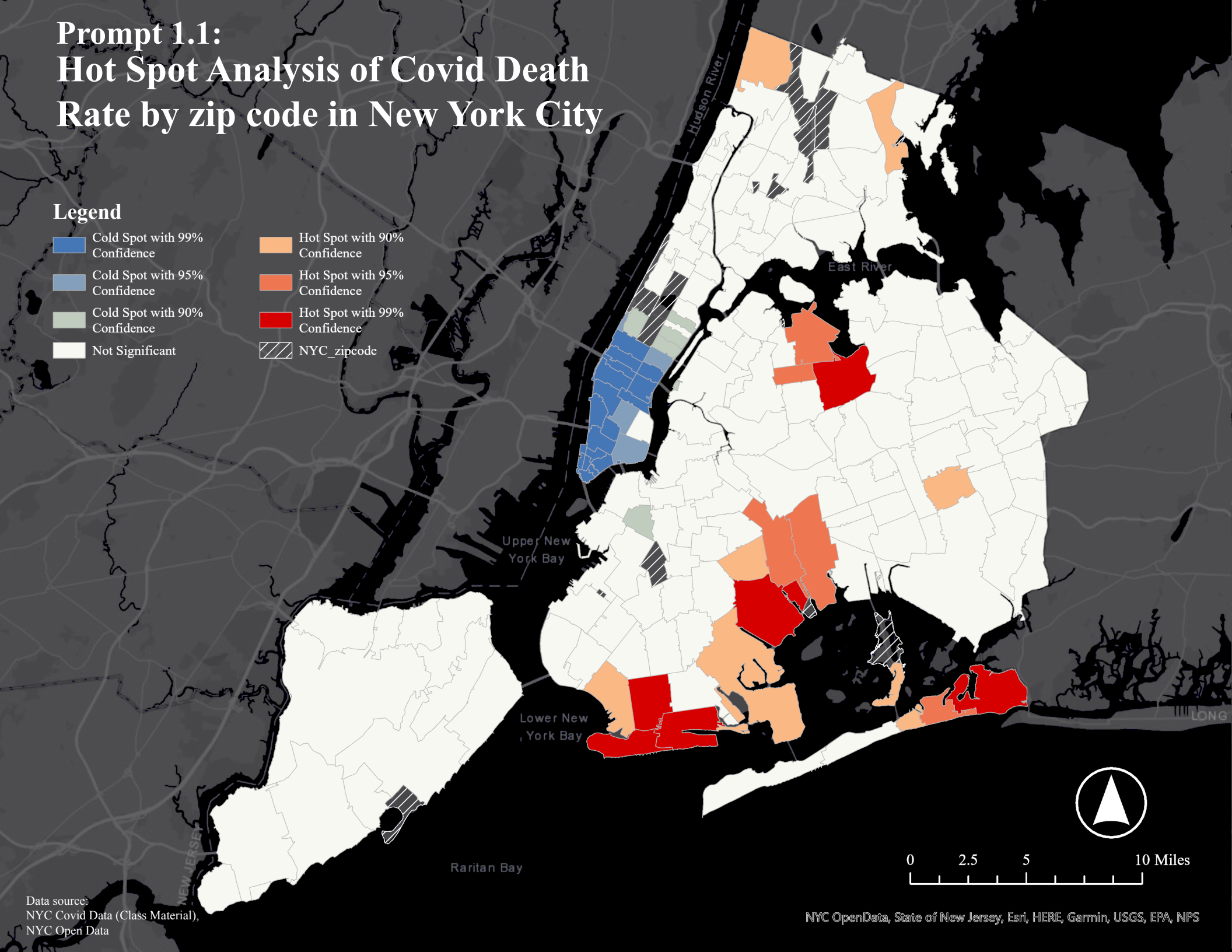
CPLN503 - Final Project Option 2.1

GIS to Study Covid Trends and Deploy Resources

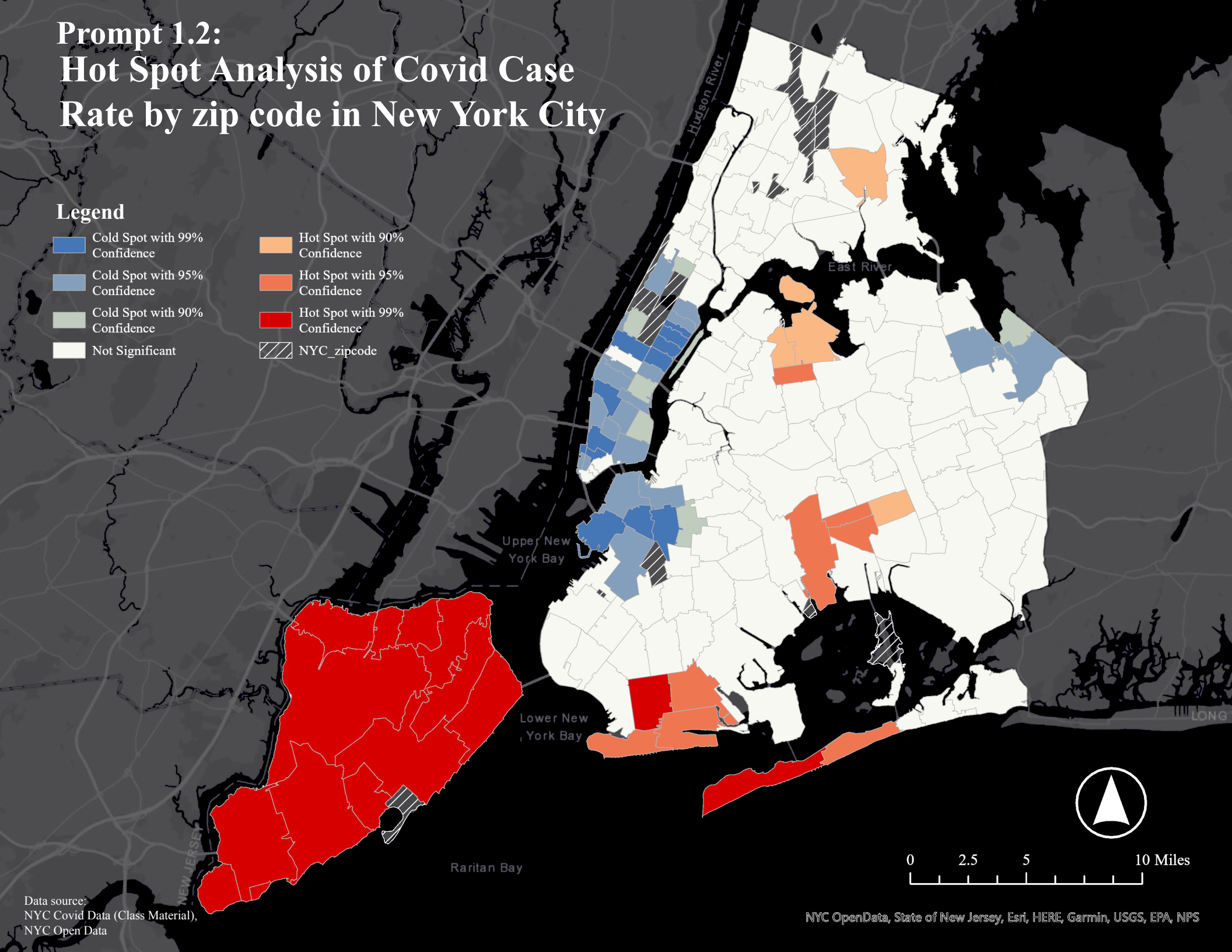
Tianyu Zhang (Neve), December 20, 2023

Prompt 1.1:
Hot Spot Analysis of Covid Death Rate by zip code in New York City



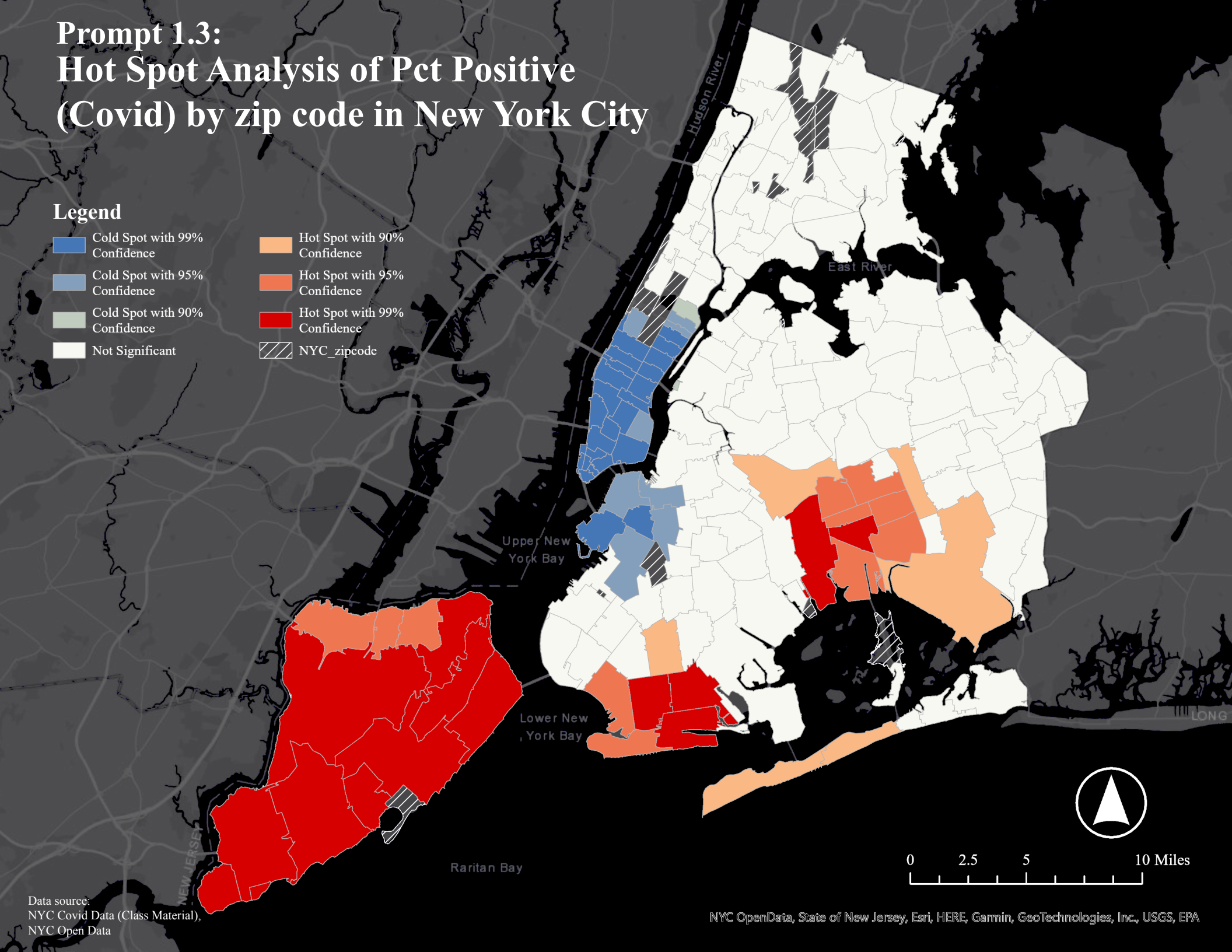
Data source:
NYC Covid Data (Class Material),
NYC Open Data

Prompt 1.2:
Hot Spot Analysis of Covid Case Rate by zip code in New York City



Data source:
NYC Covid Data (Class Material),
NYC Open Data

Prompt 1.3:
Hot Spot Analysis of Pct Positive (Covid) by zip code in New York City



Data source:
NYC Covid Data (Class Material),
NYC Open Data

Prompt 1.4:
Observation of Cluster by Cases/Deaths Patterns

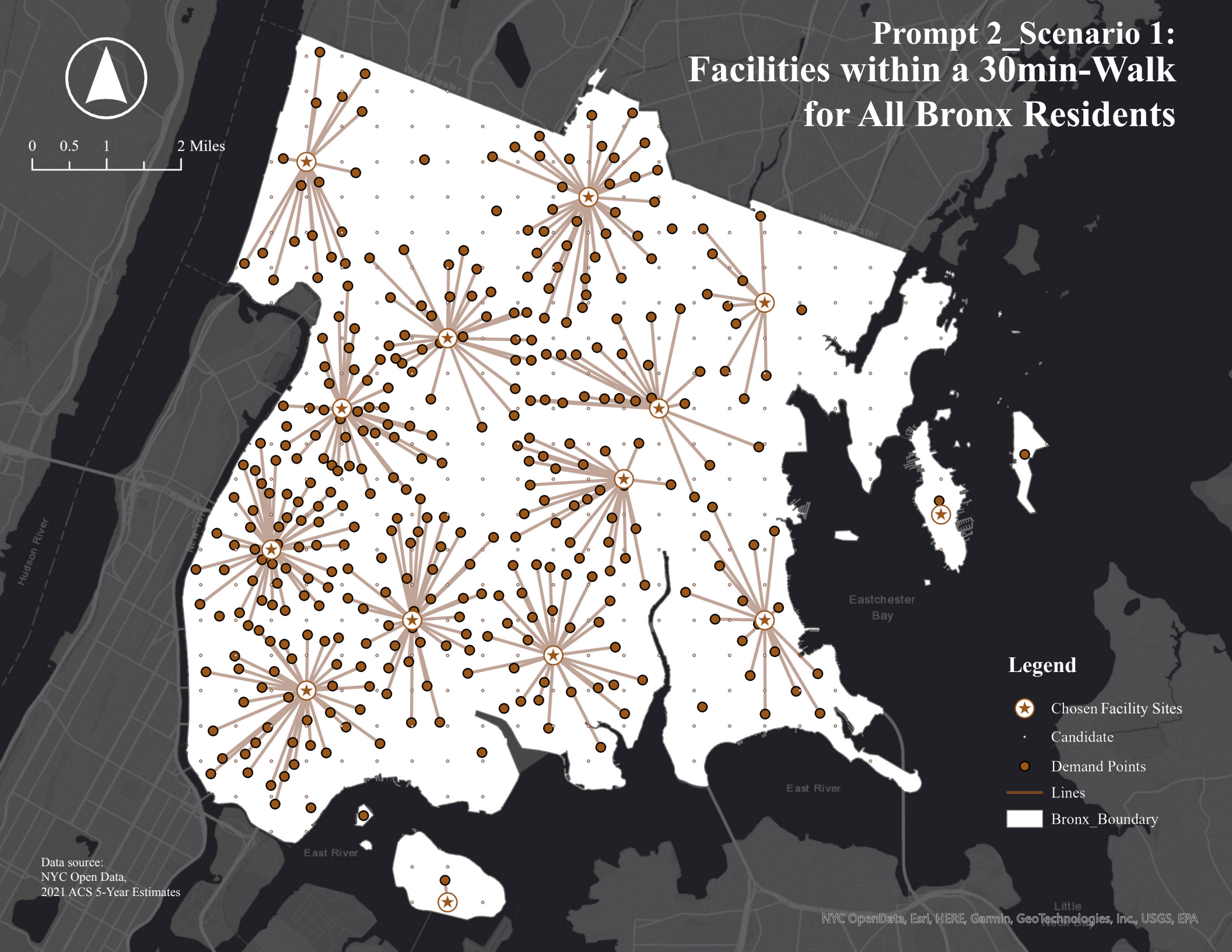
Correlations between clusters of cases and cluster of deaths vary across regions. Comparing only the last two maps, which respectively analyzes clustering of Covid Case Rate and Percent of Positive (Covid), the alignment between hot/cold spots is stronger, affirming the trend that regions with a higher Covid case rate will likely have a higher percent of positive Covid tests. As indicated by both maps, the southern edge of Brooklyn, area from Breeze Point to Jacob Riis Park, region near the JFK airport, and Staten Island are most prone to Covid infections. Political factors may explain this observed pattern, as supports for the Republican Party tend to be stronger in these regions.* As a result, the influence of Trump administration and its negligence towards Covid outbreak could have deeply influenced residents' bahavior; for instance, residents of Staten Island are said to be especially hostile towards mask mandates and other preventive measures.**

On the other hand, disparities between clusters of cases and cluster of deaths is most evident in Staten Island and the eastern tip of the Rockaway beach (or Far Rockway). These disparities likely relate to these region's racial composition. As of June 1, 2020, northern zip codes of Staten Island, predominantly black neighborhoods, unproportionately made up 54% of Covid-related deaths of the entire region.*** However, this worrisome situation might have been suppressed in the death rate map due to counter-acting forces by State Island's southern zipcodes, which feature more white-dominant, wealthier households. On the other hand, Far Rockway is also home to predominantly black communities, and had significantly lower vaccination rate comparing to the western tip of the beach.**** As a result, the death rate is seen as much higher in Far Rockway.

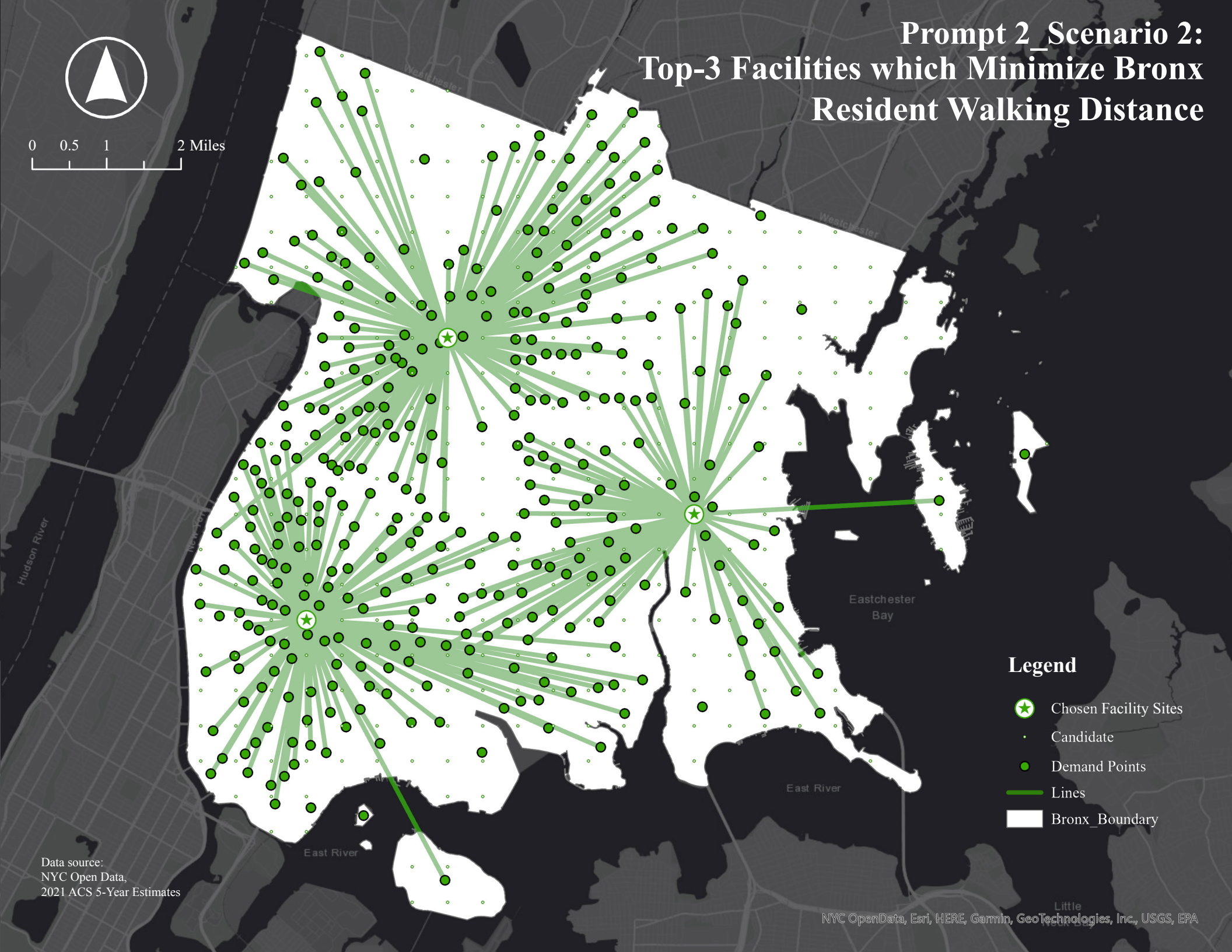
Lastly, it is worth noting that most parts of the Manhattan Borough have been consistently identified as cold spots across all three maps. This is most likely tied to high concentration of wealth in the region, which would enable better healthcare resources and preventive measures, despite its high population density.

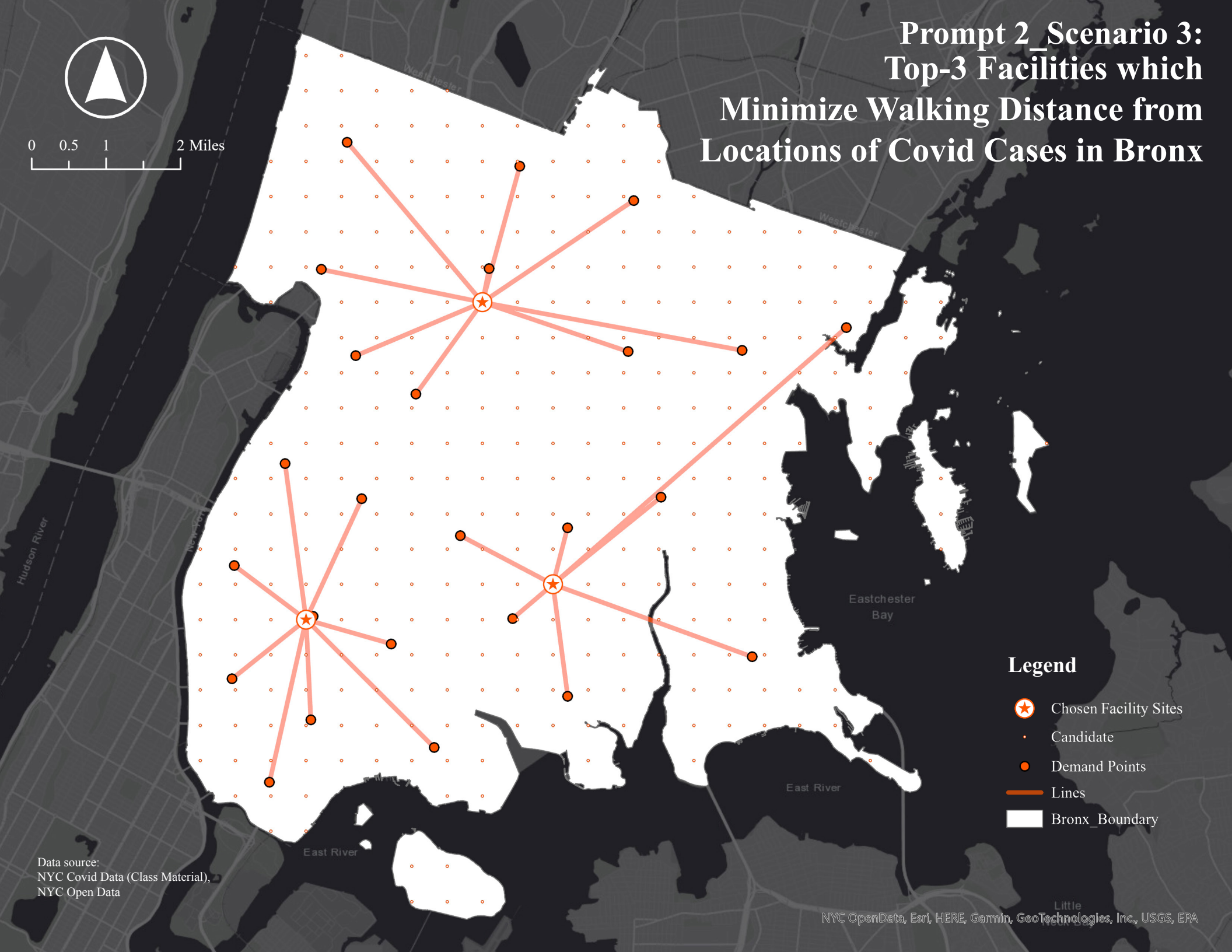
* Matthew Block and Wilson Andres, "How Every New York City Neighborhood Voted in the Republican Primary," The New York Times, updated April 20, 2016, https://www.nytimes.com/interactive/2016/04/19/us/elections/new-york-city-republican-primary-results.html#11/40.7100/-73.9800.
** Amanda Farinacci, "Staten Island is seeing a rise in coronavirus cases. Here are the neighborhoods with the highest rates," silive.com, December 10, 2020, https://www.silive.com/coronavirus/2022/04/staten-island-is-seeing-a-rise-in-coronavirus-cases-here-are-the-neighborhoods-with-the-highest-rates.html.
*** Clifford Michel, "COVID-19 Deepens a Longstanding Staten Island Divide," The City, June 3, 2020, https://www.thecity.nyc/2020/06/03/staten-island-divisions-deepened-by-covid-19-impact/.
**** David Brand and Rachel Vick, "'Shameful' Rockaway Peninsula vaccination rates illustrate zip code-level disparities," Queens Daily Eagle, February 16, 2021, https://queenseagle.com/all/shameful-rockaway-peninsula-vaccination-rates-illustrate-zip-code-level-disparities.

Prompt 2_Scenario 1: Facilities within a 30min-Walk for All Bronx Residents



Prompt 2_Scenario 2: Top-3 Facilities which Minimize Bronx Resident Walking Distance




Prompt 2_Scenario 3:
Top-3 Facilities which
Minimize Walking Distance from
Locations of Covid Cases in Bronx
0 0.5 1 2 Miles
Hudson River
Westchester
Eastchester
Bay
East River
East River
Legend
Chosen Facility Sites
Candidate
Demand Points
Lines
Bronx_Boundary
Data source:
NYC Covid Data (Class Material),
NYC Open Data
NYC OpenData, Esri, HERE, Garmin, GeoTechnologies, Inc., USGS, EPA

Prompt 2.4:
Evaluating Similarities and Differences Across Scenarios

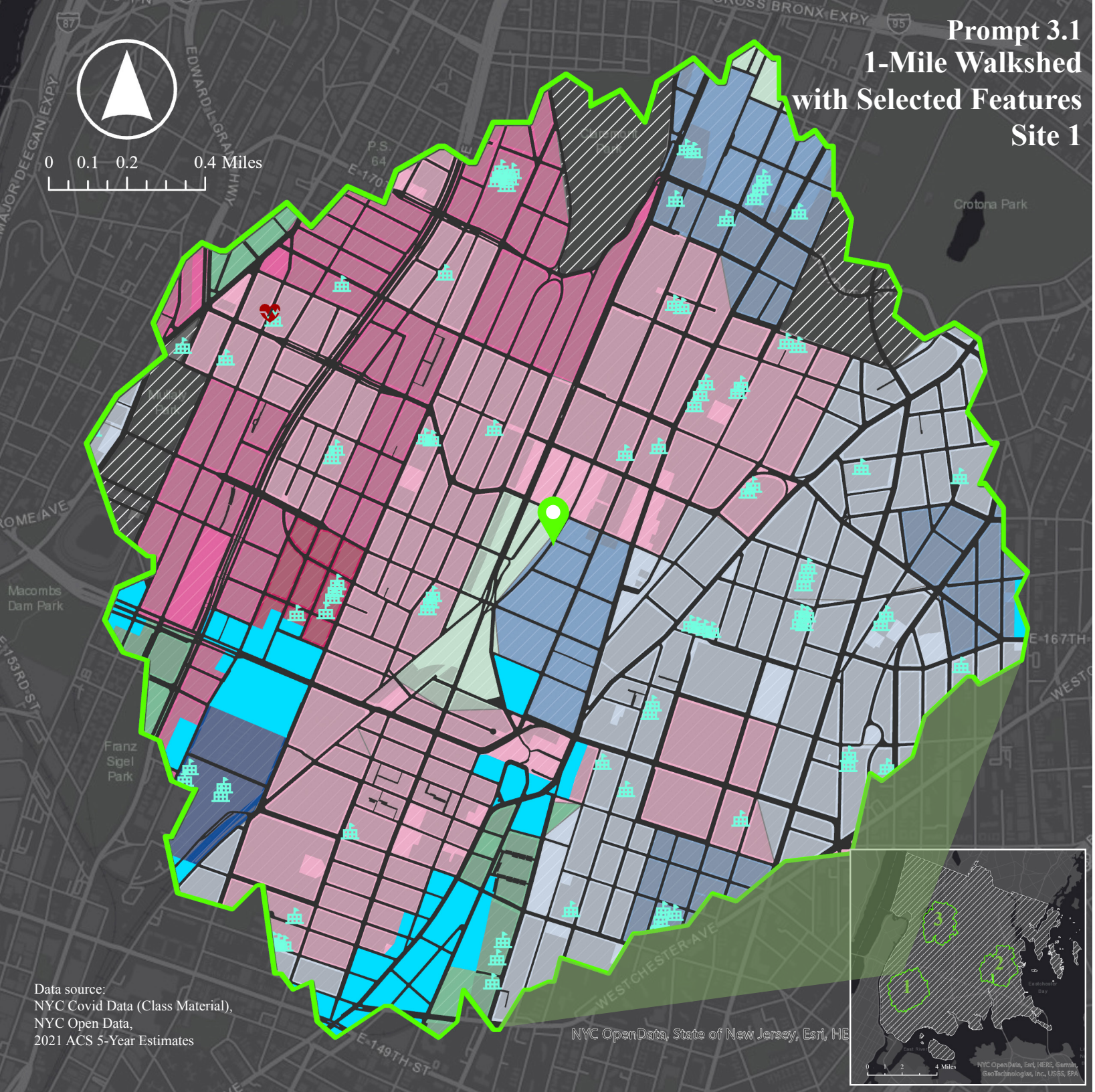
Unlike Scenario 2 and 3, Scenario 1 features the largest number of facilities distributed throughout Bronx. This is due to the only cutoff factor being 30-min walking time, which imposes no limit on the maximum number of potential facility sites. Nonetheless, chosen facility sites in this scenario tend to concentrate towards the lower west parts of Bronx, indicating higher population in those regions.

In contrast, both Scenario 2 and 3 are restricted by a maximum number of facility sites the analysis could select (3). In Scenario 2, the analysis weighs total population by census tract to deploy potential facilities, thus favoring sites close to places with high population counts. On the other hand, in Scenario 3, the analysis weighs count of Covid cases by zip code to deploy potential facilities, thus favoring sites close to places with high numbers of Covid cases. Noticeably, both Scenario 2 and 3 have identified similarly located sites in lower and upper west sections of Bronx, potentially indicating simultaneously high population and number of Covid cases in those two regions.

Prompt 3:

1-Mile Walkshed Feature Analysis for Proposed Facility Sites

Furthering analysis developed in Prompt 2, this section will summarize data around the proposed facility sites to offer an development glimpse. Since the City is interested in using these facilities to combat both Covid and future pandemics, which may unfold in different patterns, the study opts to analyze walkshed for Scenario 2 sites.



Trend 1: The walkshed is densely populated
Trend 2: The walkshed's census tracts make up a mix of high and low income level.
Trend 3: The walkshed has a high distribution of amenities, including multiple schools and a hospital
Trend 4: The walkshed's zoning is largely residential, with a cluster of commercial developments towards the lower west.
Trend 5: The walkshed is highly accessible with evenly distributed roadbed.

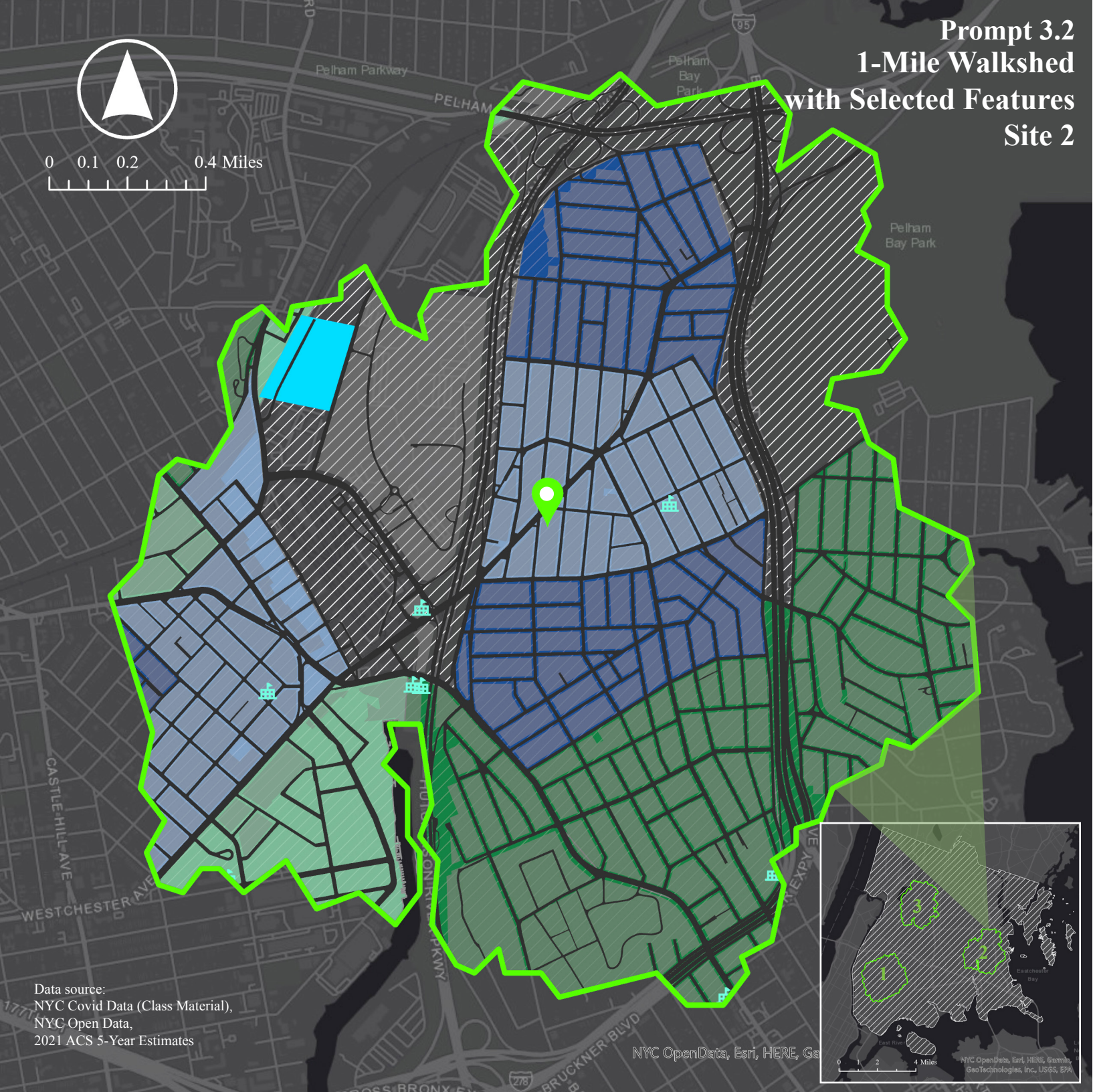
Legend

- Bronx_Health_Hospitals
- 1miWalkshed_Scenario2
- Scenario2 Sites
- Bronx_PublicSchool
- Bronx_Roadbed
- Bronx_Czoning
- Bronx_Residential_by_Lot
- Bronx_Boundary

- MedIncome
- Bronx_Pop.Density

High
Low
Low High

Prompt 3.2
1-Mile Walkshed with Selected Features Site 2



Trend 1: The walkshed's lower section is sparsely populated.
Trend 2: The walkshed is generally composed of wealthy census tracts.
Trend 3: The walkshed features sparse amenities, with only five schools and no hospital.
Trend 4: Local zoning is largely residential, with limited commercial developments.
Trend 5: The walkshed is cut through by multiple highways.

Legend

- Bronx_Health_Hospitals
- 1miWalkshed_Scenario2
- Scenario2 Sites
- Bronx_PublicSchool
- Bronx_Roadbed
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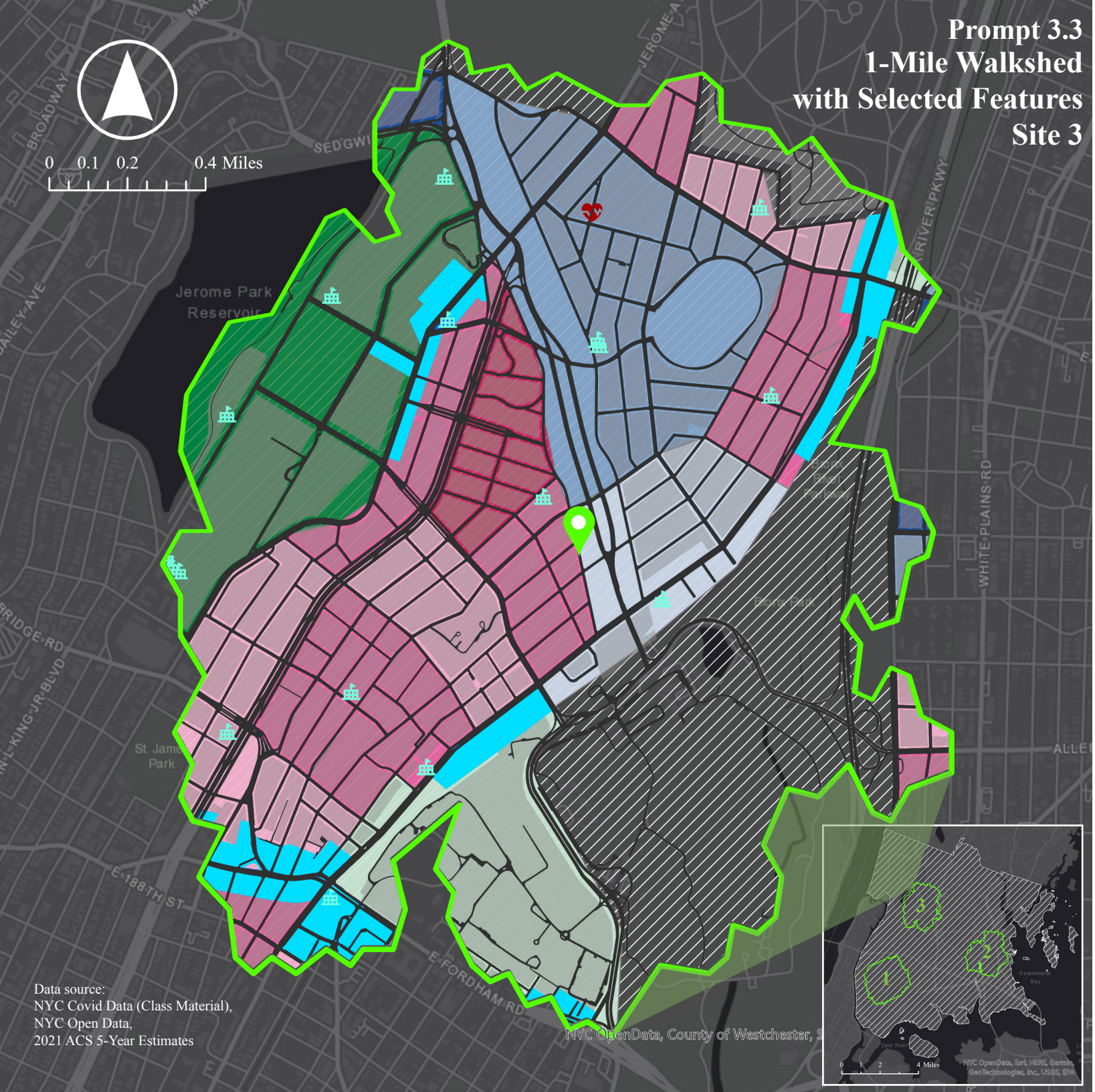

Trend 1: The walkshed's central zone is densely populated.
Trend 2: The walkshed is generally composed of wealthy census tracts.
Trend 3: The walkshed has a good distribution of facilities, including multiple schools and one hospital.
Trend 4: Local zoning features a fair share of residential with commercial and other types of zoning.
Trend 5: The walkshed is cut through by multiple highways. The upper west section has limited roadbed.

Legend

- Bronx_Health_Hospitals
- 1miWalkshed_Scenario2
- Scenario2 Sites
- Bronx_PublicSchool
- Bronx_Roadbed
- Bronx_Czoning
- Bronx_Residential_by_Lot
- Bronx_Boundary

- MedIncome
- Bronx_Pop.Density

High
Low
Low High