



New Jersey Town Centers Distributed Energy Resource Microgrids Potential

Statewide Geographic Information Systems Assessment

October 2014

Acknowledgments

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Principal Investigator Thomas Dallesio AICP/PP, Director, Center for Resilient Design, NJIT

Grants Administrator Mary Delano, Center for Building Knowledge, NJIT

Consultants L. Nicolas Ronderos, New York Director, RPA
 Laura Tolkoff, Senior Planner for Energy and Environment, RPA
 Rewa Marathe, Energy & Environment Intern, RPA

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Seaside Heights (Mario Tama/Getty Images)



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Table of Contents

Executive Summary	1
Chapter 1. Introduction	2
Case Study 1. Princeton, NJ	3
Case Study 1. Co-op City, Bronx	3
Chapter 2. Methodology	4
Step 1. Identify Facilities and Buildings in the Sandy-Affected Counties	4
Step 2. Classify Facilities and Buildings	4
Step 3. Identify Potential Errors and Recalibrate	5
Step 4. Identify Clusters of Facilities That Could Serve as Potential Sites	5
Step 5. Analyze and Prioritize Clusters of Facilities	5
Next Steps	5
Chapter 3. Atlantic County	10
Chapter 4. Bergen County	12
Chapter 5. Hudson County	16
Chapter 6. Cape May County	20
Chapter 7. Essex County	24
Chapter 8. Middlesex County	28
Chapter 9. Monmouth County	30
Chapter 10. Ocean County	32
Chapter 11. Union County	34



Master Sgt. Mark Olsen/U.S. Air Force, via European Pressphoto Agency

Executive Summary

This report presents the findings of an analysis of potential locations for distributed energy resources in the Sandy-affected region of New Jersey, as defined by the U.S. Department of Housing and Urban Development. The analysis conducted for this project uses spatial statistics to identify clusters of public facilities and buildings located in low- and moderate- income areas that, taken together, comprise “town centers” that may be suitable for community microgrids. A town center is defined as a geography that includes statistically significant public buildings and facilities that overlap or are adjacent to low-to-moderate income census tracts. For each town center, a potential anchor is identified. An anchor could be a wastewater treatment plant or a statistically significant public facility or building. This analysis identifies 27 town centers in 19 municipalities the 9 Sandy-affected counties in New Jersey.

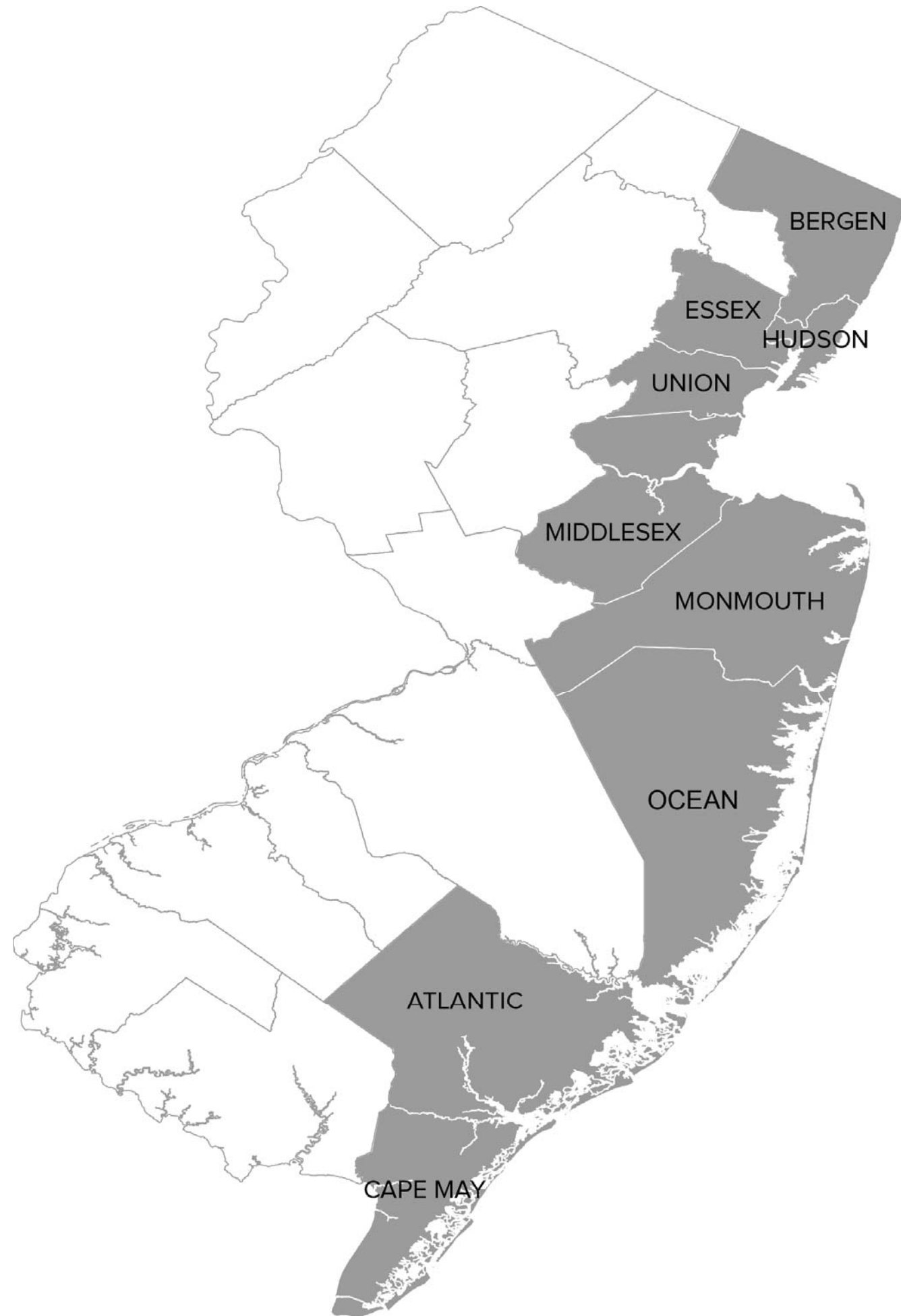
The project did not attempt a detailed site-by-site evaluation of each facility and building’s electric and thermal consumption, but was based on geospatial methods and best practices for community microgrid planning methods. As such, the findings in this report represent the first phase of a screening study. Subsequent studies will need to assess daily and hourly energy needs and evaluate the technical and financial feasibility of installing distributed generation at the proposed sites.

This report is intended for use by public officials, decision-makers and community members as a first level screening study. Chapter 1 introduces the role of distributed energy resources in providing resilience to the electric grid. It also provides two high-level case studies of where distributed energy resources have been used successfully to provide reliable and resilient power. Chapter 2 is a high-level methodology that explains the analysis. Chapters 3 through 11 present the county-level findings from the analysis—one chapter for each of the Sandy-affected counties in New Jersey. Each of these chapters provides an atlas with one or more clusters of facilities and buildings that comprise a “town center”.

This analysis identifies 27 town centers in 19 municipalities the 9 Sandy-affected counties in New Jersey.

- Atlantic City (1)
- Bayonne (2)
- Bergenfield (1)
- Cape May (2)
- Elizabeth (2)
- Galloway Township (1)
- Garfield (2)
- Hoboken (1)
- Jersey City (1)
- Lakewood (2)
- Lodi (1)
- Long Branch (1)
- Newark (3)
- New Brunswick (2)
- Ocean City (1)
- Red Bank (1)
- South Amboy (1)
- Union City (1)
- West New York (1)

Figure 1. Geographical Area of Study



Chapter 1. Introduction

The electric grid is a monumental feat of engineering, physics, and economics. The grid works so well to meet daily needs—powering subways, computers and cell phones, trading floors and data centers, lighting traffic signals and heating homes—that it is hardly noticed. That changed on October 29, 2012 when Hurricane Sandy made landfall in Brigantine New Jersey, leaving millions of people without power, some for weeks.

Hurricane Sandy was a wakeup call that demonstrated how vulnerable the electric grid is to shocks and stressors, such as extreme weather. For over 100 years, the central-station model of electricity has served us well, but new demands coupled with technological advances are changing the way electricity can be generated, transmitted and delivered to where it is used. In a central-station model, there is a one-way flow of power and information from generators to customers. This can make it challenging to locate and respond to outages when they occur. Distributed energy resources (DER) can provide power locally to an area where the electricity is consumed. Distributed generation (DG) is one type of distributed energy resource in which distributed plants are connected to the distribution network or to the customer side of the meter. DG technologies generate power locally, minimize line losses, allow for greater cost control, and enable islanding and black start capabilities. Together, these benefits can provide New Jersey with reliable and resilient energy to keep the lights on during “blue sky” days and emergencies alike.

New Jersey is looking at distributed generation as a way to provide reliable and resilient energy. DG can accommodate both hydrocarbon-based technologies such as combined heat and power (CHP) and renewable technologies (solar, geothermal, wind, anaerobic digestion, etc.). Microgrids are one type of distributed generation. As defined by the U.S. Department of Energy, microgrids are “localized grids that can disconnect from the traditional grid to operate autonomously and help mitigate grid disturbances to strengthen grid resilience” (energy.gov). A community microgrid is a small-scale power grid that is “specifically designed to meet some of the energy needs of a community” and has definable boundaries (PACE, 2).

This report is intended to identify “town centers” that could be supported by a community microgrid. As such, the project did not attempt a detailed site-by-site evaluation of each facility and building’s electric and thermal consumption, but was based on geospatial methods and best practices for community microgrid planning methods.

Case Studies

Princeton, NJ

Princeton University is home to Princeton Energy Plant, a district energy facility that powers, heats and cools many buildings on campus. The plant has 4.5 MW of solar generation and a 15 MW gas turbine. It can serve a peak demand of 27 MW and support approximately 12,000 people. Since its completion in 1996, it has saved 18,000 metric tons of carbon dioxide. It is connected to the larger electric grid in two places: the cogeneration facility connects the western part of campus at PSE&G's Elm substation and the eastern part of campus at PSE&G's Charlton substation (Thomas A. Nyquist, November 12, 2013). Since it is connected to two substations, can be islanded from the grid, has multi-fuel capacity and black start capabilities, the Plant provides the University with the resilience it needs. Critically, it also helps Princeton maintain its leading position as a world-class research university by ensuring that its labs and research are secured when a grid outage occurs.

Figure 2. Princeton Co-generation Plant



Google Maps

Co-op City, Bronx

Co-op City is one of the largest cooperative housing developments in the world (UGI Performance Solutions 2013). It contains over 14,000 units across over 40 buildings and is home to over 50,000 people. In 2009, Co-op city replaced its power plant with a cogeneration facility that produces 40 MW of power, enough to meet almost all of Co-op city's demand for electricity and heating. When Hurricane Sandy hit, the cogeneration facility continued to provide heat and hot water. To the residents of Co-op City, this was a welcome added benefit to the lower energy costs and clean energy that they already enjoyed.

Figure 3. Co-op City Co-generation plant



Google Maps

Figure 4. Co-op City, Bronx



"Co-op City Hutch River" (Wikipedia)

Chapter 2. Methodology

This analysis is intended help define the boundaries of a community or “town center” and the buildings that could be supported by a community microgrid. As such, the project did not attempt a detailed site-by-site evaluation of each facility and building’s electric and thermal consumption, but was based on geospatial methods and best practices for community microgrid planning methods.

Several criteria were used to guide this analysis and to ensure that investments comply with federal funding sources that are seeding the New Jersey Energy Resilience Bank. Potential town centers must:

- ▶ Be located in the nine Sandy-affected counties of New Jersey;
- ▶ Include two or more public facilities or buildings located approximately no more than 0.5 miles from each other;
- ▶ Be located in census tracts in which at least 50% of the residents are low-to-moderate income, as defined by the U.S. Department of Housing and Urban Development.

Figure 5. Process Diagram



STEP 1. Identify Facilities and Buildings in the Sandy-Affected Counties

The first step was to identify the public facilities and buildings to be included in this analysis. These included: but were not limited to hospitals, police stations, emergency shelters, correctional facilities, fire stations, schools, public housing units and waste water treatment plants. Once all of the raw files were obtained, the data were processed so that they could be used in this analysis. First, all files were clipped to the geography under study—the nine Sandy-affected counties in New Jersey, as defined by the U.S. Department of Housing and Urban Development (HUD). In some cases, polygon features were converted to point features. In other cases, information was disaggregated and re-classified. For instance, the public buildings were downloaded as part of the MOD_IV tax dataset for New Jersey. It included schools, libraries, senior centers, town halls, academic institutions, museums, correctional facilities and youth centers. These were then isolated into separate layers for each type of public building listed above. All of the data was then classified into the following six categories: education, inpatient health facilities, office, service, public assembly, and public safety and order. Table 1 shows how each building type was reclassified into the six categories.

STEP 2. Classify Facilities and Buildings

This analysis used tools from the spatial statistics toolset in ESRI's ArcGIS. The specific tool used is called a Cluster-Outlier Analysis. A Cluster-Outlier analysis is a spatial statistics tool that identifies statistically significant hot spots, cold spots, and spatial outliers using the Anselin Local Moran's I statistic.

In order to run, this tool requires each data point to have a numerical classification, which can either be a weight or a simple categorical classification. For the purpose of this analysis, categorical classifications were used based on electric and thermal load and on criticality for each facility and building type. This section describes the method for assigning these classifications.

Classify by Electric and Thermal Load

Each of the facilities and buildings were then processed so that they could be used for analysis. Facilities and buildings were first classified by electric and thermal load. The Energy Information Administration's Commercial Building Energy Consumption Survey (CBECS) (2003) was used to classify electric and thermal load. The CBECS is intended to provide basic statistical information about energy consumption and expenditures in U.S. commercial buildings. The latest complete dataset is available for 2003. In further studies, daily, hourly and sub-hourly electric and thermal loads should be acquired from distribution utilities and property owners in order to assess technical feasibility more precisely.

Each facility and building type was classified according to the building types defined in CBECS: education, inpatient health facilities, office, service, public assembly, and public safety and order. Energy consumption per square foot for each building type based on data from CBECS was used to create categorical classifications. The classifications are listed in Table 1.

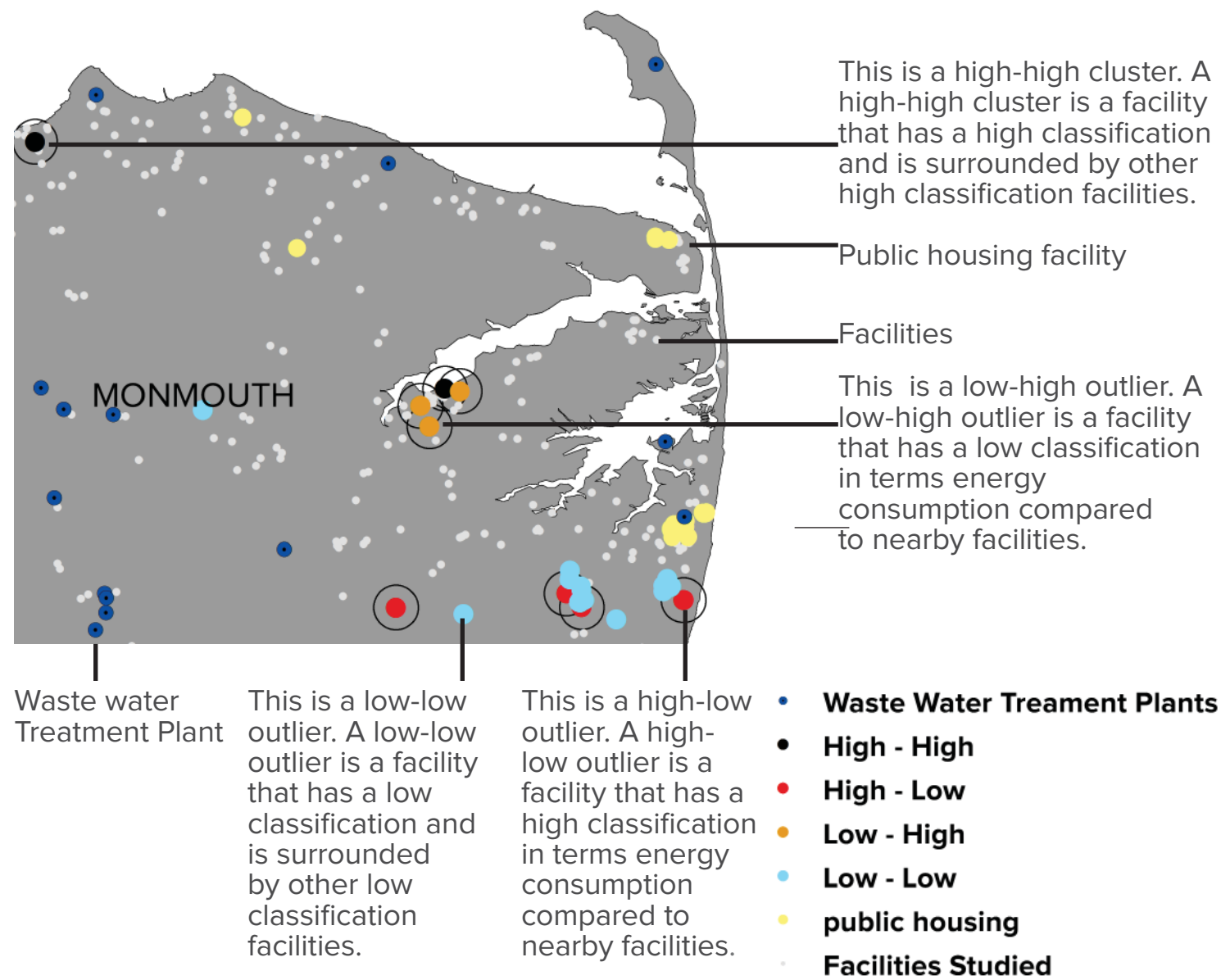
Classify by Criticality

Next, buildings were classified by criticality using Federal Emergency Management Agency's (FEMA) definition, which defines facilities and buildings as critical based on their centrality for life safety. According to FEMA, Category I buildings include buildings and structures whose failure would represent a low hazard to human life. Category II buildings include those that are not specifically included in other categories. Category III includes buildings and structures that represent a substantial hazard to human life in the event of failure. Category III includes buildings with higher concentrations of occupants, such as schools, colleges, adult education, and daycare facilities. Category IV buildings and structures are the most critical for life safety. These include essential facilities such as hospitals, fire and police stations, rescue and other emergency service facilities, water supply facilities, and others.

Table 1. Categorical Classification of Facilities & Buildings Based on Energy Consumption & Criticality

Principal Building Activity	Energy Consumption (1000s BTU per square foot)	Energy Consumption Classification	Criticality Classification
Service	77	1	1
Education	83.1	2	3
Office	92.9	3	2
Public Assembly	93.9	4	3
Public Safety & Order	115.8	5	4
Inpatient Health Facility	249.2	6	4

Figure 5. Map Reference



Step 3. Identify Potential Errors and Recalibrate

The next step was to identify and correct any potential errors. For example, the MOD IV data set often has missing data. Using Google Earth, sites were manually inspected to identify other potential locations that could be included in this analysis. Through this inspection, about twenty buildings that could be classified as educational facilities that otherwise would not have been included in the analysis were identified.

Step 4. Identify Clusters of Facilities That Could Serve as Potential Sites

Once all of the facilities and buildings were compiled, processed and ready for use a set of spatial statistics tests were run to check the presence of spatial clustering in the data set. The analysis was run on all facilities and buildings except for public housing units and wastewater treatment plants. These are both critical and consume a high amount of energy and are therefore treated independently by layering them of the output of the cluster-outlier analysis.

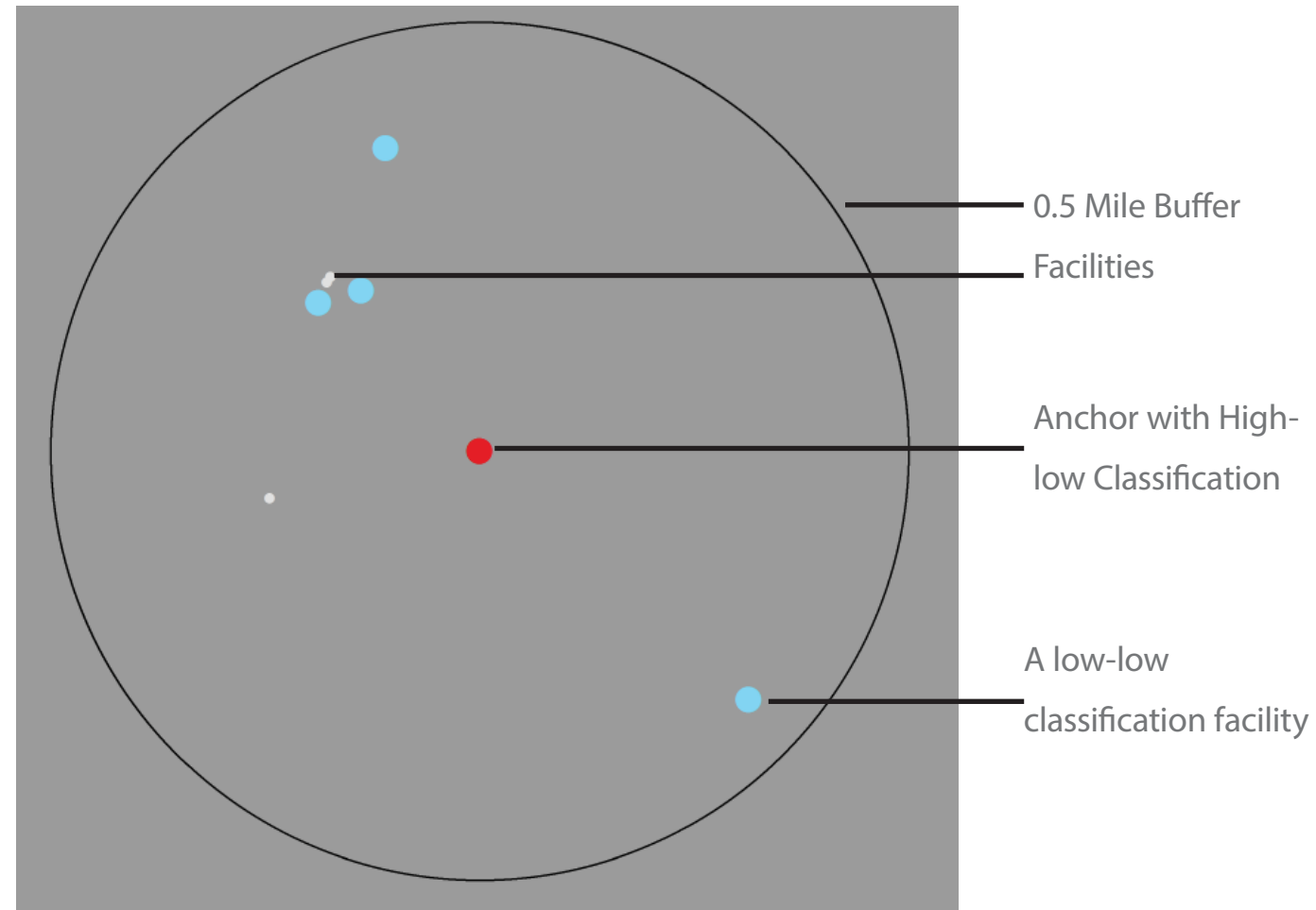
The results of these tests are presented in Appendix A. Once these spatial patterns were confirmed, the cluster-outlier analysis was run on the data. The output indicates spatial clustering and whether the clusters are similar or different. The cluster-outlier analysis identifies statistically significant four types of statistically significant hot spots: high-high, high-low, low-high and low-low. For instance, if the energy consumption is being measured, a “high-high” feature is one that has high energy consumption (5-6) surrounded by other features that are high energy consumers. (5-6). It could be a hospital in close proximity to a fire station. Figure 5 shows how to interpret the outputs of a cluster-outlier analysis.

Step 5. Analyze and Prioritize Clusters of Facilities

The output of the cluster analysis was mapped. Two other types of facilities were layered on top of the output: public housing units and wastewater treatment plants. To identify town centers that could be suitable for a microgrid or CHP facility, only three types of hot spots were prioritized; high-highs, low-highs and high-lows. Low-low hot spots were discarded because they are facilities or buildings with low energy consumption surrounded by other facilities or buildings that also consume a small amount of energy. Microgrids and CHP facilities typically need an “anchor load” that requires a large amount of electric or thermal energy.

Each town center includes at least three facilities and buildings included in the study that are located within a 0.5 mile buffer around an anchor. An anchor can be a public facility or building that is classified as high-high, high-low, or low-high according to the cluster-outlier test. An anchor could also be a waste water treatment plant, which also consumes a lot of energy and

Figure 6. Typical Town Center



has a high thermal output, which makes it suitable for combined heat and power. In this step, 79 potential town centers were identified. Each town center is also overlapping or adjacent to a census tract that is 50-80% low-to-moderate income, as defined by HUD.

Additional criteria were needed to identify priority town center locations from the 79 potential sites. The final 27 town centers include only those that:

- ▶ Have at least 2 facilities within a 0.5 mile distance of the potential anchor.
- ▶ Have at least 1 high criticality facility (e.g. hospital or emergency dispatch) within the 0.5 mile radius.
- ▶ Have public housing units in the 0.5 mile radius
- ▶ Have a waste water treatment plant in the 0.5 mile radius
- ▶ Have facilities that are located in census tracts that are classified as low-to-moderate income

Using these criteria, 52 facilities were dropped. The following chapters present the 27 town centers that were identified as priority locations for New Jersey Energy Resilience Bank investments.

Next Steps

This report is intended help define the boundaries of a community or “town center” and the buildings that could be supported by a community microgrid. As such, the project did not attempt a detailed site-by-site evaluation of each facility and building’s electric and thermal consumption, but was based on geospatial methods and best practices for community microgrid planning methods. Additional studies should assess the:

- ▶ State of existing underground infrastructure where pipes and wires may be placed to connect neighboring buildings and facilities;
- ▶ Daily, hourly and sub-hourly electric and thermal loads, and the simultaneity of loads;
- ▶ Energy efficiency investments that can be made first to reduce demand and to appropriately size a microgrid or CHP facility;
- ▶ Net energy savings and other revenue streams to support the financing of microgrid or CHP facility;
- ▶ Total capital costs, net of expected savings;
- ▶ Potential location of suitable town centers in the other counties of New Jersey.

Chapter 3. Atlantic County

Figure 7. Atlantic County

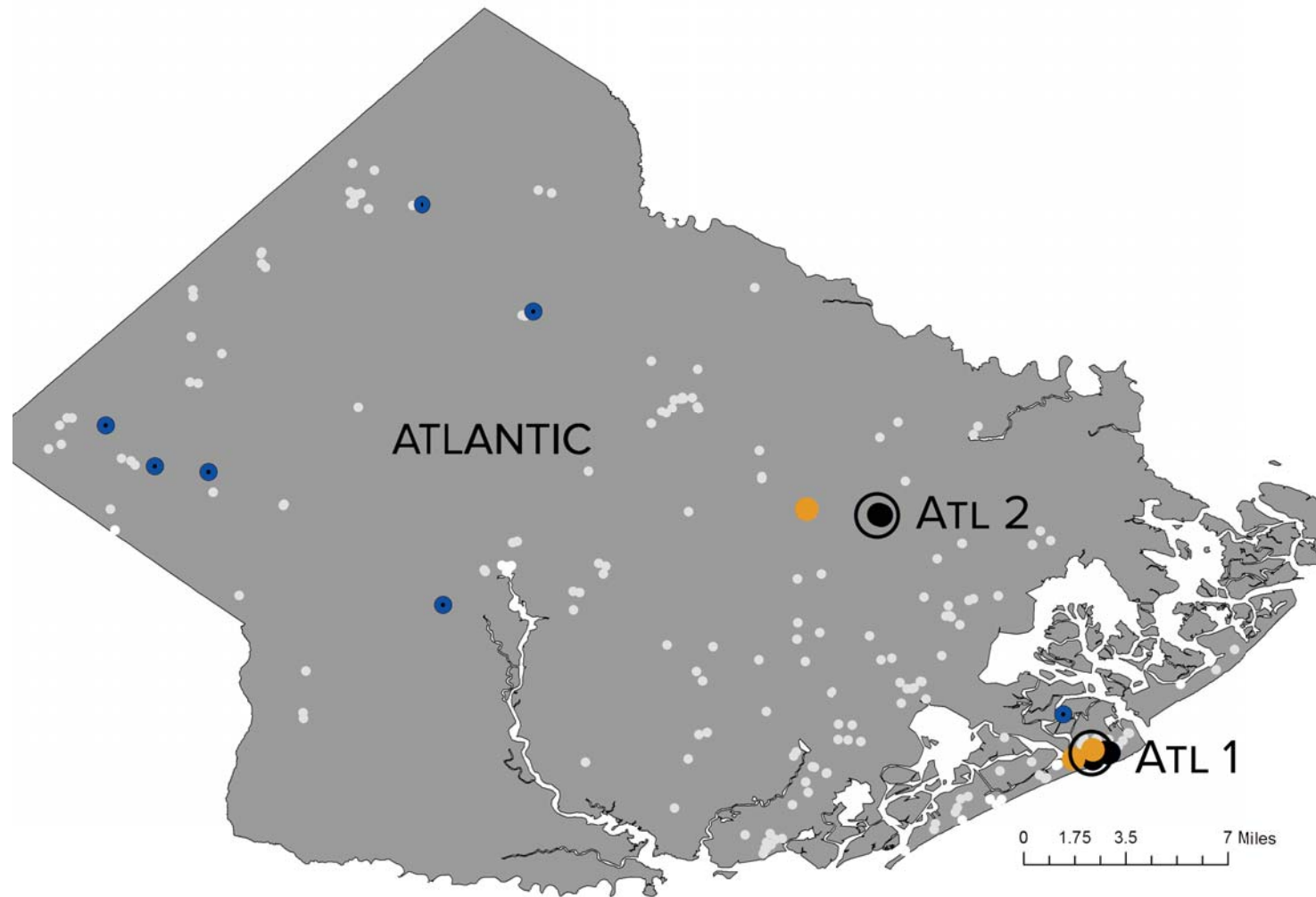
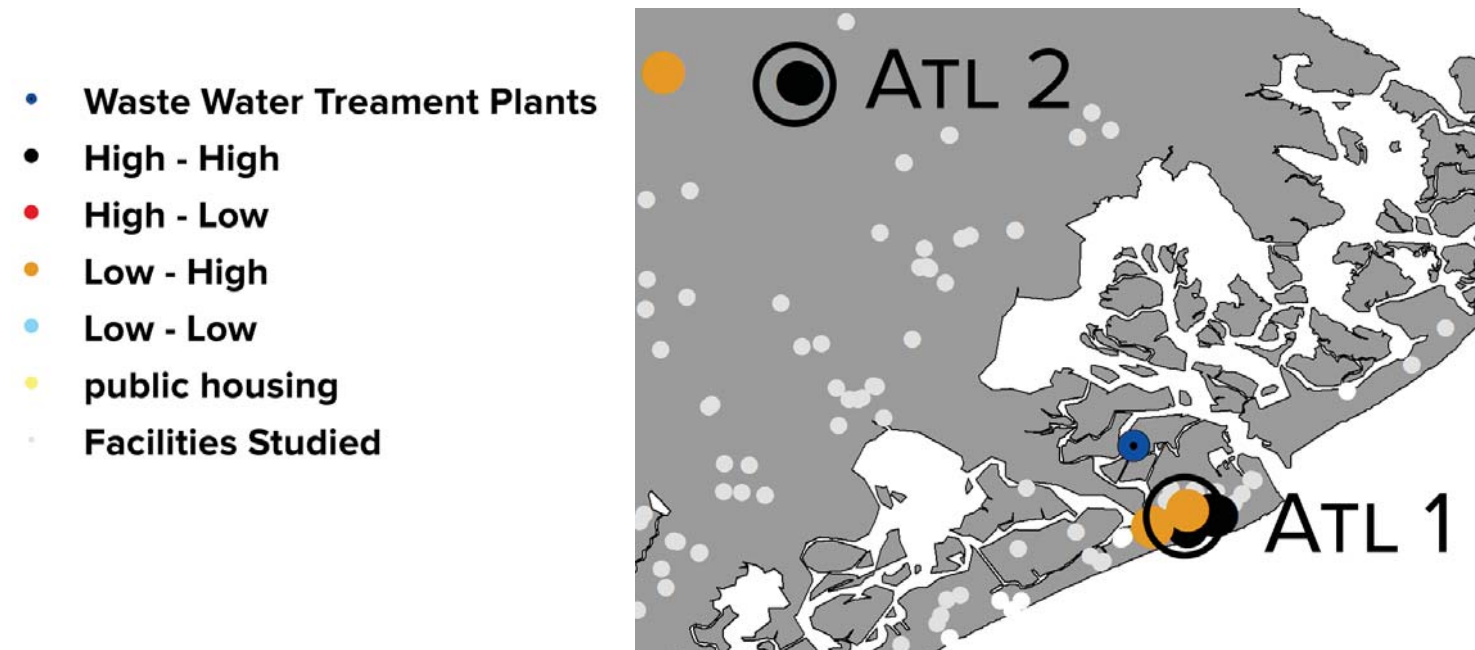


Figure 8. Town Center Locations in Atlantic County



Population ; 275,862 (2013)

Housing Units: 127,278

Median Household Income: \$54,559

Persons below poverty level: 12.8%

Atl 1 and Atl 2 are obvious choices because they include statistically significant “clusters” (high-highs) and “outliers” (low-highs). Where there are “high” facilities, there are potential anchors. Atl 1 is prioritized because it includes diverse set of buildings that might present a range of load profiles and also public housing units that represent vulnerable population of of the community.

Figure 9. Town Center Atl 1

Atl 1. is located in Atlantic City. It contains 88 public housing facilities totalling to 886 public housing units. It also contains two schools and three inpatient healthcare facilities. The anchor for the town center is Atlantic Regional Medical Center.

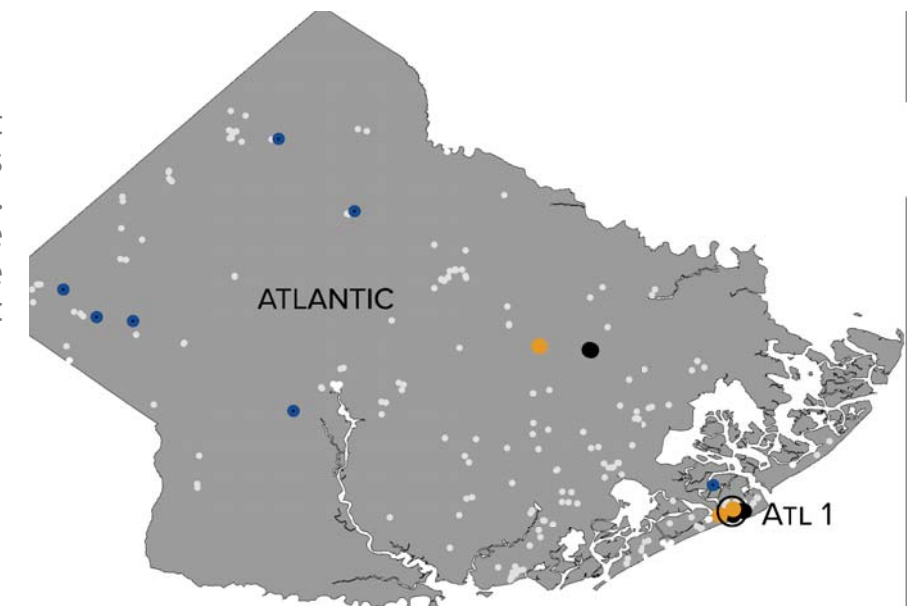
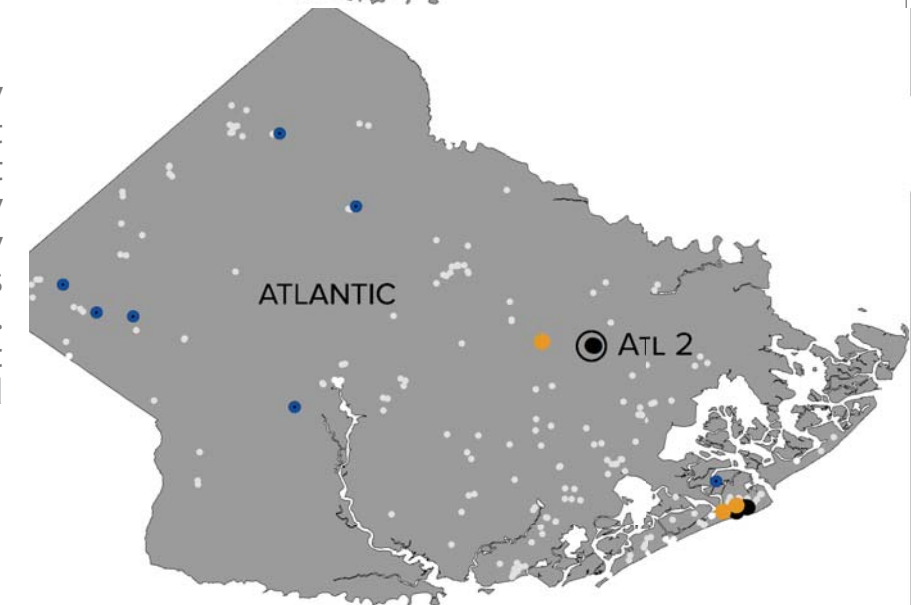


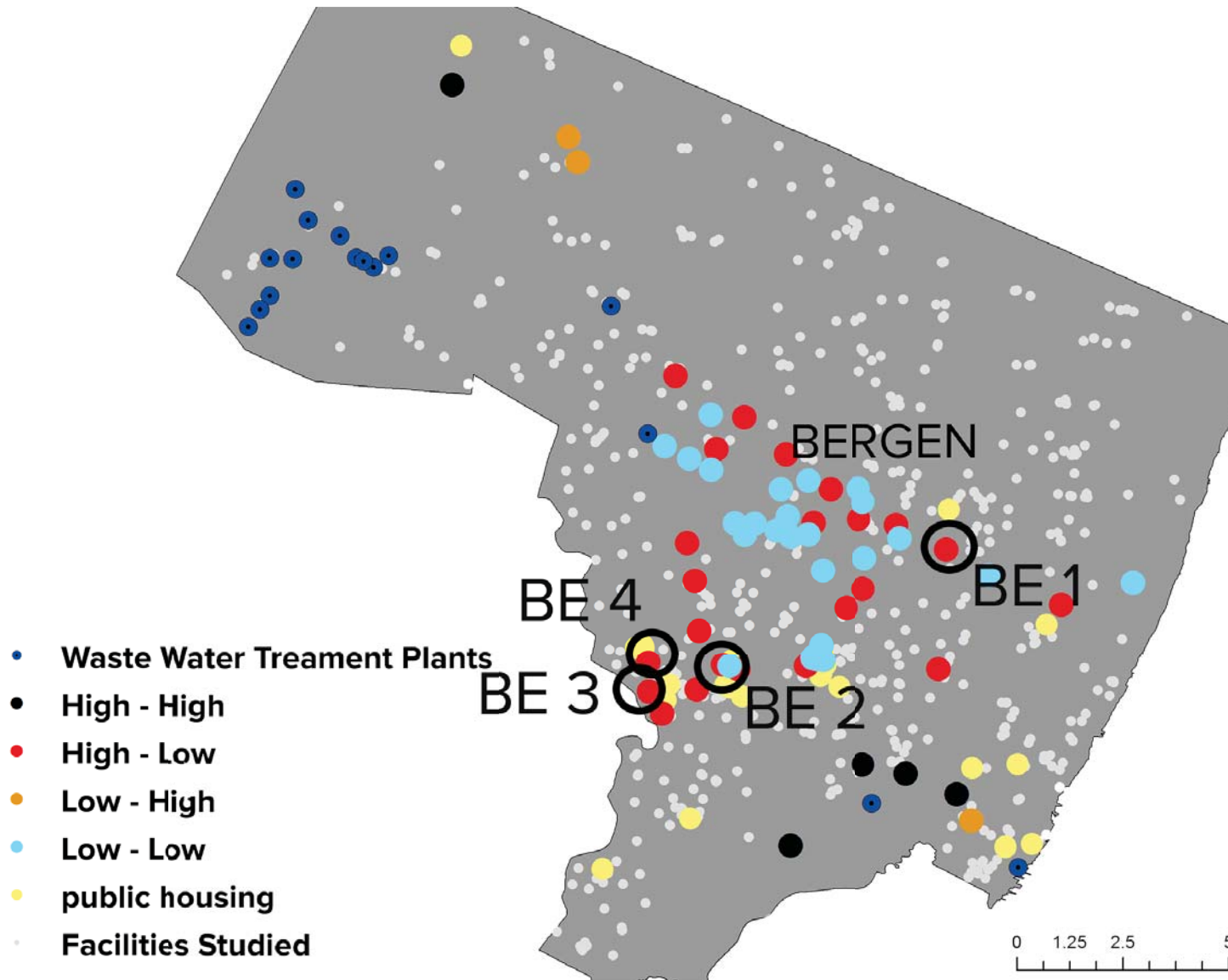
Figure 10. Town Center Atl 2

Atl 2. is located in Galloway township. It contains 2 inpatient healthcare facilities. The next nearest large public facility is Atlantic City International Airport, but this facility was not included in the analysis and is located about 2.5 miles away. The anchor for the facility is Atlantic Regional Medical Center - Mainland Division.



Chapter 4. Bergen County

Figure 11. Town Center Locations in Bergen County



Population ; 925,328 (2013)

Housing Units: 355,088

Median Household Income: \$54,559

Persons below poverty level : 6.6%

These town centers are obvious choices because they include statistically significant “clusters” (high-highs) and “outliers” (low-highs and high-lows). Where there are “high” facilities, there are potential anchors. BE2 and BE3 both include a diversity of buildings, including those that could potentially serve as shelters (schools) and a number of public housing units.

Figure 12. Town Center BE 1

BE 1. is located in the town of Bergenfield. The anchor is Prospect Fire Company Incorporated. This town center includes 1 library and 3 schools.

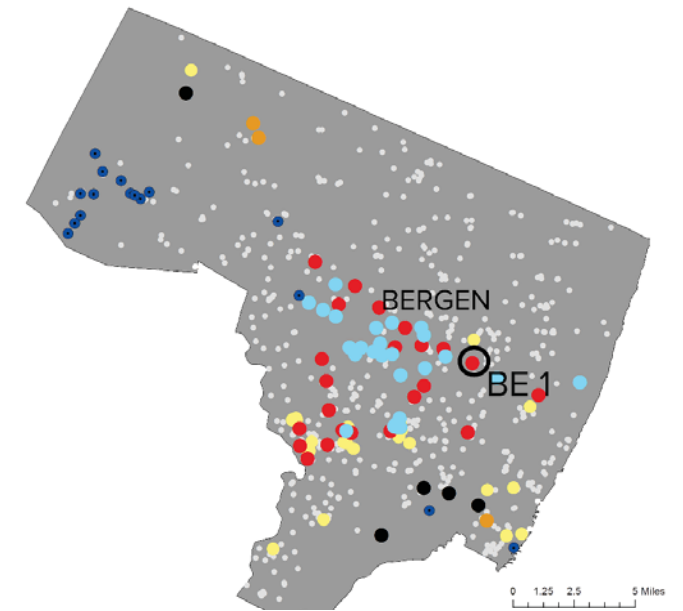


Figure 13. Town Center BE 2

BE 2. is a town center located in Lodi. It is anchored at Lodi ambulance and rescue squad. The town center also includes 2 fire department, 1 school, 1 municipal building and 2 public housing sites called DeVries Park with a total of 40 units.

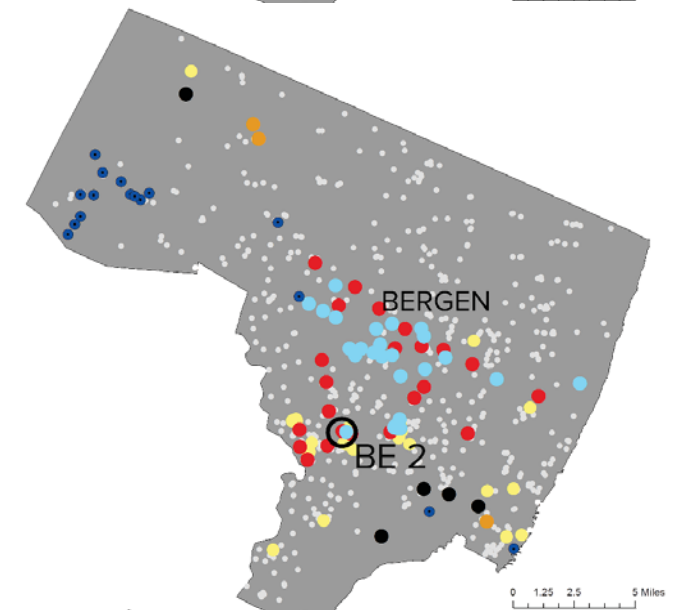


Figure 14. Town Center BE 3

BE 3. is a town center in Garfield. It is anchored at the City of Garfield Fire Department Company 2. It includes 1 more fire department and 2 schools. It also includes 285 units of Garfield Public Housing Authority.

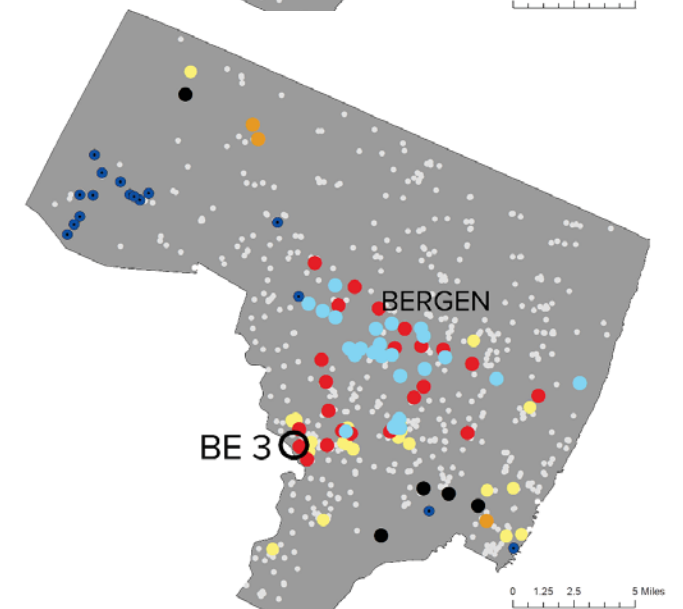
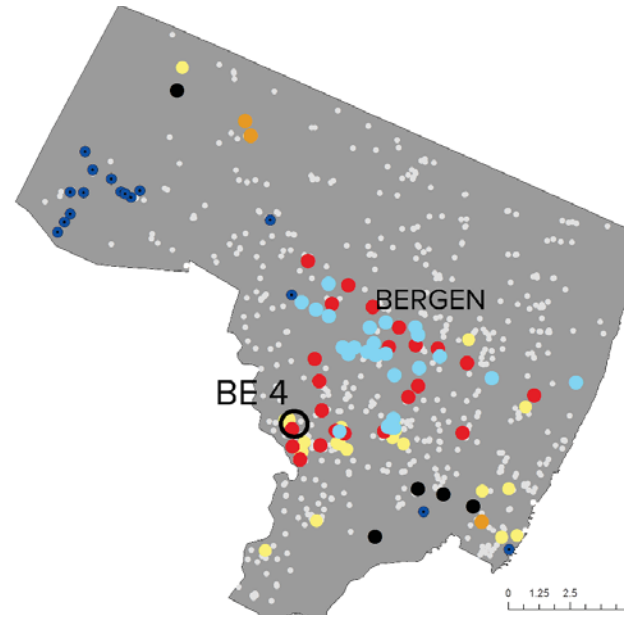


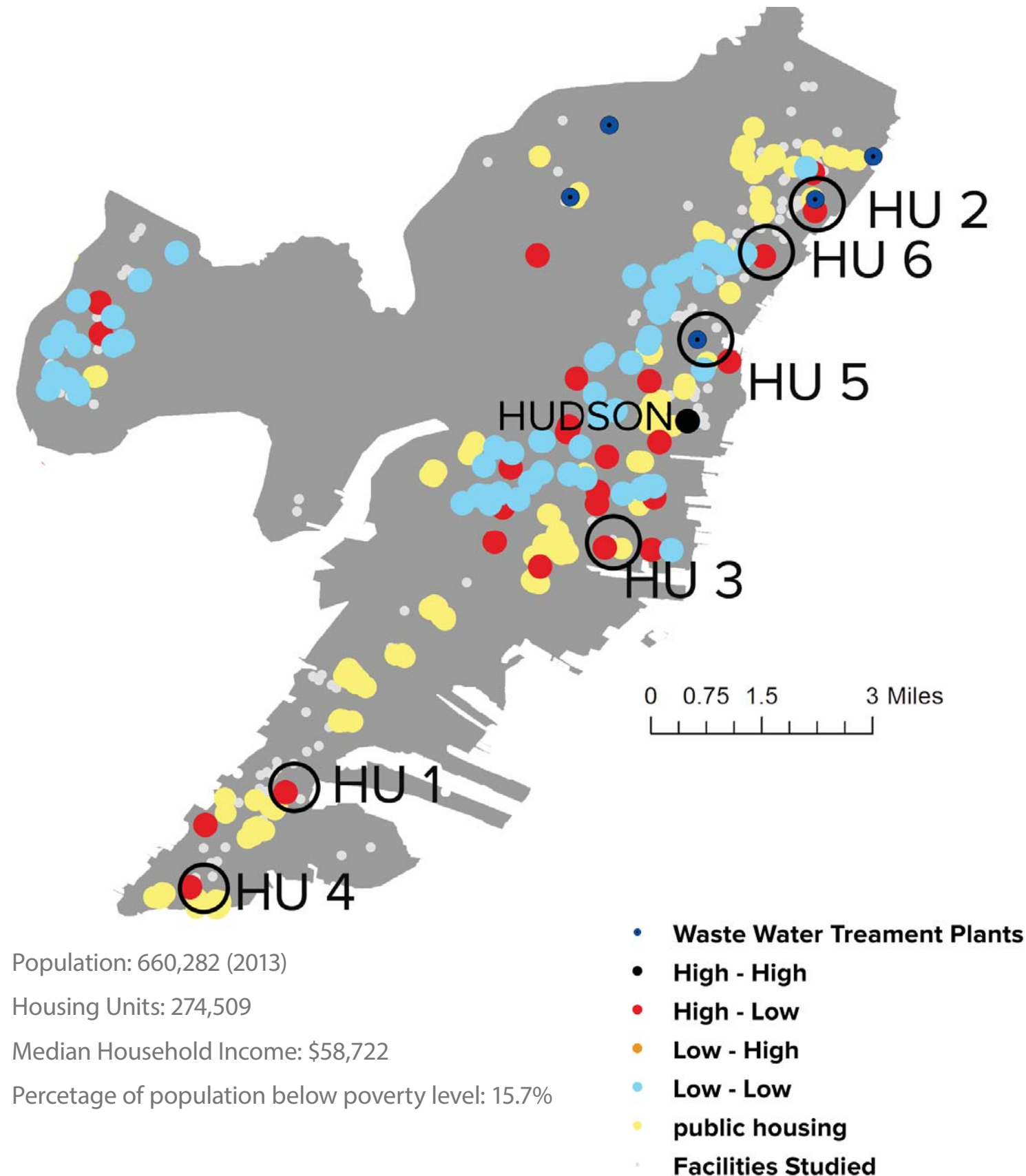
Figure 15. Town Center BE 4

BE 4.* is a town center located in Garfield. It is anchored at the City of Garfield Fire Department Company 5. It includes 1 more fire department and 3 schools. It also includes 171 units of Garfield Public Housing Authority.



Chapter 5. Hudson County

Figure 16. Town Center Locations in Hudson County



Population: 660,282 (2013)
 Housing Units: 274,509
 Median Household Income: \$58,722
 Percentage of population below poverty level: 15.7%

There are 6 town centers in Hudson County. The high number of town centers is, in part, a function of the density of development in the county. HU1 and 2 are obvious choices because there are a large number of different types buildings in proximity to the anchor, which also consumes a lot of energy. Similarly, HU3 contains a waste water treatment plant, which gives off waste heat that can be used to generate energy for nearby facilities in the town center. HU4-HU6 all contain a diversity of buildings that are important for life safety.

Figure 17. Town Center HU 1

HU 1. is located in Bayonne and includes Bayonne Medical Center, which is the potential anchor for this town center. There are 13 other public buildings and facilities in this town center including 8 schools, 1 municipal building, 1 public library, 1 ambulance dispatch center and 1 fire department. This could be a priority location because it has a facility that consumes a large amount of energy and is critical for life safety, surrounded by a diversity of building types. It also has 126 public housing units.

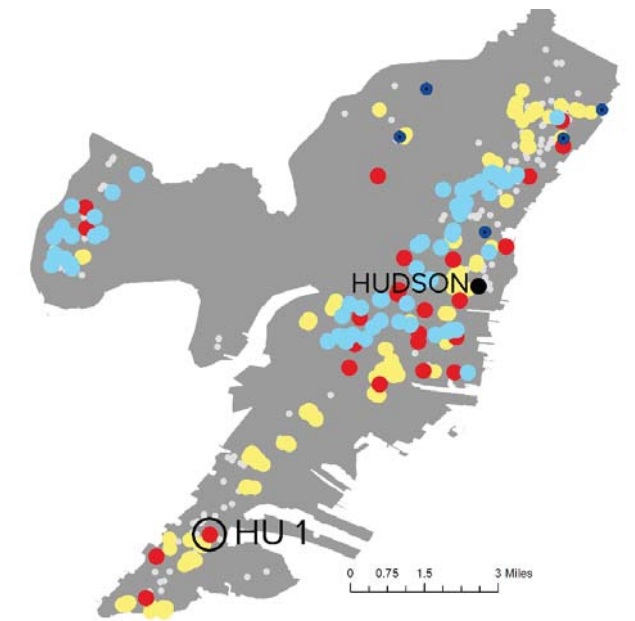


Figure 18. Town Center HU 2

HU 2. is located in West New York. The potential anchor for this town centers is West New York Volunteer Emergency Medical Service, which is located near 14 other public buildings and facilities, including 4 fire and rescue squads, 8 schools, 1 community action center and 1 library. This town center could be a priority location because it has a diversity of buildings and facilities, including those that are important for life safety and shelter.

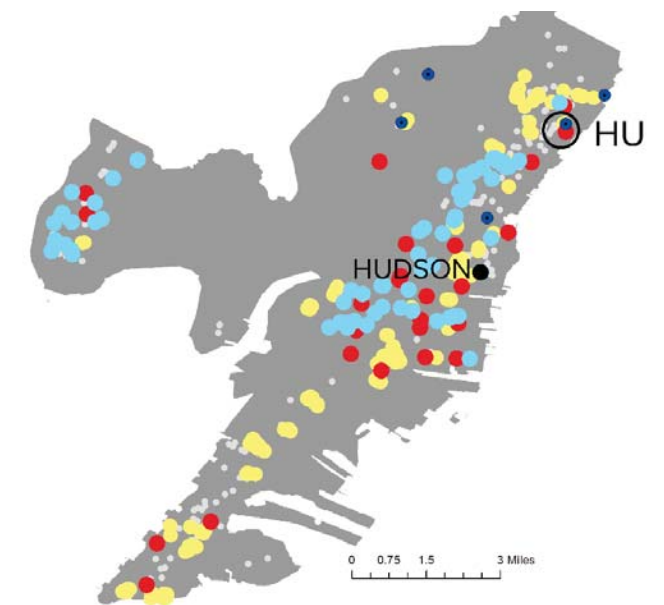


Figure 19. Town Center HU 3

HU 3. is located in Hoboken. It is anchored at Adams Street waste water treatment plant. The town center includes 5 schools, 2 fire stations, 1 inpatient healthcare system and 1 library.

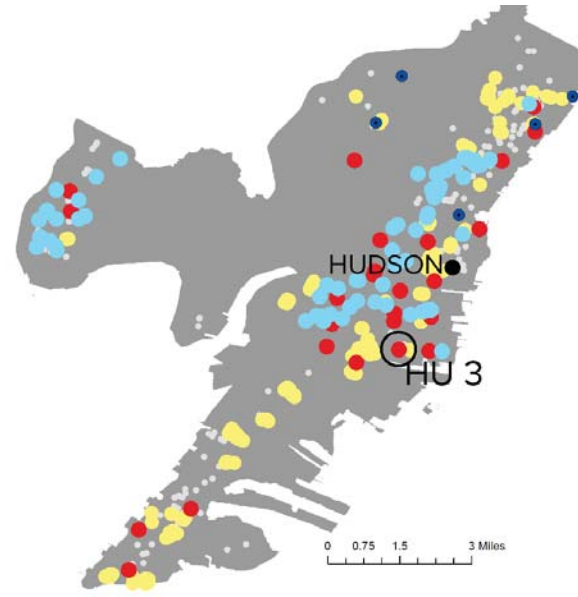


Figure 20. Town Center HU 4

HU 4. is a town center in Jersey City. It is anchored at the Jersey City Medical Center and includes 3 schools and 6 public housing units.

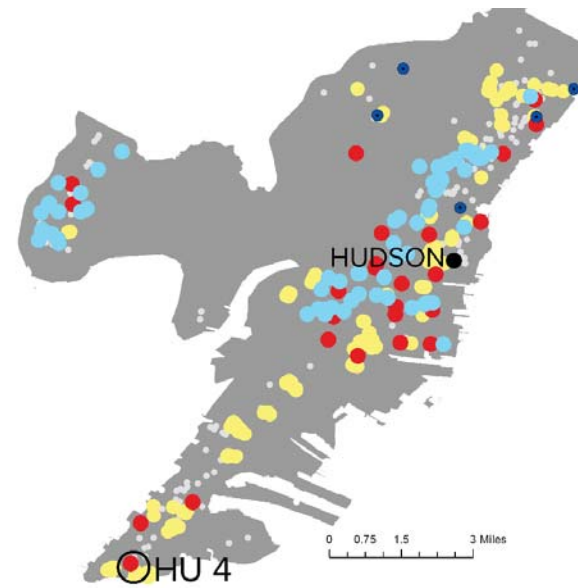


Figure 21. Town Center HU 5

HU 5. is located in Bayonne. It is anchored by the Bayonne Fire Department Engine Company Station 2 and includes a museum and 2 schools.

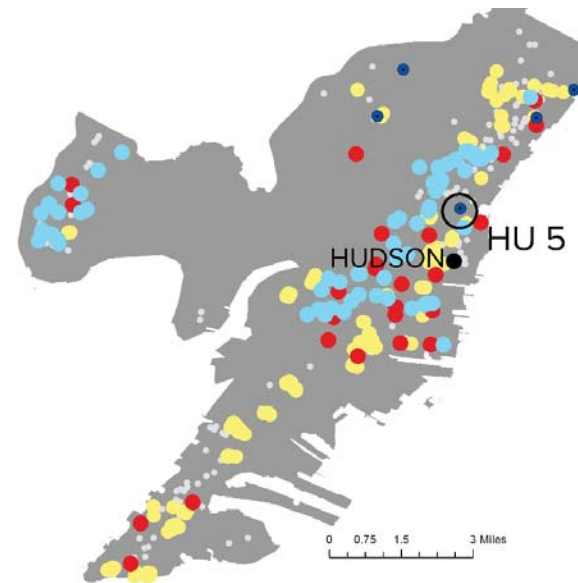
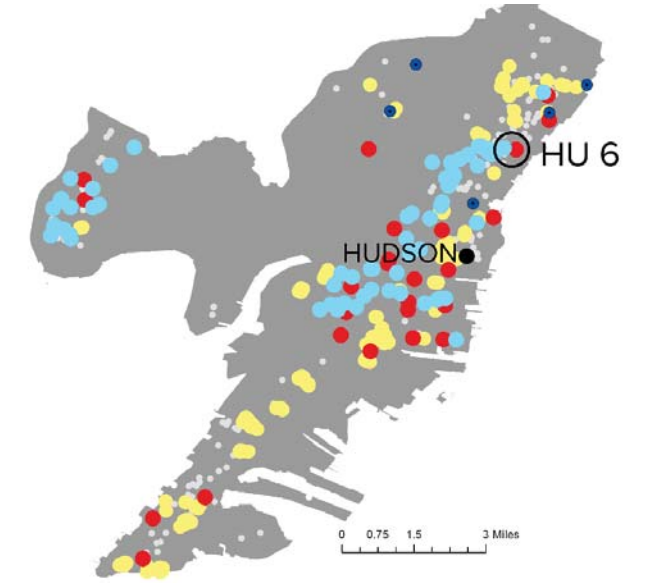


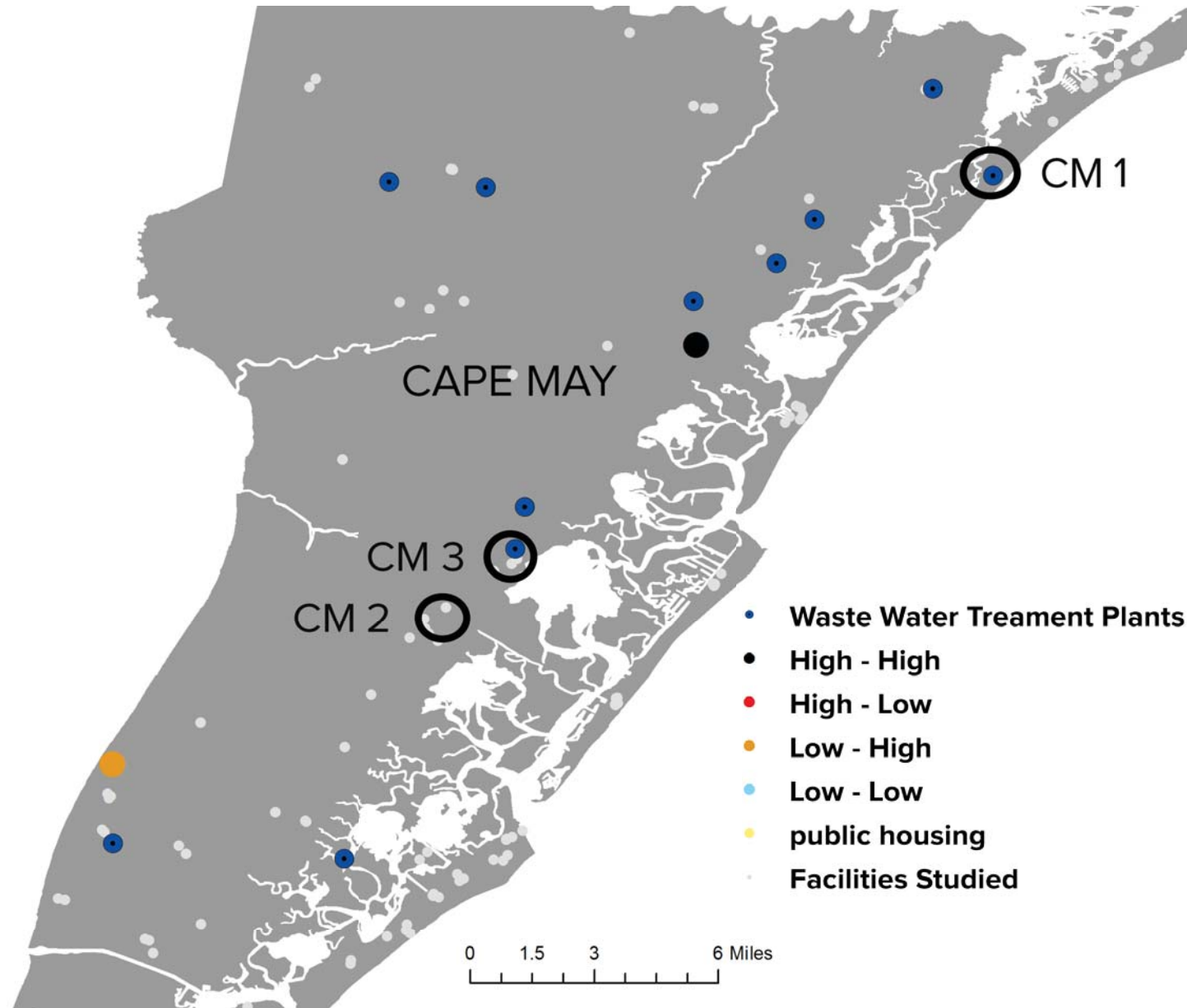
Figure 22. Town Center HU 6

HU 6. is a town center in Union City. It is anchored at Weehawken Ambulance Corporation. It has 14 facilities including 7 schools, 2 fire and rescue engines, 1 municipal building, 1 library and 1 homeless shelter.



Chapter 6. Cape May County

Figure 23. Town Center Locations in Cape May County



Population : 95,897 (2013)

Housing Units: 98,686

Median Household Income: \$54,559

Census Tracts with Low-Moderate Income: 79

Cape May County has too few facilities to fit any of the criteria discussed in Step 6 of the Methodology section for identifying town centers, thus it was dealt with as a special case. This is due to Cape May's low population density of 382 people per square mile compared to New Jersey's 1,185 people per square mile.

In this case, the selection was based on their criticality, number of facilities in a 0.5 mile radius, and presence of public housing and of waste water treatment plant within that radius.

Figure 24. Town Center CM 1

CM 1. is located in Ocean City. It is anchored at Ocean City Regional Water Treatment Facility. It includes 1 fire and rescue station and 1 municipal building.

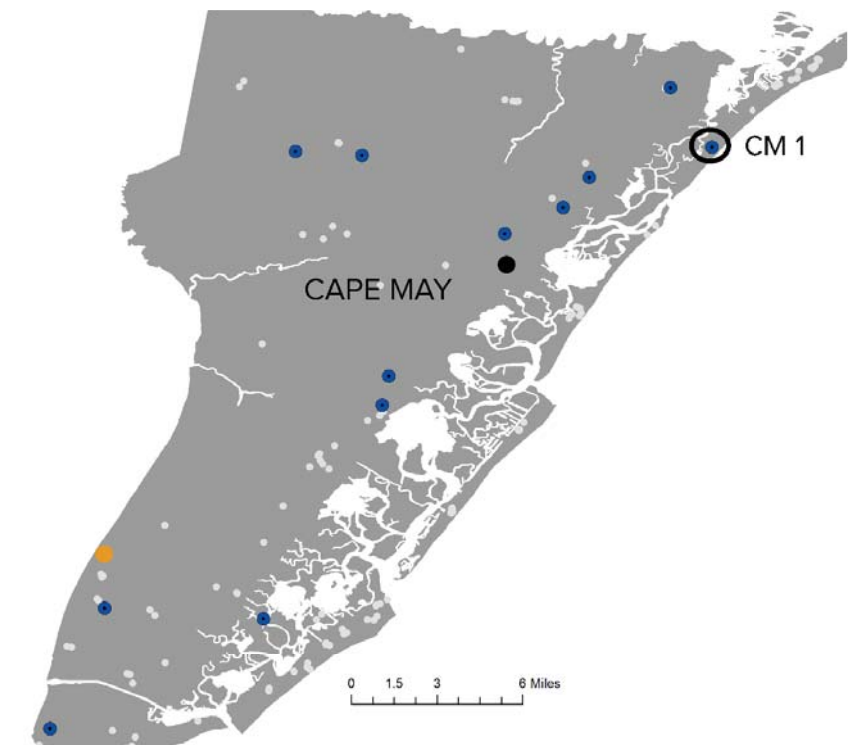


Figure 25. Town Center CM 2

CM 2. is anchored at Cape Regional Medical Center. It is located in Cape May. It also includes 2 emergency dispatch centers, 3 schools and 1 library.

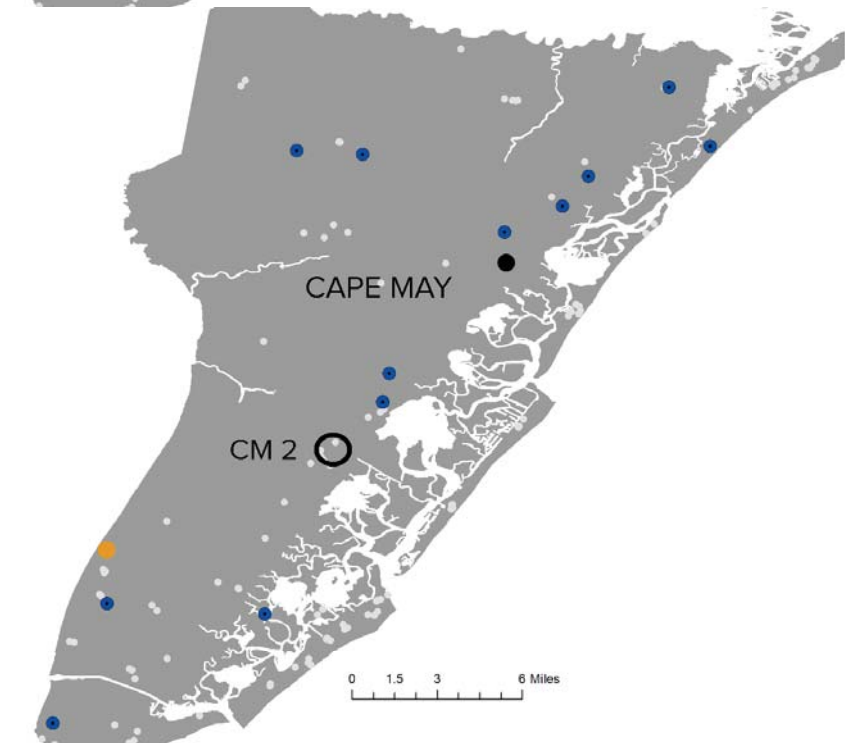
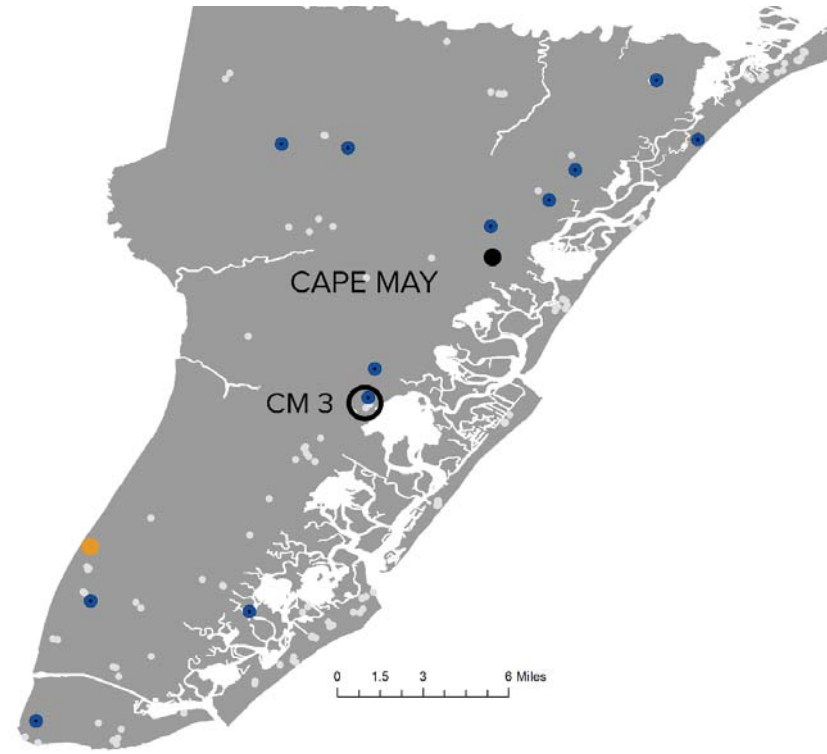


Figure 25. Town Center CM 3

CM 3. is anchored at Cape May County MUA. It includes the Cape May County Fire Academy and 1 vocational institute.



Chapter 7. Essex County

Figure 26. Essex County

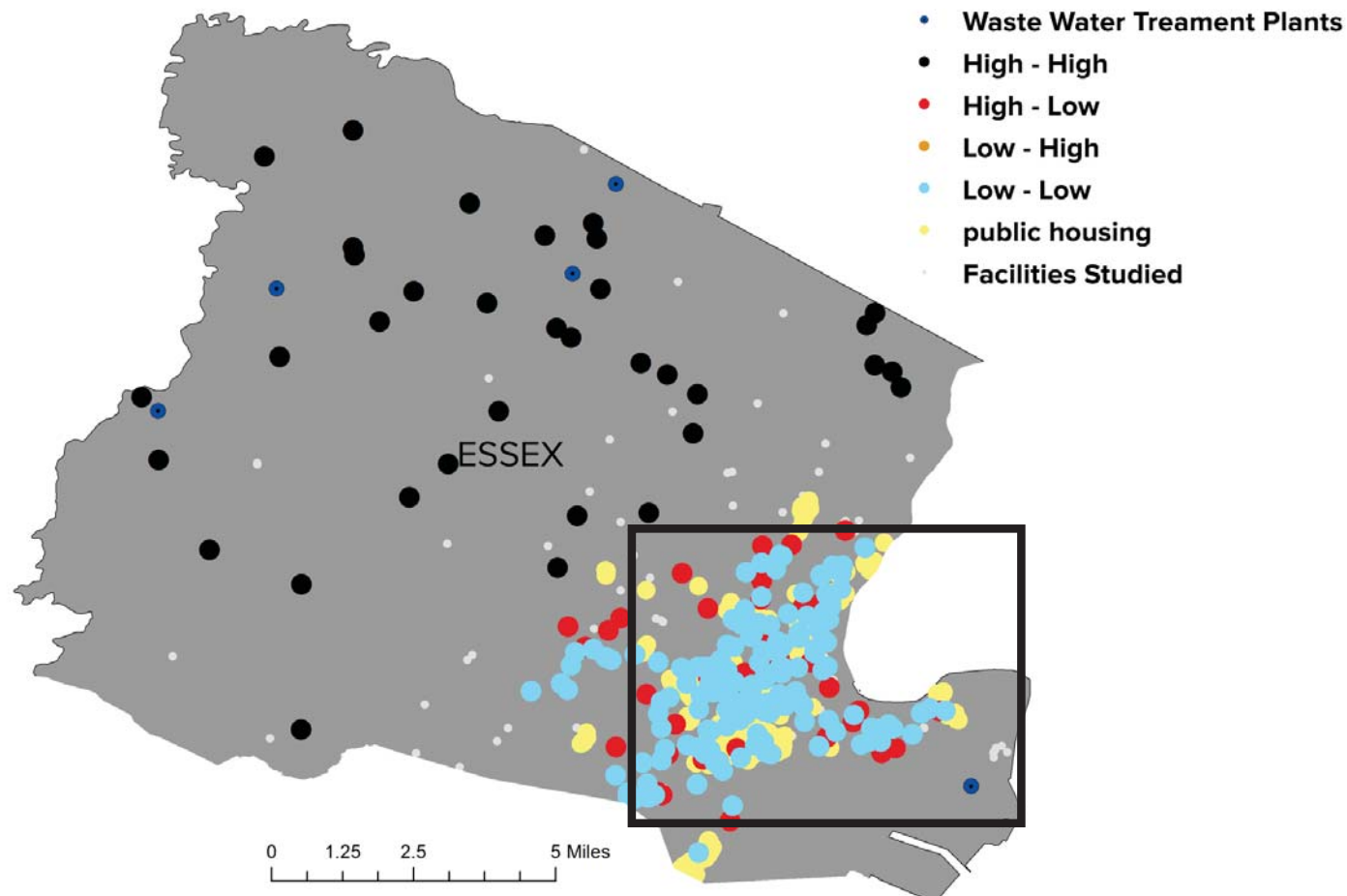
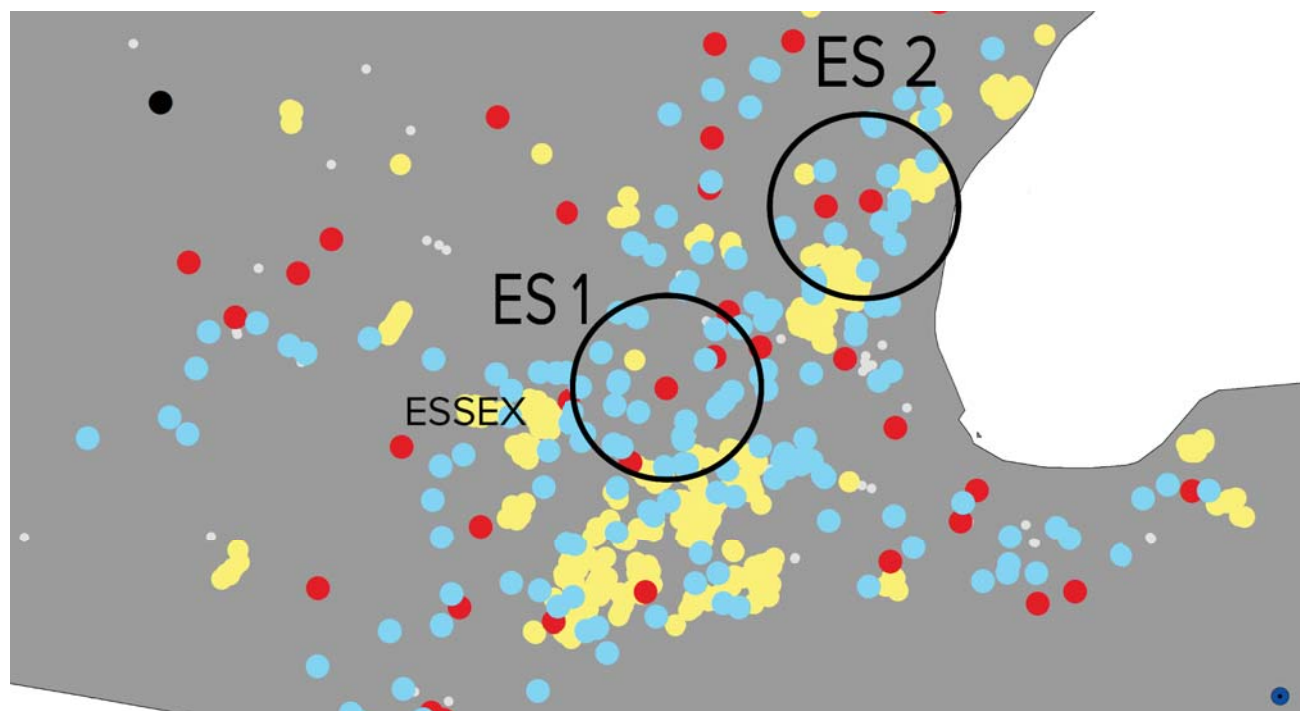


Figure 27. Town Center Locations in Essex County



Population : 789,565 (2013)

Housing Units: 313,726

Median Household Income: \$55,027

Persons below poverty level : 16.1%

It is important to note that much of data for Essex county from the MOD_IV dataset are missing or incomplete. Thus the results here are concentrated in Newark - the municipality for which most of the required data are available. The town centers presented here are still suitable for microgrids. ES1 is anchored by a facility that is both critical to life safety and requires a lot of energy; moreover, it includes a number of different types of facilities. ES2 includes a number of critical facilities and facilities that can serve as shelters, as well as several hundred public housing units.

Figure 28. Town Center ES 1

ES 1. is located in Newark. Its anchor is the University Hospital. There are 18 facilities in this town center. These include 1 fire stations, 1 library and 15 schools. 14 facilities are in LMI census tracts.

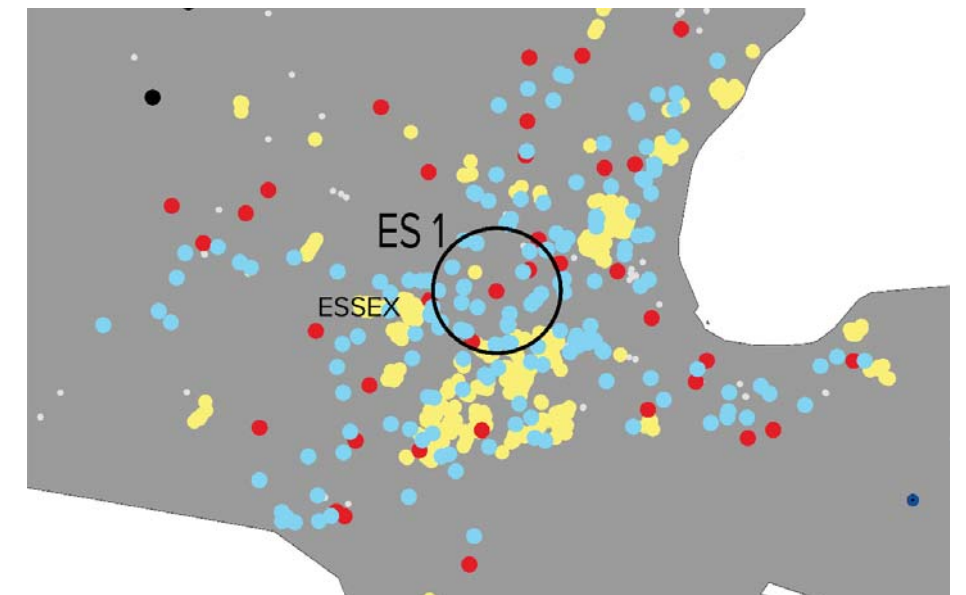


Figure 29. Town Center ES 2

ES 2. is in Newark. It is anchored at Newark Fire Department Engine 9. It includes 15 facilities out of which there is 1 fire department engine, 1 library and 13 schools. All of these facilities are in LMI census tracts. There are 273 public housing units in this town center.

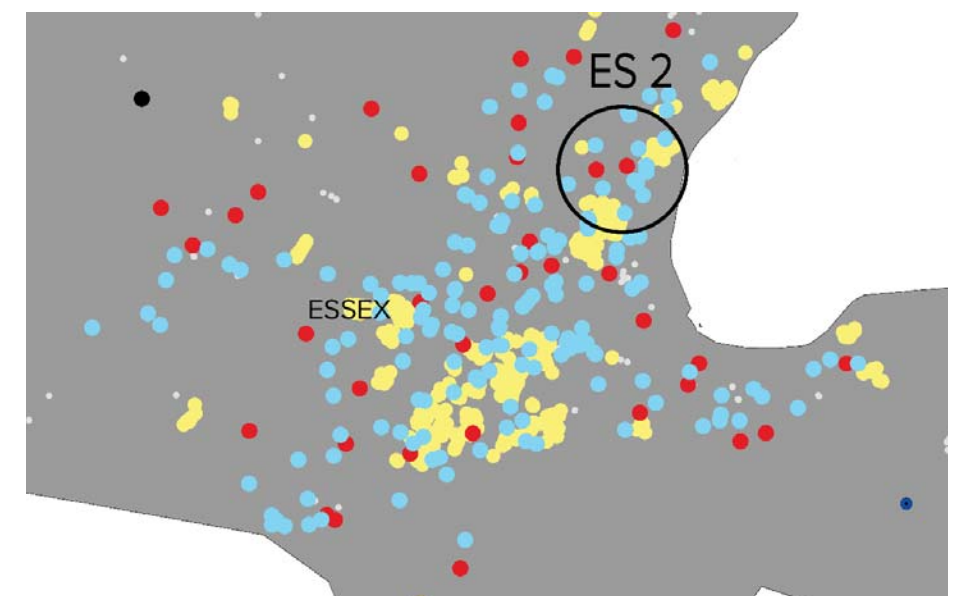
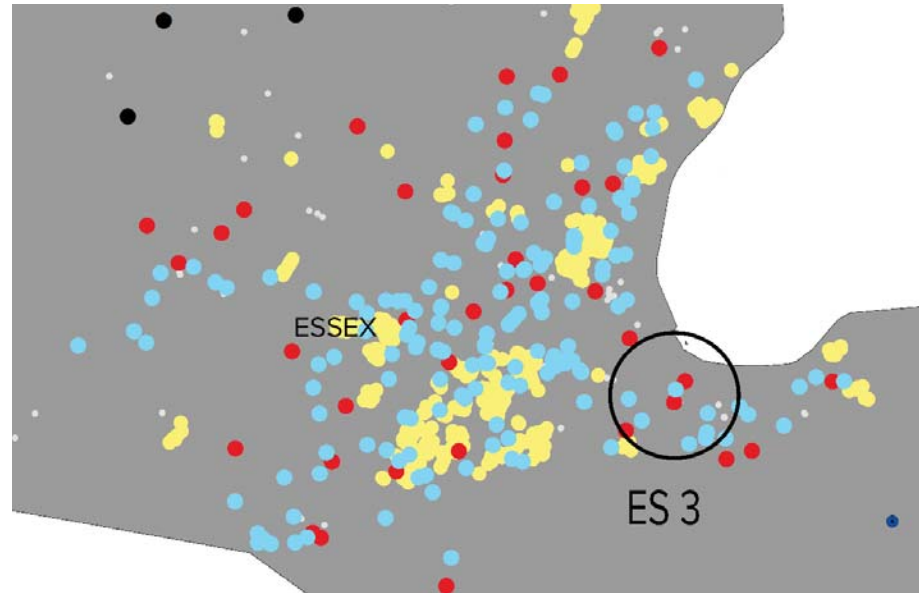


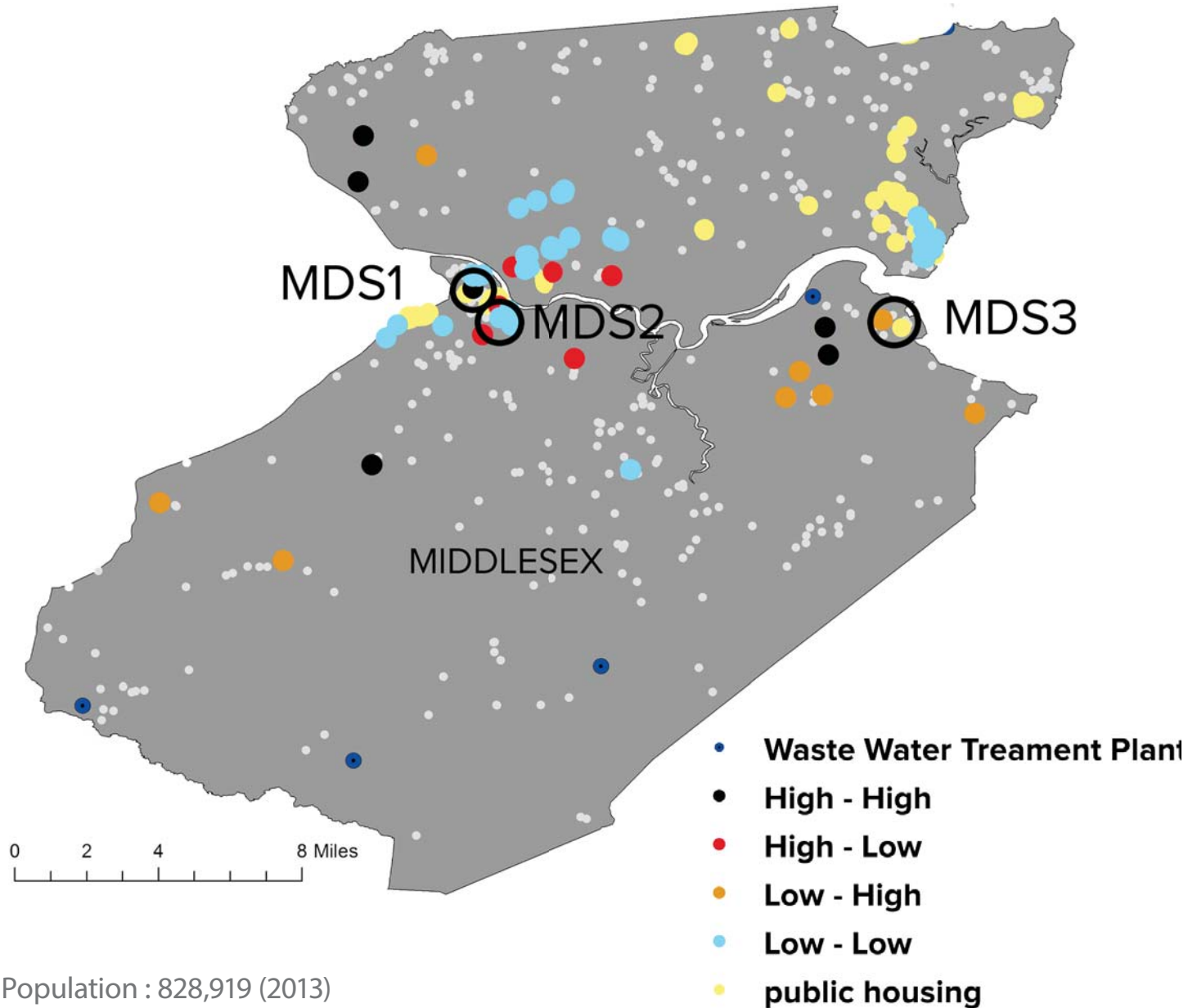
Figure 30. Town Center ES 3

ES 3. is located in Newark. There are 10 facilities in the town center. It is anchored at Saint James Hospital and includes 8 schools and 1 fire department. It has no public housing units. All of the facilities are in an LMI census tract.



Chapter 8. Middlesex County

Figure 31. Town Center Locations in Middlesex County



Population : 828,919 (2013)

Housing Units: 298,102

Median Household Income: \$79,442

Persons below poverty level : 8.0%

Middlesex County contains 3 town centers; they are a mix of “clusters” (similar facilities together) and “outliers” (dissimilar facilities together) MDS 1 is anchored by a facility that consumes a lot of energy and is critical for life safety. The town center includes a number of other healthcare facilities, municipal buildings and schools. MDS 2 and 3 contain a diversity of buildings that are also important for life safety, as well as a number of public housing units.

Figure 32. Town Center MDS 1

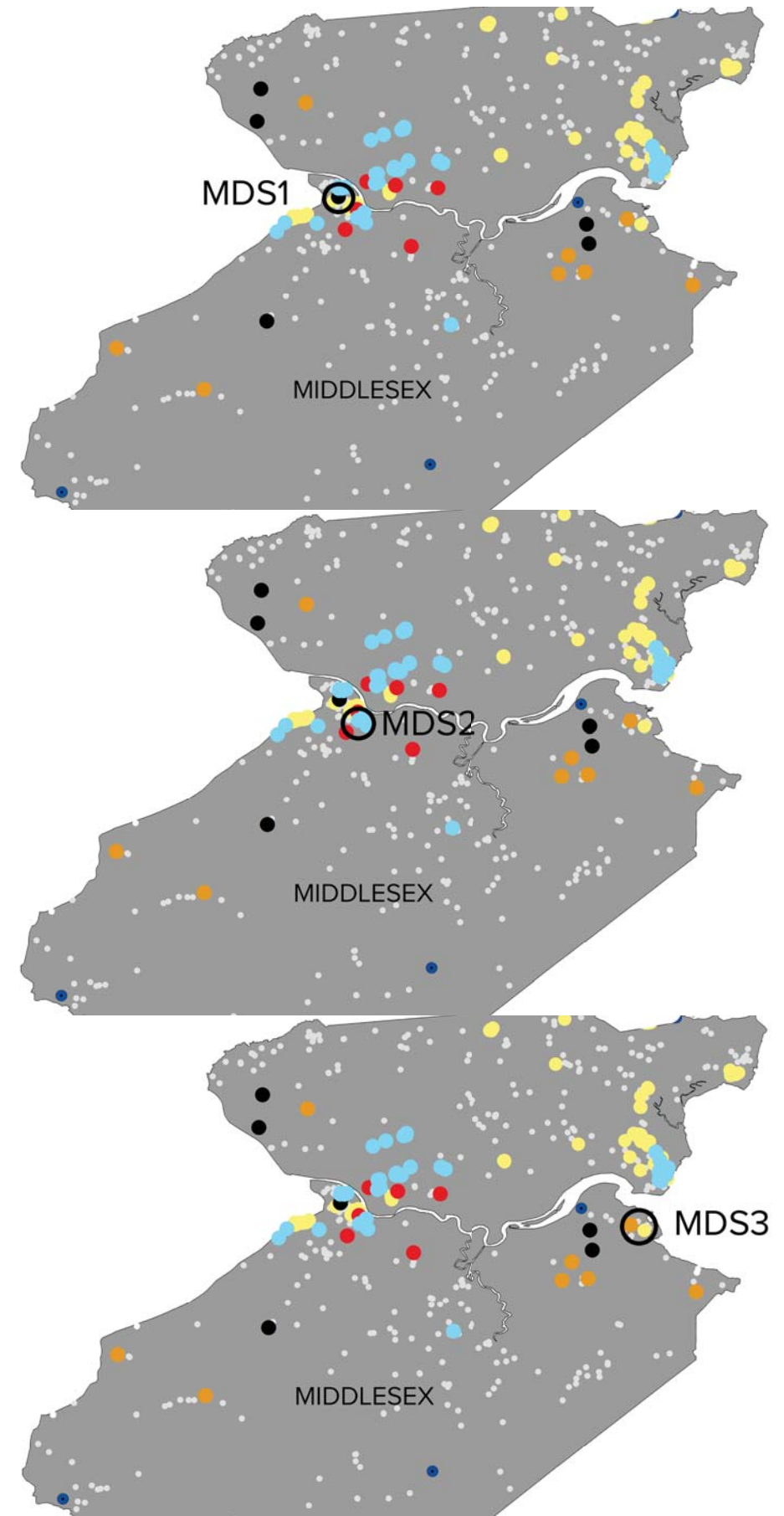
MDS 1. is located in New Brunswick. Robert Wood Johnson University Hospital is the potential anchor for this town center. This town center includes 21 buildings out of which 7 are Rutgers University buildings. It also includes 3 more inpatient health care facilities, the city hall for the municipality, 6 schools and 2 emergency dispatch services. There is 1 public housing facility in this town center. Out the total, 7 facilities are in an LMI area.

Figure 33. Town Center MDS 2

MDS 2. is located in New Brunswick. A public safety building owned by Rutgers University is the potential anchor for this town center. This town center includes 6 buildings ,out of which 2 are Rutgers University buildings. It also includes 3 school buildings and 25 public housing facilities. Out the total, 5 facilities are in an LMI area.

Figure 34. Town Center MDS 3

MDS3. is located in South Amboy. South Amboy Fire Department is the potential anchor for this town center. This town center includes 7 buildings including 4 emergency dispatch services, 2 schools and 1 library. There are 72 public housing units in this town center. Four of the facilities are in an LMI census tracts.



Chapter 9. Monmouth County

Figure 35. Monmouth County

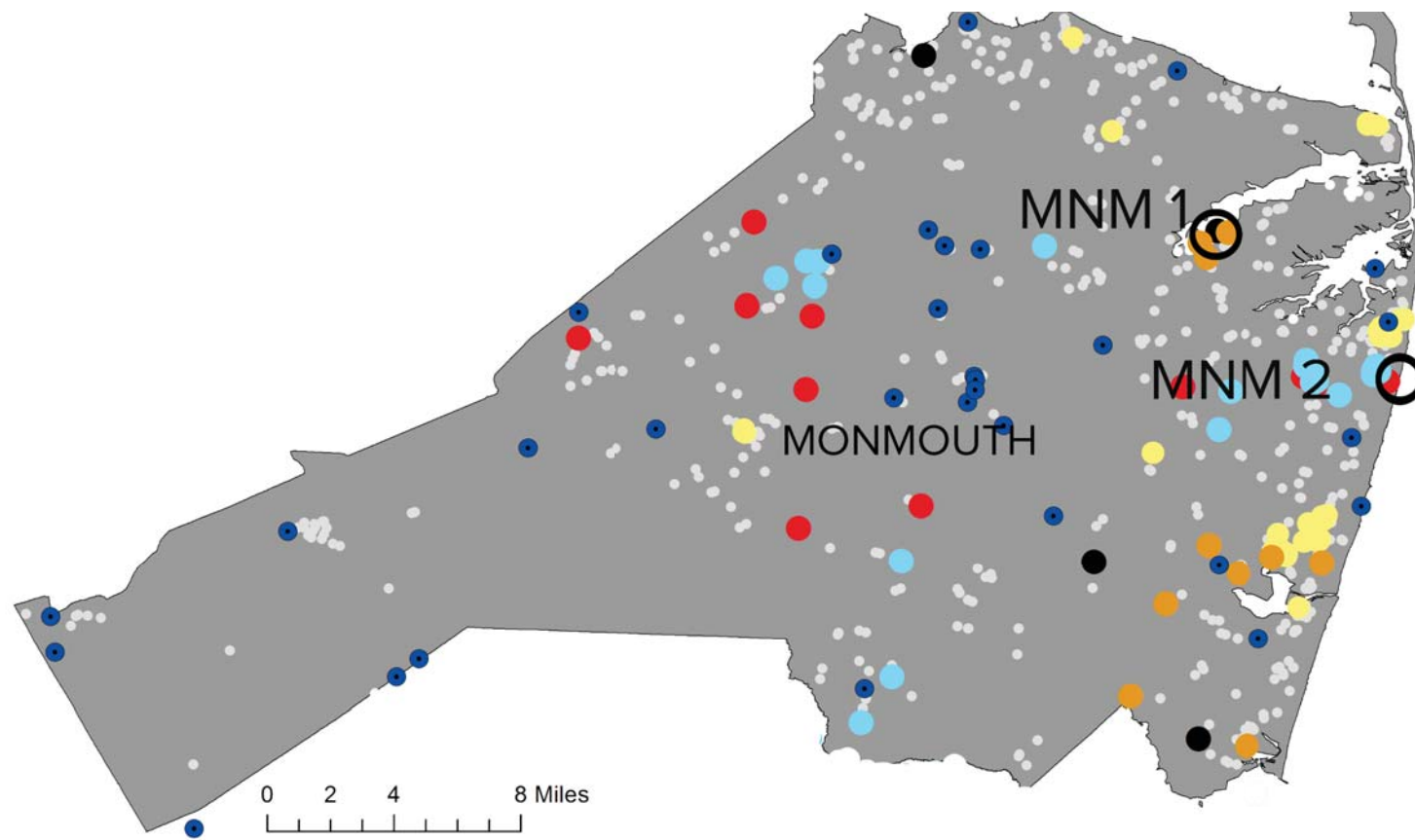
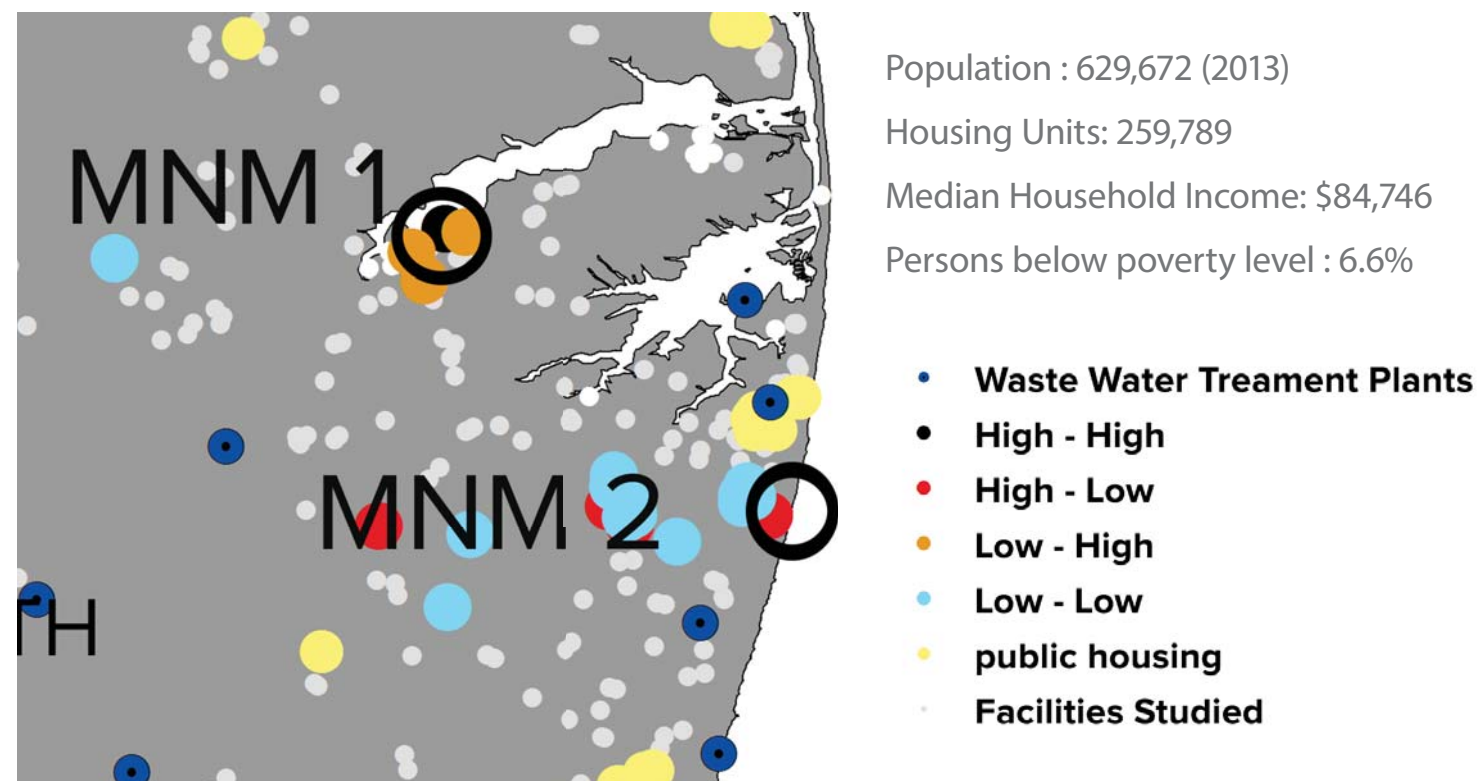


Figure 36. Town Center Locations, Monmouth County



Monmouth County has 2 town centers. They are both “outliers” or facilities surrounded by dissimilar facilities (high-lows and low-highs). They are obvious choices because they contain highly critical facilities that are also high energy. MNM2 also contains a number of public housing units and is located in a low-to-moderate income community.

Figure 37. Town Center MNM 1

MNM 1. is anchored at Riverview Medical Center. It includes 1 school, 5 emergency dispatch services and 1 library. There is no public housing facility in this area. None of the facilities are in a LMI census tracts.

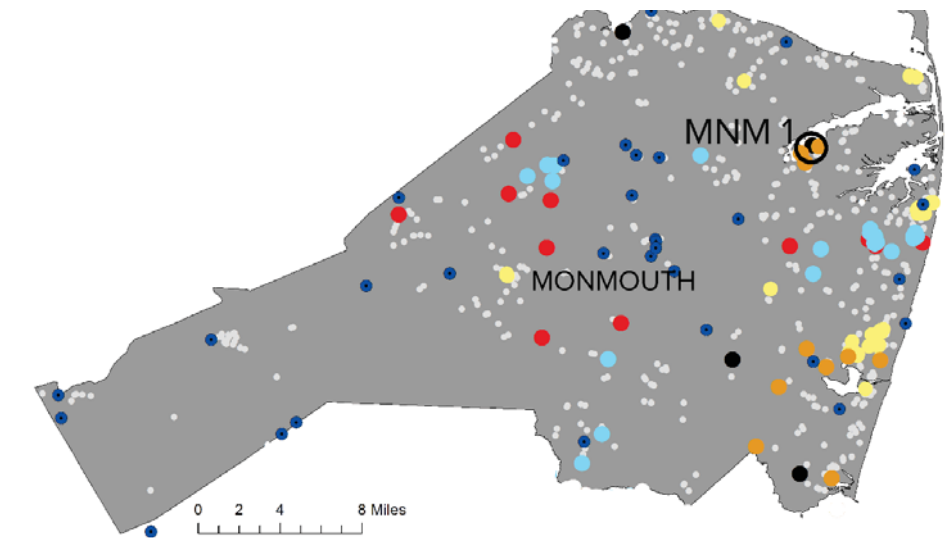
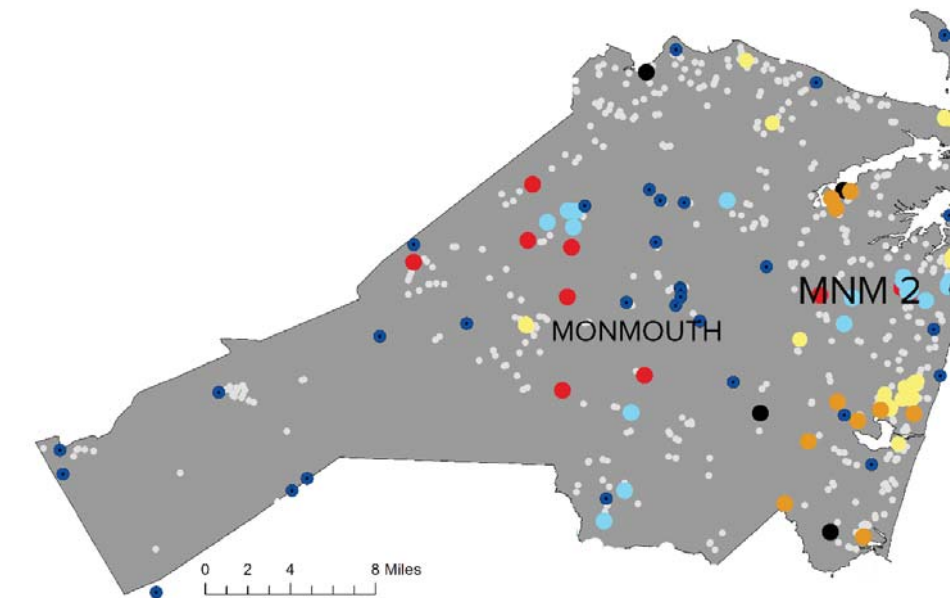


Figure 38. Town Center MNM 2

MNM 2. is located in Long Branch. It is anchored at Monmouth Medical Center. It includes 2 emergency dispatch facility in addition to another inpatient healthcare facility. It also includes 387 public housing units. All the facilities are in LMI census tracts.



Chapter 10. Ocean County

Figure 39. Town Center Locations in Ocean County

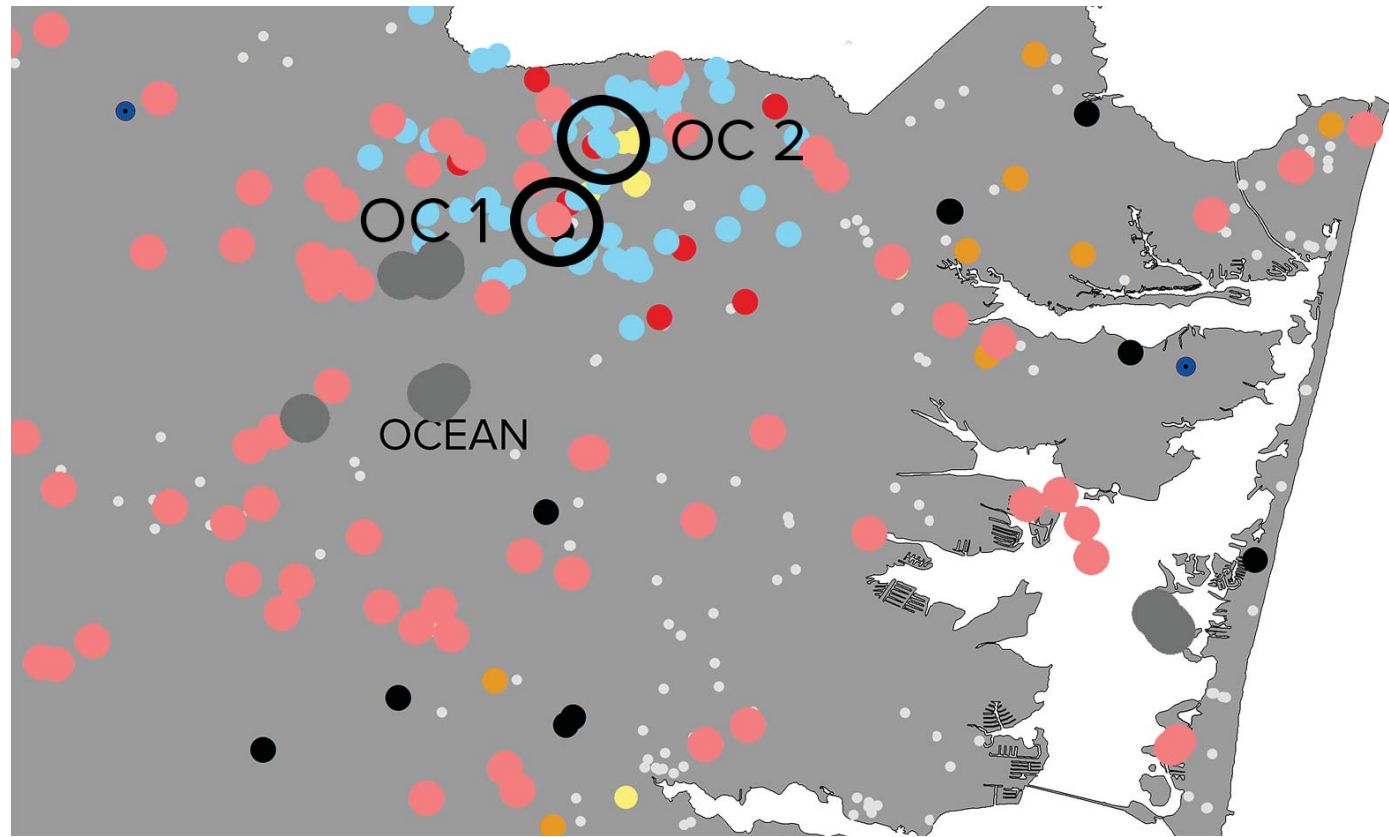
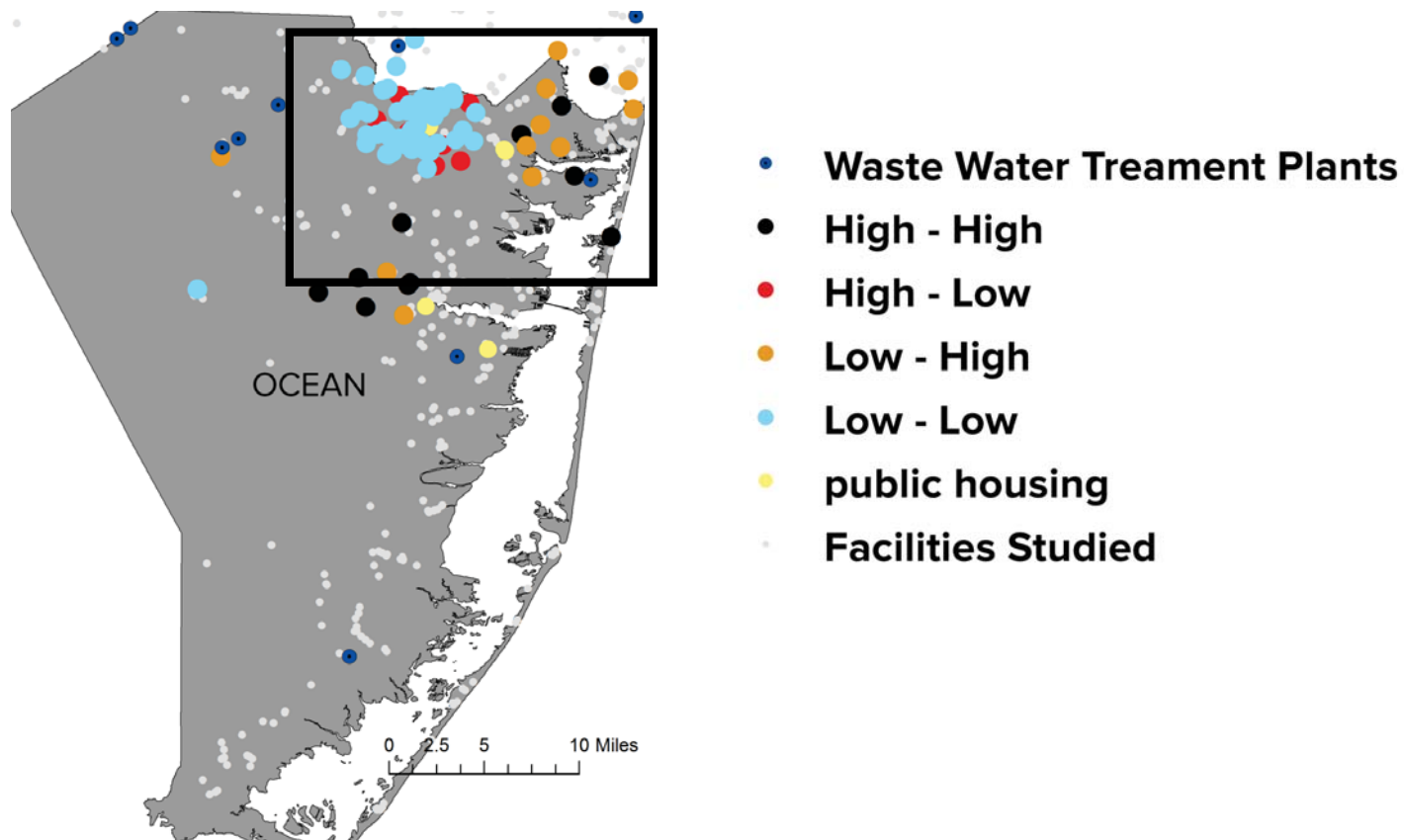


Figure 40. Ocean County



Population ; 583,414 (2013)

Housing Units: 279,015

Median Household Income: \$61,038

Persons below poverty level : 10.2%

The town centers are concentrated in the north eastern part of the county. OC 1, OC 2, OC 3, OC 4, OC 5 are the town centers with statically significant clusters with diverse set of buildings.

Figure 41. Town Center OC 1

OC 1. is located in Lakewood. Lakewood Fire Department Station is the potential anchor for this town center. This town center includes 7 buildings which include 6 schools and 1 Fire Department Station. There are 62 public housing units in this town center. All of these are in an LMI area.

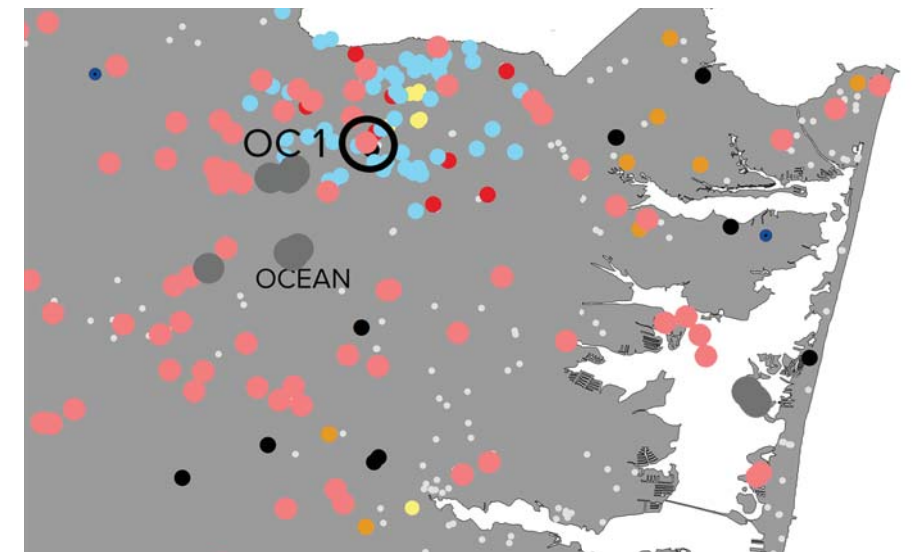
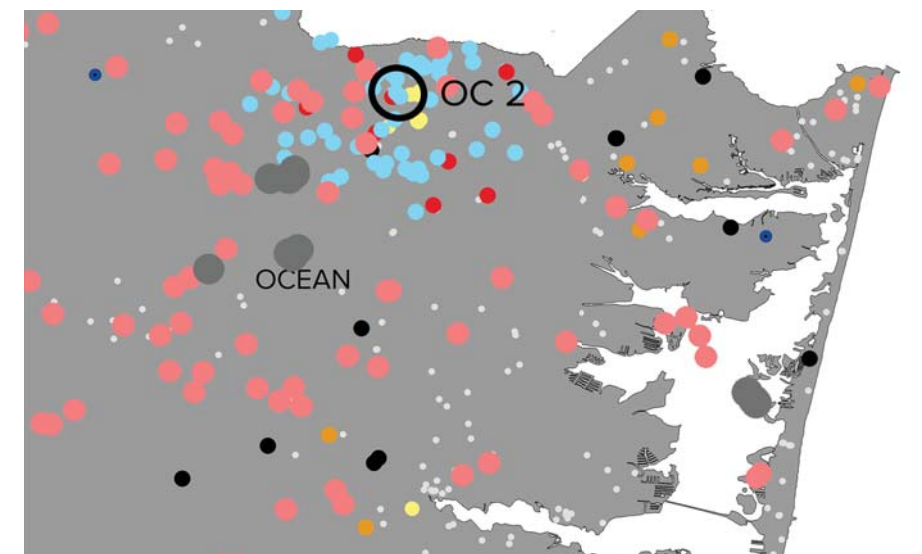


Figure 42. Town Center OC 2

OC 2. is located in Lakewood. Kimball Medical Center is the potential anchor for this town center. This town center includes 7 buildings. There are 3 inpatient facilities, 3 schools and one fire department station in this town center. There are no public housing facilities in their town center and 3 of these facilities are in an LMI census tract.



Chapter 11. Union County

Figure 43. Union County

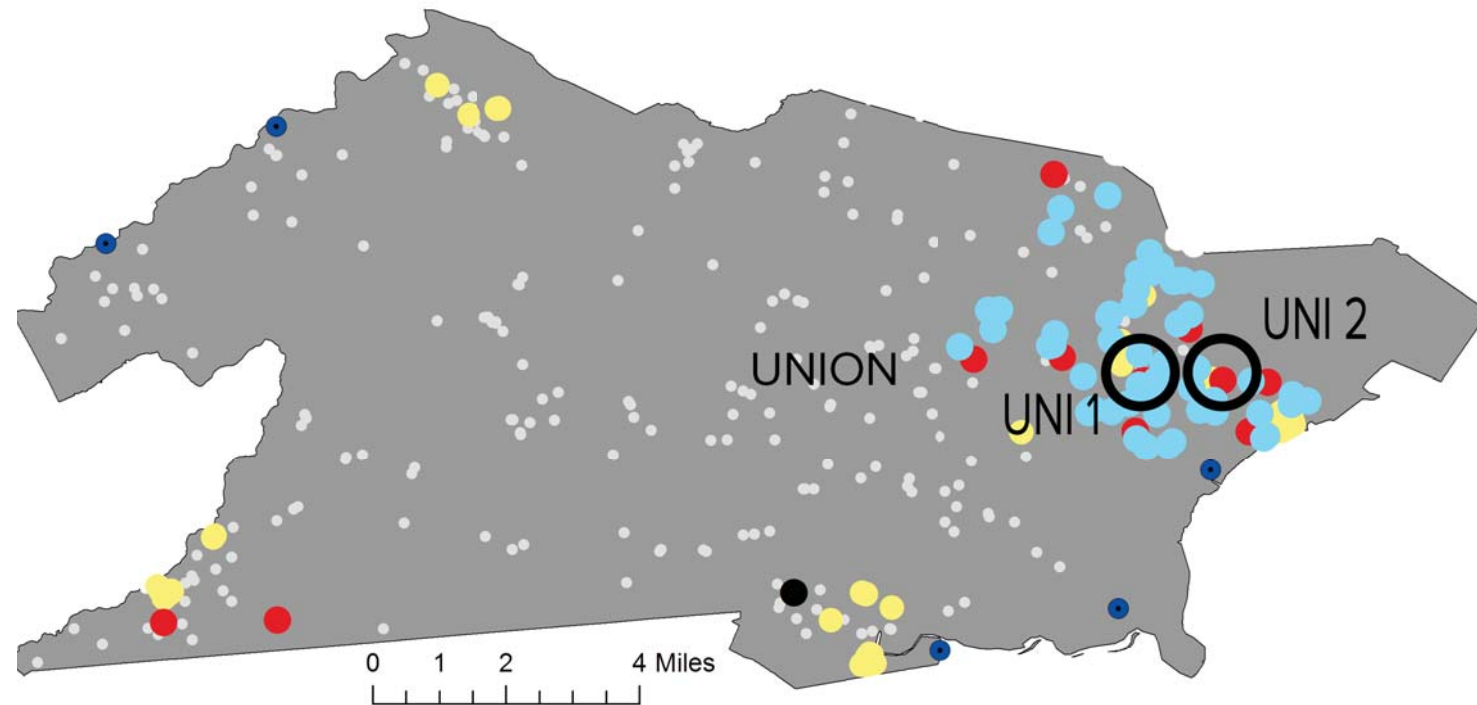
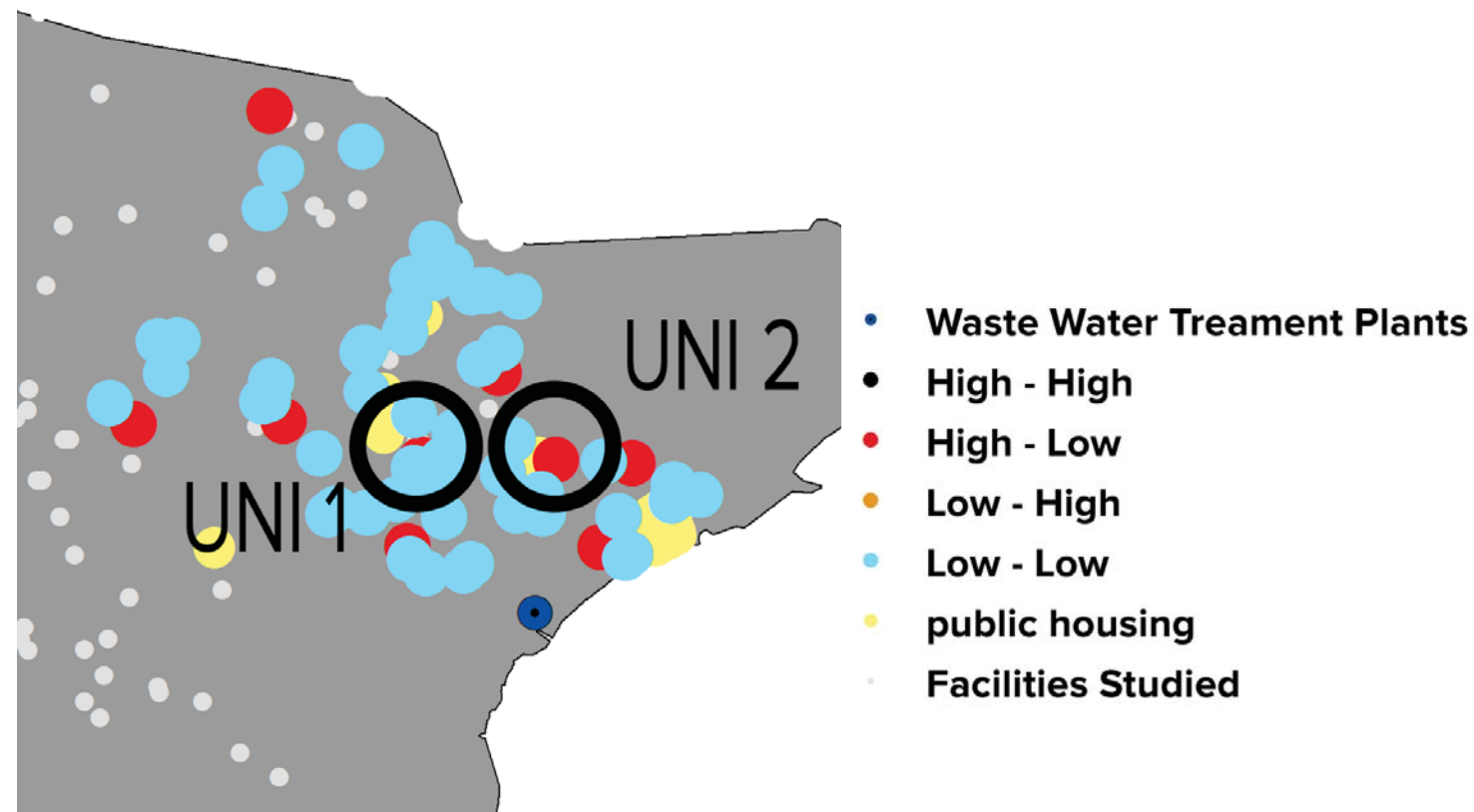


Figure 44. Town Center Locations in Union County



Population ; 548,256 (2013)

Housing Units: 200,769

Median Household Income: \$69,347

Persons below poverty level : 10.4%

There are two town centers in Union County. Both are anchored by medical facilities, contain a diversity of buildings and facilities, and include a large number of public housing units.

Figure 45. Town Center UNI 1

UNI 1. is located in Elizabeth. The anchor is Trinitas Hospital. There are 13 facilities in the neighborhood comprised of 1 library, 1 museum and 10 schools. Out of these 8 facilities are in LMI census tracts. There 249 public housing units in the town center.

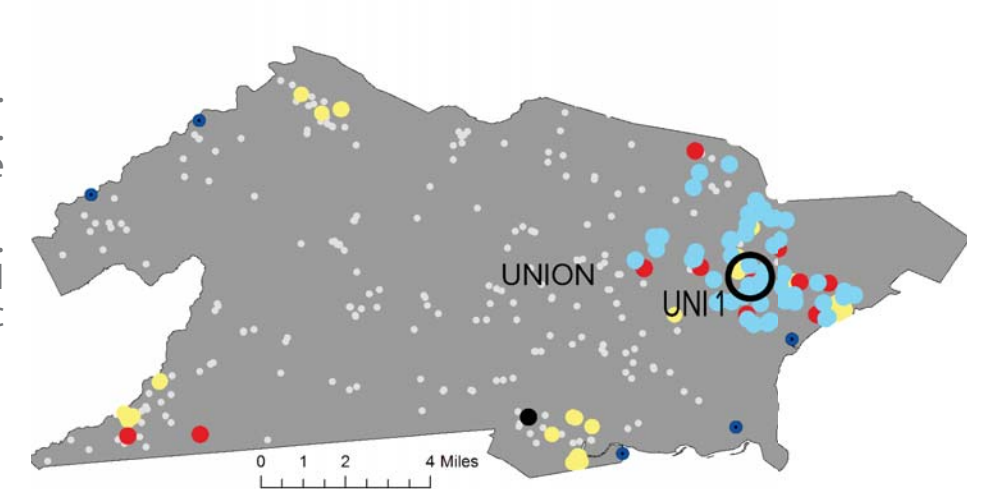


Figure 46. Town Center UNI 2

UNI 2. is located is Elizabeth and the anchor is Trinitas Hospital - Newpoint Campus. The town center has 7 facilities it includes 6 schools in addition to the anchor. All facilities are in LMI census tracts. There are 126 public housing units in the town center.

