RESILIENT NJ
RARITAN RIVER AND BAY COMMUNITIES

ABOUT OUR REGION

DRAFT - AUGUST 2021

IMAGE CREDIT: DOC SEARLS VIA FLICKR

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WE'RE LOOKING FOR YOUR FEEDBACK ON THIS REPORT! PLEASE SHARE YOUR THOUGHTS USING THIS FORM: https://tinyurl.com/z8txucnb

The About Our Region report is a snapshot in time of the progress that has been made toward developing an action plan to address current and future flood risks in our region. Your feedback on this report will be incorporated into later waves of the project. Each project wave will develop a draft element of the final action plan, expected May 2022, to be refined as needed throughout the process.

FEEDBACK FORM

DISCLAIMER

This information is available in the following languages upon request: Español 中文:繁體版 Việt-ngữ 한국어 Tagalog Português العربية Kreyòl ગુજરાતી Italiano Polski

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01 - INTRODUCTION

ABOUT RESILIENT NEW JERSEY

The Resilient NJ - Raritan River and Bay Communities project is one of four regions as part of a regional planning program administered by the New Jersey Department of Environmental Protection (NJDEP). It is funded by the U.S. Department of Housing and Urban Development (HUD). The program's goal is to build on existing efforts and capabilities in New Jersey to create and implement creative regional planning solutions to address current and future flood-related hazards and promote the health and well-being of coastal and riverine communities.

The Resilient NJ program brings together resilience experts, local leaders, community organizations, residents, and regional infrastructure entities to develop solutions to reduce flood risk and build resilience. As we saw during Hurricane Sandy, flooding can have devastating impacts on people's lives and the economy. These risks are increasing with climate change. The four regions participating in the program are Raritan River and Bay Communities (which is the focus of this report), Long Beach Island, Northeastern New Jersey, and Atlantic County Coastal Region.

In addition to using regional planning approaches to address current and future flood-related hazards and promote the health and well-being of coastal and riverine communities, Resilient NJ emphasizes:

- ***The use of current best available information and data***
- ***A focus on community health and well-being***
- ***A commitment to diversity, equity, and inclusion in decision making processes and the fair distribution of benefits and burdens***
- ***An approach that builds on existing efforts and capabilities***

RESILIENCE means being able to adapt to changing conditions, such as those driven by climate change, and grow in the face of disruption or challenges. Resilience is about creating physical change that you can see and that will prevent flood damage, as well as creating strong civic and governance systems that support inclusive decision-making so we can equitably adapt to changing conditions. We want to advance projects that reduce risk while building the kind of region our communities want now and for future generations.

Resilient NJ centers the importance of **DIVERSITY, EQUITY, AND INCLUSION** and will ensure that efforts to emphasize each within the project are prioritized. As such, we will be using the definitions of Diversity, Equity, and Inclusion provided on page 14 throughout the project, which come from the Middlesex County Destination 2040 Diversity, Equity, and Inclusion Guiding Principle.

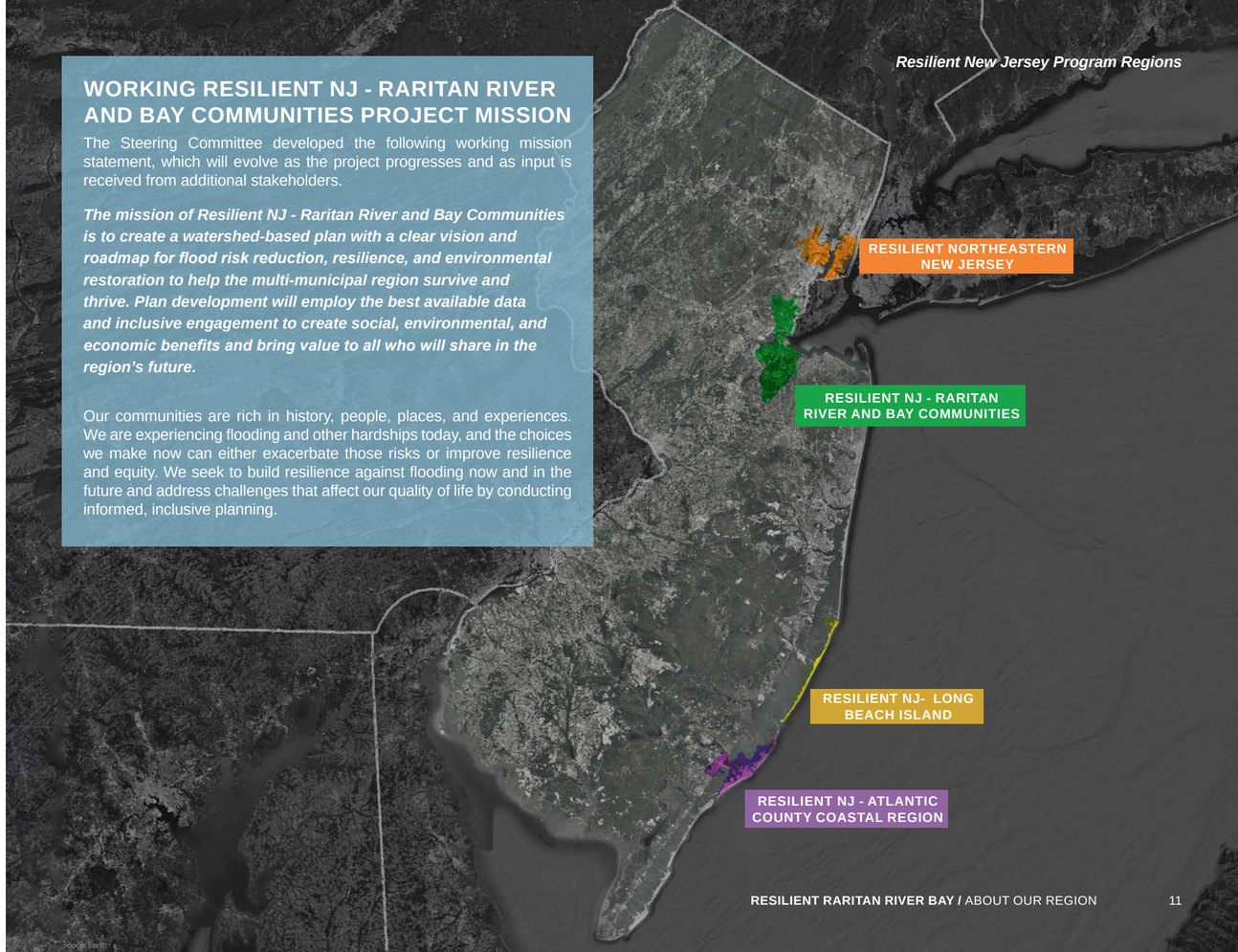
FLOODING can come from rainfall, overwhelmed sewer systems, overflowing rivers, coastal storms, or high tides. Flooding is more significant at lower elevations (ground levels) and can be made worse when drainage systems lack necessary capacity or paved surfaces prevent rainfall from being absorbed. Coastal storms can cause a temporary rise in ocean levels (or storm surge) and strong winds can lead to large waves that overtop bulkheads or coastal barriers. Climate change is causing sea levels to rise and is producing more severe rain events, which will increase flood risk in some areas.

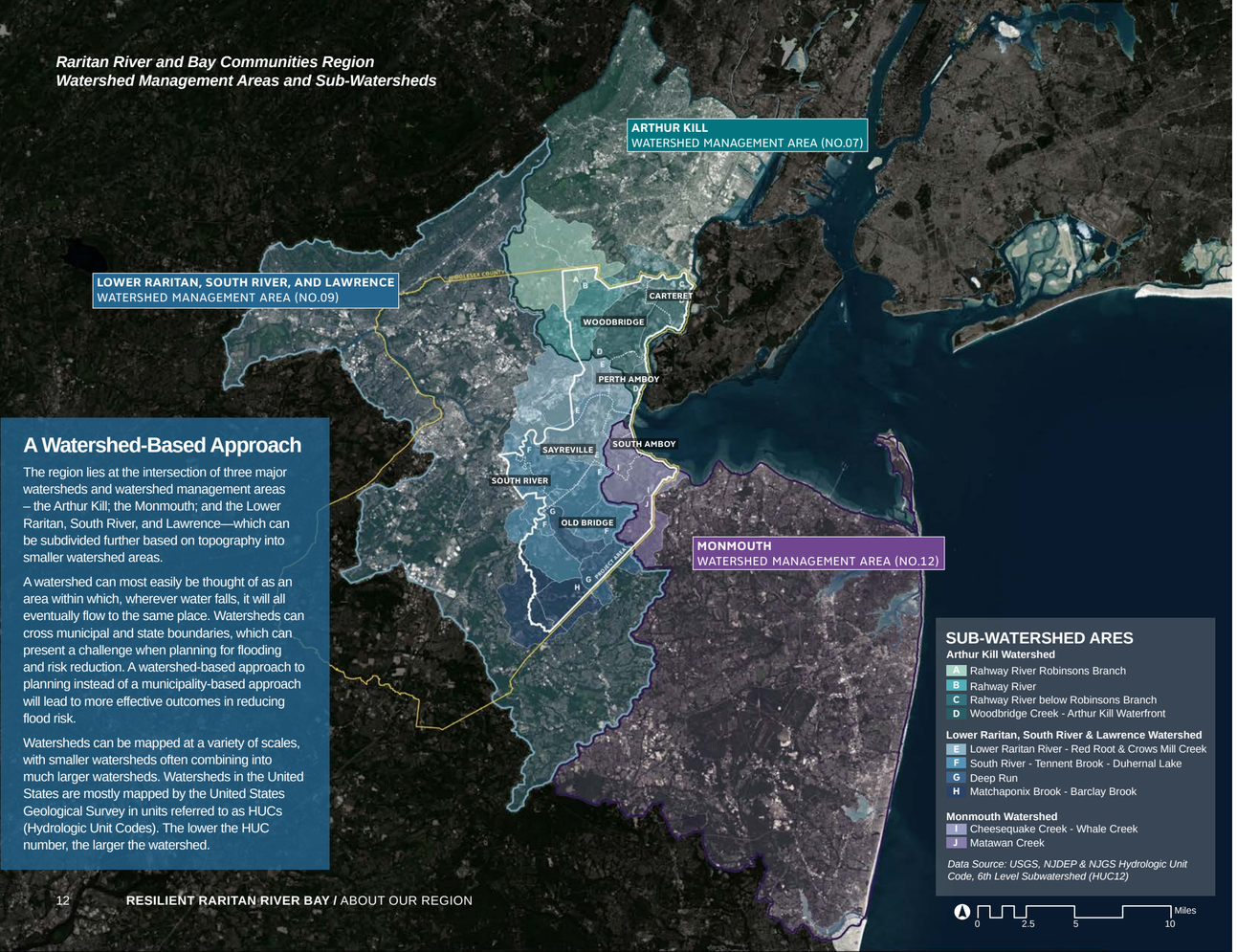
WORKING RESILIENT NJ - RARITAN RIVER AND BAY COMMUNITIES PROJECT MISSION

The Steering Committee developed the following working mission statement, which will evolve as the project progresses and as input is received from additional stakeholders.

The mission of Resilient NJ - Raritan River and Bay Communities is to create a watershed-based plan with a clear vision and roadmap for flood risk reduction, resilience, and environmental restoration to help the multi-municipal region survive and thrive. Plan development will employ the best available data and inclusive engagement to create social, environmental, and economic benefits and bring value to all who will share in the region's future.

Our communities are rich in history, people, places, and experiences. We are experiencing flooding and other hardships today, and the choices we make now can either exacerbate those risks or improve resilience and equity. We seek to build resilience against flooding now and in the future and address challenges that affect our quality of life by conducting informed, inclusive planning.





A Watershed-Based Approach

The region lies at the intersection of three major watersheds and watershed management areas – the Arthur Kill; the Monmouth; and the Lower Raritan, South River, and Lawrence—which can be subdivided further based on topography into smaller watershed areas.

A watershed can most easily be thought of as an area within which, wherever water falls, it will all eventually flow to the same place. Watersheds can cross municipal and state boundaries, which can present a challenge when planning for flooding and risk reduction. A watershed-based approach to planning instead of a municipality-based approach will lead to more effective outcomes in reducing flood risk.

Watersheds can be mapped at a variety of scales, with smaller watersheds often combining into much larger watersheds. Watersheds in the United States are mostly mapped by the United States Geological Survey in units referred to as HUCs (Hydrologic Unit Codes). The lower the HUC number, the larger the watershed.

ABOUT RESILIENT NJ - RARITAN RIVER AND BAY COMMUNITIES

The Resilient NJ - Raritan River and Bay Communities project will develop resilience recommendations that will enhance the existing character of the multi-municipality project region. The region comprises the municipalities of Woodbridge, Old Bridge, South River, Perth Amboy, South Amboy, Sayreville, and Carteret. These municipalities are part of the New York-New Jersey Harbor Estuary, and share common characteristics such as frequent flooding events, but are diverse in their character and history.

The project is guided by a Steering Committee that includes representatives from each municipality, as well as Middlesex County. The project also features a robust stakeholder engagement strategy to maximize access to information about the project. The strategy also aims to empower residents living in the multi-municipal region of the study area to participate in decision making processes, with a special emphasis on underserved and socially vulnerable populations. See resilient.nj.gov/rrbc for more on engagement.

Resilient NJ - Raritan River and Bay Communities project will bring together the people who live, work, and play in the area, alongside government, business, infrastructure providers, engineers, scientists, and environmental and community organizations to create a clear and equitable action plan using the best available data to address current and future flooding, while improving quality of life.

The partnership will identify vision and priorities to address infrastructure and communities that are most at risk of flooding. These steps will lead to development of potential scenarios or alternatives for addressing risks and priorities, which will be evaluated by our communities and formed into a clear roadmap for implementation. This process breaks into four clear steps with associated critical questions we must ask.

2021 — **May 2022**

VISION AND PRIOIRITIES	RISKS AND TOOLS	POTENTIAL SOLUTIONS	ACTION PLAN
What do we want our region to look like in 2070? What should stay the same and what should change? What do we want our relationship with water to look like?	**What neighborhoods and infrastructure in our region are most at risk of flooding today and in the future (2070)? What tools do we have to address these risks?**	**What policies, programs, or projects can be implemented to address and achieve the identified visions? How will the solutions impact our region?**	**What actions do we commit to accomplish these actions? How can each person in our region do something to help?**

ABOUT THIS REPORT

This report was developed through collaboration with the Resilient NJ - Raritan River and Bay Communities Steering Committee. It describes key features of the region and its cities that are important to understand when planning for reduced flood risk and better quality of life in the future. The goal of the report is to acknowledge the individual nature of each municipality while also highlighting shared regional interests and initiatives that must be considered in the planning process that will unfold over the coming year..

This report also summarizes past and ongoing work to advance resilience in the region. As such, it should be used as a tool to inform community members living in the Raritan River and Bay region how their regional neighbors have traditionally approached resilience in the past. In doing so, this report also contextualizes new opportunities and reveals challenges that might be considered during the Resilient New Jersey project.

The action plan that will come out of Resilient NJ will ideally support and advance, but never supplant, disrupt, or duplicate, other effective ongoing work that is highlighted in this report.

DIVERSITY, EQUITY, AND INCLUSION

Marginalized groups exist everywhere. This means that some people are excluded from or have limited access to traditional or “mainstream” economic, political, cultural, and social activities. This exclusion or marginalization can have significant impacts on individuals, families, and communities. Middlesex County is recognized as one of the most diverse counties in New Jersey. Middlesex County promote diversity, equity, and inclusion by:

1. Making marginalized groups, in particular Black and Brown people, feel welcomed and ensuring that they have access to the resources and opportunities necessary to connect, belong, grow and improve the quality of their lives
2. Acknowledging and eliminating disparities along race, class, gender, age, disability status and other dimensions of diversity
3. Expanding choice and opportunity for Black and Brown people, recognizing a special responsibility to plan for the needs of those who have been historically discriminated against
4. Fostering racial and economic integration
5. Ensuring diversity and inclusion in decision-making processes

This project seeks to ensure the fair distribution of the burdens and benefits of resilience solutions, and the active cultivation of equitable decision-making processes and resilience outcomes. This project has the potential to impact thousands of people in underserved communities. The Resilient Raritan River and Bay project team has a responsibility to:

- ***Ensure that project processes incorporate input from community members.***
- ***Maintain intentional commitment to respect and civility in all project engagement.***
- ***Sustain action and assessment of progress towards equitable resilience goals.***

IMAGE CREDIT: JIM LUKACH

IMAGE CREDIT: TERRY MCKENNA

02 - OUR HISTORY

The history of our region provides context for the current strengths and challenges we face when planning for future flooding in Raritan River and Bay Communities. This chapter provides an overview of events and trends in our region's history that shaped the region as we know it today, with a specific focus on history relevant to the most flood-prone areas.

OUR HISTORY

Located in Middlesex County in central New Jersey between New York City and Philadelphia, the Resilient NJ—Raritan River and Bay Communities region has been shaped geographically and culturally by the Raritan Bay. The Bay continues to influence and shape the region today.

The Raritan River, which is the area's predominant geographic feature, flows the entire width of the county from west to east. This allowed the area to serve as an entrance point to the rest of Middlesex County, as well as a connection point with New York City and New England. This role as a transportation hub sped settlement.

The region's development was also heavily influenced by its flat topography and natural features caused by the Raritan River. The Bay's rich sediment fostered diverse marine ecosystems with plentiful oysters and other shellfish. Its large intertidal zone also made the bay an attractive spot for other food sources that drew people to live and work nearby. On land, the area was historically intertidal with forested wetlands that were easily trafficked and networked by trails. Along the Raritan River, the floodplain drained well and provided rich soil for natural growth and habitat. As development progressed, people removed forests and cultivated the land. Forests are now fragmented, changing the composition of the floodplain and disrupting the movement and habitat of wildlife. Industrialization in the twentieth century increasingly polluted natural resources and changed the levels of salt in the water (salinity). This led to cascading effects on the shellfish ecosystems and tree species that had been present, changing possible uses of the region's ecological features for those who had relied on them.[1]

1 Raritan Basin Watershed Management Project, *New Jersey Water Supply Authority,* "Raritan Basin: Portrait of a Watershed," Aug 2002. http://raritan.rutgers.edu/wp-content/uploads/2015/10/NJWSA-2002-Portrait-of-a-watershed.pdf

EARLY SETTLEMENTS

The region was settled 3,000 years ago by the Lenape, who created an extensive system of trails that later became roads and developed into a major transportation network. The Lenape migrated seasonally and likely practiced small-scale agriculture along with hunting, gathering, and fishing the abundant shellfish in surrounding waters.

With the arrival of Dutch colonists in the 17th century, the Lenape livelihoods were uprooted through armed conflicts, including the "Pig War" of 1640 where the Dutch governor of Nieuw Amsterdam ordered the extermination of the Raritan-based Lenape tribes on Staten Island. The group retreated west into New Jersey. Eventually this land too was occupied, and the indigenous population declined due to the spread of contagious diseases. Those who were left relocated to a reservation in Burlington County.[2]

Moreover, Dutch settlers grew Perth Amboy into a prominent port that enabled more commerce and trade in the region. In addition, while not in the current project area, Raritan Landing (located in what is now Piscataway) expanded the region's trading capacity with large warehouses to store goods before exporting or selling them at the port. In the late 17th century, a new ferry service improved travel in the region.

INDUSTRIAL GROWTH

The area relied mostly on farming until the 19th century when it began to transition towards industrialization and manufacturing as a result of a new rail network through Middlesex County. The region – same as the study area – was a major producer of hosiery, musical strings, playing cards, ice, refrigeration equipment, and horseshoes. Many wetlands were filled in during this period to create space for industrial development. These areas are highly vulnerable to flooding today, and contain contaminated soil due to both the fill material and industrial uses. Many sites have also been remediated and redeveloped with parks and other uses, and many more have remediation planned.

2 Beekman, G. C. (1901). Early Dutch Settlers of Monmouth County, New Jersey. Freehold, N.J. : Moreau Brothers. (DLC) 16006498.

Today, the region is largely suburban, with former industrial sites along the coast redeveloped as retail and office. Its largest employers are healthcare, pharmaceutical companies, the financial industry, and distributors of goods.

POPULATION SHIFTS

The growth of manufacturing over the twentieth century in Middlesex County attracted many immigrants, increasing the diversity of the population and overall size. In 1900, the county's population reached almost 80,000. The County expanded to over 750,000 residents by 2000.

Today, Middlesex is the second most populous county in New Jersey, and over 300,000 people from a multitude of diverse backgrounds live in the municipalities that comprise the Raritan River and Bay Communities.

MAJOR STORMS

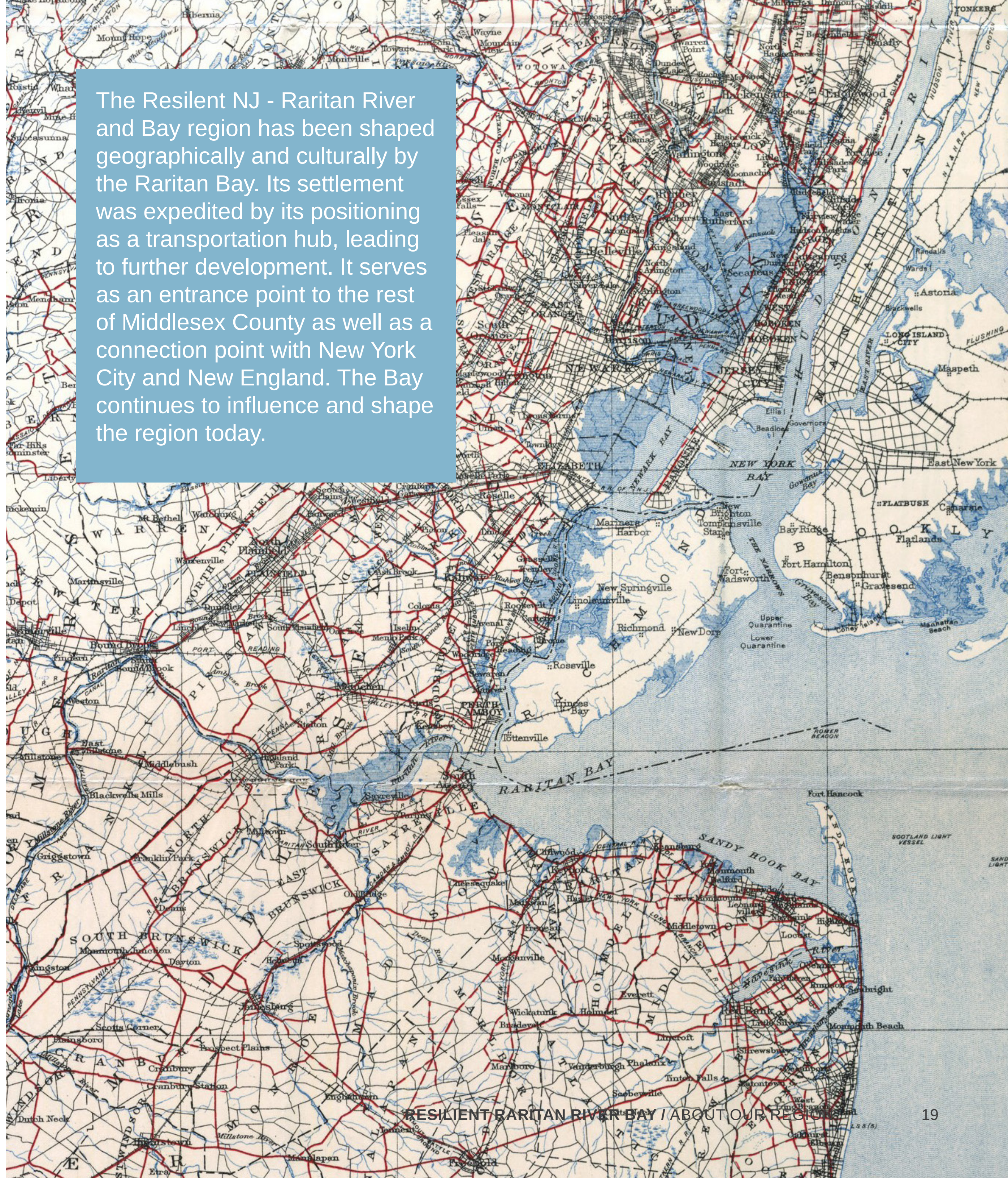
Thousands of residents living in the Raritan River and Bay Communities live in areas vulnerable to flooding. These hazards include tidal flooding from coastal storms and storm surge, coastal erosion, high tide flooding from sea level rise, riverine flooding, flooding from heavy rainfall, and for some areas, combined sewer overflows.

The location and extent of flooding is dependent upon the type. In 2011, Hurricane Irene brought with it a storm surge of three to six feet. Irene's record rainfall caused damaging riverine flooding in highly populated areas along the rivers that feed the Raritan Bay in north-central New Jersey, including the Raritan River and Arthur Kill (which separates Perth Amboy and Woodbridge, among other towns). The storm was particularly damaging because it pushed the water levels significantly above what was expected to be an unusually high tide around dawn, while simultaneously, heavy rain dramatically raised water levels in upstream rivers and creeks.

One year after Irene, Hurricane Sandy brought less rainfall to the Raritan River and Bay Communities, but record-breaking high tides and wave action combined with sustained winds. Water accumulated in the coastal bays, waterways, harbors, and rivers. Storm surge along the coast ranged from four to nine feet high. Many trees and powerlines came down and there were dangerous gas leaks and water shortages in many communities. Due to power outages and sewage infrastructure failure, 75 million gallons of raw sewage a day flowed into Raritan Bay for nearly a week.

Although there was some active resilience planning prior to Hurricane Sandy, the event propelled

Data Source: *1913 map, Rutgers Cartography Services*



The Resilient NJ - Raritan River and Bay region has been shaped geographically and culturally by the Raritan Bay. Its settlement was expedited by its positioning as a transportation hub, leading to further development. It serves as an entrance point to the rest of Middlesex County as well as a connection point with New York City and New England. The Bay continues to influence and shape the region today.

the region to begin evaluating and implementing projects to reduce future damage from similar storms. In addition, Hurricane Sandy spurred federal funding and action to address flooding in the municipalities that make up the Raritan River and Bay Communities, including new flood risk mapping and the Resilient New Jersey program.

A selection of key completed and planned projects that have already or will significantly alter the region's risk landscape are summarized in the Planning Initiatives section of this report.

There has also been substantial effort statewide on developing long term control plans for areas with combined sewer systems. In this region only Perth Amboy has a combined sewer system. In 2015, the New Jersey Department of Environment Protection issued new permits to utilities, including Middlesex County Utility Authority (MCUA), that required the development of plans to control the overflow of sanitary sewer flows following heavy rainfalls. MCUA and the City of Perth Amboy submitted a draft plan in October 2020.

ENVIRONMENTAL JUSTICE

In September 2020, New Jersey Governor Phil Murphy signed the Environmental Justice Law, which requires the evaluation of certain facilities' contributions to existing environmental and public health stressors during permit application review.

NJDEP is working to achieve the guidelines set forth in the Environmental Justice Law through its Office of Environmental Justice, which has provided the following key definitions:

- **Environmental Justice** is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.
- **Fair treatment** means that no group of people, including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.
- **Meaningful involvement** means that the public has an opportunity to participate in decisions about activities that may affect their environment and/or health; the public's contribution can influence the regulatory agency's decision; community concerns will be considered in the decision-making process; and decision makers will seek out and facilitate the involvement of those potentially affected.

Researching, identifying, and envisioning ways to address environmental justice issues within the Raritan River and Bay region will be a consistent focal point of the Resilient New Jersey project. The Raritan River and Bay region includes specific instances where industrial development, flood risk and disproportionate social, environmental, and economic impacts intersect.

Environmental issues disproportionately affect lower-income and minority populations throughout the United States, and these issues stretch into Middlesex County. Populations in the region have historically faced and are currently facing disproportionate legacy contaminant issues in their water, air, and soil that affect health. This causes health problems like asthma and allergies for many communities. These pollution issues compound on other factors, including inequitable access to health care services and open space, as well as exposure to greater flood risks and less investment in flood risk mitigation.

IMAGE CREDIT: JIM LUKACH

03 - OUR REGION

The Raritan River and Bay Communities region is varied and diverse, and is heavily interconnected along major transportation networks and waterbodies, with a variety of cultures and industries. This chapter highlights key characteristics that shape current exposure to flooding, as well as changes underway that will change exposure in the future. Where flood hazard and people, infrastructure, and existing challenges intersect, risk is increased. By understanding how the various characteristics of the region intersect with what we currently know about flood risk and what we will learn through the forthcoming risk assessment, we will better focus resources and attention, engagement, and technical analyses toward reducing risk and building resilience.

IMAGE CREDIT: KEN LUND ON FLICKR

TOPOGRAPHY AND FLOOD HAZARDS

The Federal Emergency Management Agency (FEMA) defines a hazard as "an event or physical condition that has the potential to cause fatalities, injuries, property damage, infrastructure damage, agricultural loss, damage to the environment, interruption of business, or other types of harm or loss."[1] A **flood hazard** is the potential for inundation that involves risk to life, health, property, and natural floodplain resources and functions. It is comprised of three elements: severity (magnitude, duration, and extent of flooding), probability of occurrence, and speed of onset of flooding. This map shows the flood hazard zones that are used by FEMA to set flood insurance rates and by the state to set minimum construction and development standards. The areas shown in blue are generally more likely to flood from coastal storms surge or overflowing rivers. The data shown here is from the Preliminary Maps released by FEMA in 2015. FEMA is in the process of updating this data. Revised Preliminary Maps are expected in 2024 with effective Flood Insurance Rate Maps expected the following year.

FEMA flood maps often do not address urban flooding or flooding from rainfall and drainage issues, flooding from high tides. NJDEP is developing models for the Resilient NJ program that will address flooding from major rain events now and with projected climate change through 2070.

1 FEMA, "Survey of Hazards and Disasters," 1997.

As shown in this map, the Raritan River and tidal waterways, wetlands, and coastal areas along Raritan Bay are subject to a 1% annual chance of flood hazard. Additionally, coastal areas along Raritan Bay and Arthur Kill are subject to storm waves (VE zone). The topography of Middlesex County ranges from low lying wetlands to high points at about 600 feet in elevation.

LEGEND

FEMA Flood Zones

- 0.2 Percent Annual Chance Flood Hazard
- A, AE, AO
- VE

Elevation (feet)

- 600
- 0

Bathymetry (feet)

- 0
- -30
- -60
- -90

- Municipal Boundaries
- Middlesex County Boundary

Data Sources: *FEMA Digital Flood Insurance Rate Map (2015), New Jersey Office of GIS Digital Elevation Model (2018)*

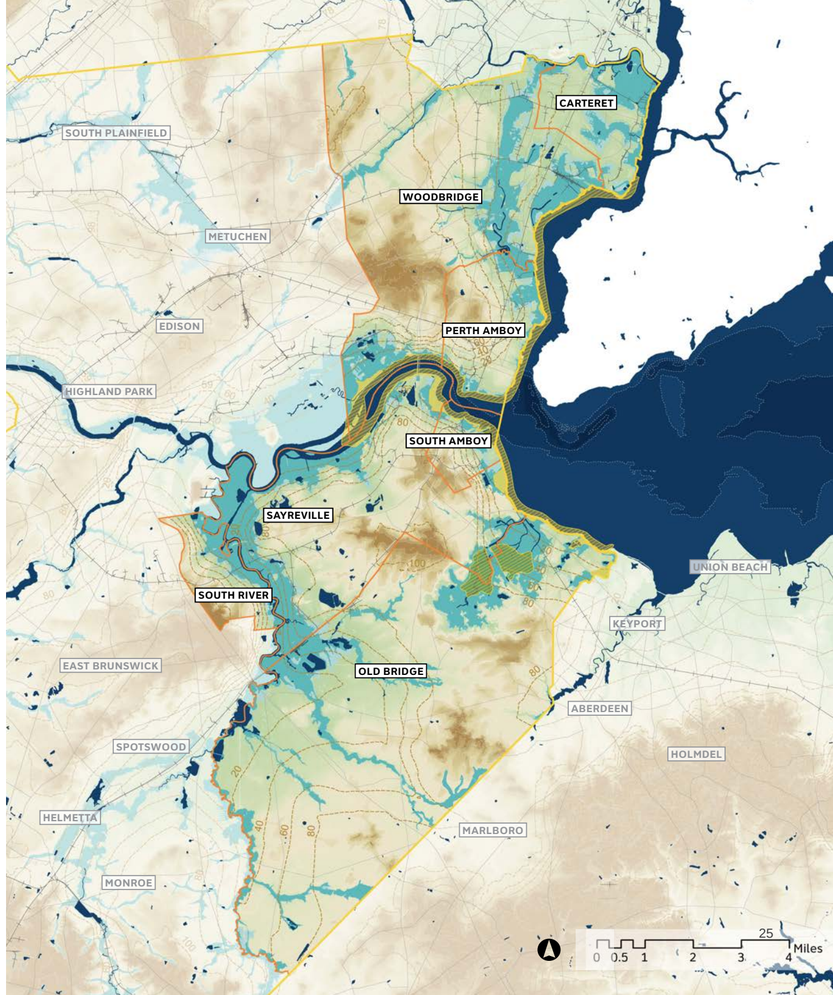


IMAGE CREDIT: NATURE IN THE BURBS ON FLICKR

HOW TO READ A FEMA FLOOD INSURANCE RATE MAP

According to the National Flood Insurance Program (NFIP), flood hazard areas identified on the Flood Insurance Rate Map are identified as a Special Flood Hazard Area (SFHA). FEMA flood maps show areas that have a 1-percent or greater annual chance of flooding. It's important to note that these maps don't include areas that may flood due to heavy rainfall and overwhelmed drainage systems, and they don't include any future projection of sea level rise.

SFHA are defined as the area that will be inundated by the flood event having a 1% chance of being equaled or exceeded in any given year. The 1% annual chance flood is also referred to as the base flood or 100-year flood.

Moderate flood hazard areas, labeled Zone B or Zone X (shaded) are also shown on the FIRM but are not considered part of the Special Flood Hazard Area. The areas of minimal flood hazard, which are the areas outside the SFHA and higher than the elevation of the 0.2-percent-annual-chance flood, are labeled Zone C or Zone X (unshaded).

SPECIAL FLOOD HAZARD AREAS:

- ZONE A - Area inundated by the Base Flood with no Base Flood Elevations determined.
- ZONE AE - Area inundated by the Base Flood with Base Flood Elevations determined.
- ZONE AH - Area inundated by the Base Flood with flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined. *This zone has not been mapped in the project area.*
- ZONE AO - Area inundated by the Base Flood with flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding (areas that emerge from narrow canyons for example), velocities are also determined.
- ZONE V - Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE - Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.
- ZONE X (shaded), B (moderate-risk zones) An area of moderate flood hazard that is determined to be outside the Special Flood Hazard Area between the limits of the base flood and the 0.2-percent-annual-chance (or 500-year) flood.
- ZONE X (unshaded), C (low-risk zones) An area of minimal flood hazard that is determined to be outside the Special Flood Hazard Area and higher than the elevation of the 0.2-percent-annual-chance (or 500-year) flood.

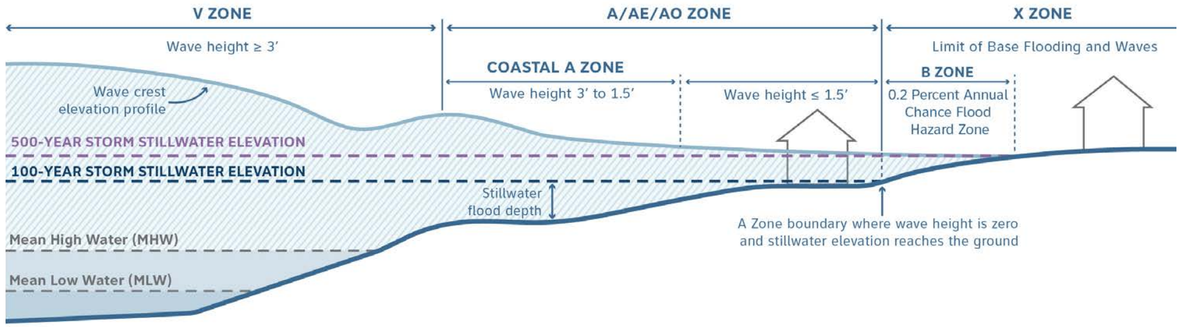
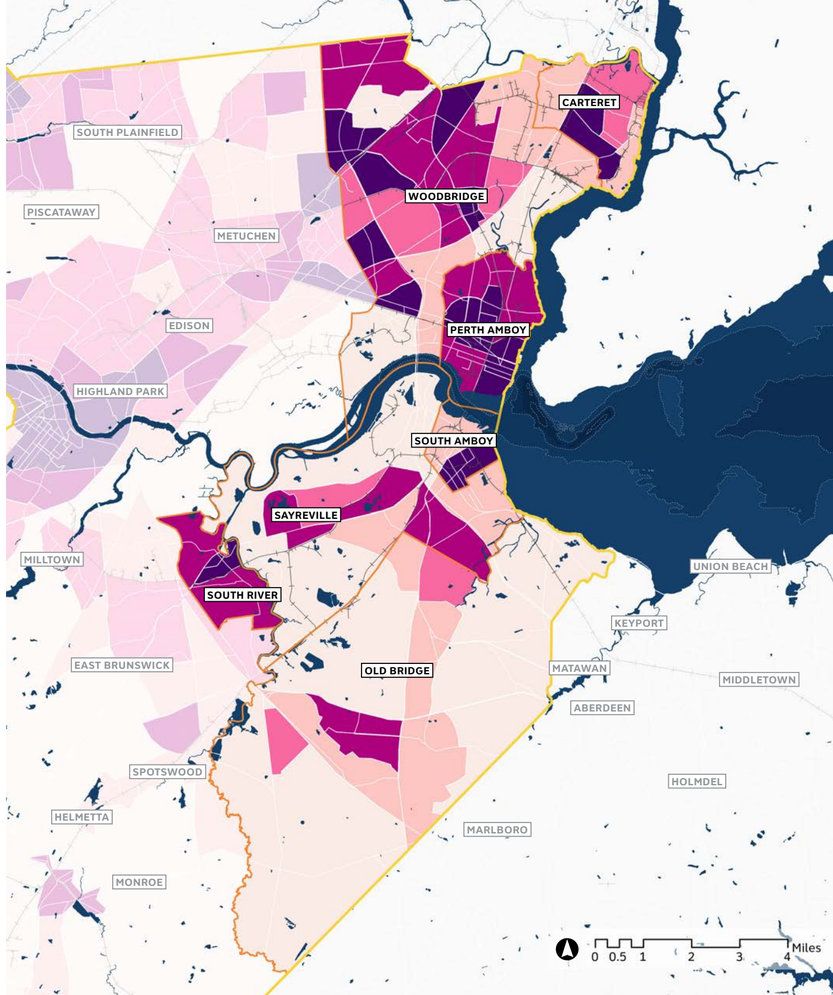


IMAGE CREDIT: DOC SEARLS VIA FLICKR

POPULATION DENSITY

The region has a wide range of population density, with higher density areas in Carteret, Woodbridge, Perth Amboy, and South Amboy, and sparsely populated areas adjacent to major wetlands and forests. There are several areas of high population density in the floodplain, including the Perth Amboy waterfront, areas of the South River riverfront, and South Amboy's downtown.



LEGEND

Population Density by Census Tracts

(Total Population/Acres)

- <5
- 5 - 9
- 10 - 19
- 20 - 29
- 30 - 50

***Data Source:** Centers for Disease Control and Prevention/ Agency for Toxic Substances and Disease Registry Social Vulnerability Index (2018)*

SOCIALLY VULNERABLE POPULATIONS

Social vulnerability refers to the degree to which a community's people are challenged when faced with significant disruptions.

For example, low income, non-English speaking, young, elderly, homeless, or physically disabled people are more likely to need support to prepare, respond to, or recover from a flood event. Minority and elderly populations are also less likely to have equal access to financial and physical resources to do the same. These members of our community are likely to suffer more from a flood than people who do not experience the same vulnerabilities. To build community resilience, we must plan for the community's needs. And planning for the needs of socially vulnerable populations living in Raritan River and Bay communities means alleviating barriers to access services and critical information.

The Centers for Disease Control and Prevention (CDC) developed a Social Vulnerability Index that incorporates 15 factors grouped into four common themes: socioeconomic status, household composition, race/ethnicity/language, and housing / transportation. The index uses US Census data to rank the social vulnerability of each census tract. This map shows the CDC SVI for the region, with the darker areas being more socially vulnerable and the lighter areas being less socially vulnerable, according to the index.

Regional coordination on multiple levels during a disruptive event can increase access to essential services during a crisis: clear, consistent, available risk management and communication resources can create a multi-functional web of support for those seeking help and those offering assistance alike. Coordinated approaches towards government planning and preparedness actions can further accelerate pre-event adaptation measures and post-event recovery efforts, not only through an increased service area, but also, through alignment and facilitation measures that reduce redundancy and inconsistency.

Ultimately, Resilient NJ aims to bring such a coordinated focus to the RRBC region. The project will particularly focus on planning within areas where social vulnerability and frequent flooding intersect, as well as with the infrastructure and support systems that serve these areas.

As shown on the map, socially vulnerable populations are concentrated in Perth Amboy and Carteret, as well as a few sections of Woodbridge, Sayreville and South River.

Most of **Perth Amboy** is shown as high social vulnerability. A majority (80 percent) of the city's residents identify as Hispanic or Latinx. The city also has the highest poverty rate among the municipalities in the region at 19 percent. **Perth Amboy** is also the only community in the region with combined sewers and an associated Long-term Control Plan to help address Combined Sewer Overflows in the community.

Much of **Carteret** is also shown as high social vulnerability. The borough is home to many immigrant populations, including a large Asian community, as well as many who identify as Black or Hispanic/Latinx. According to the SVI index there are also high rates of overcrowding in housing.

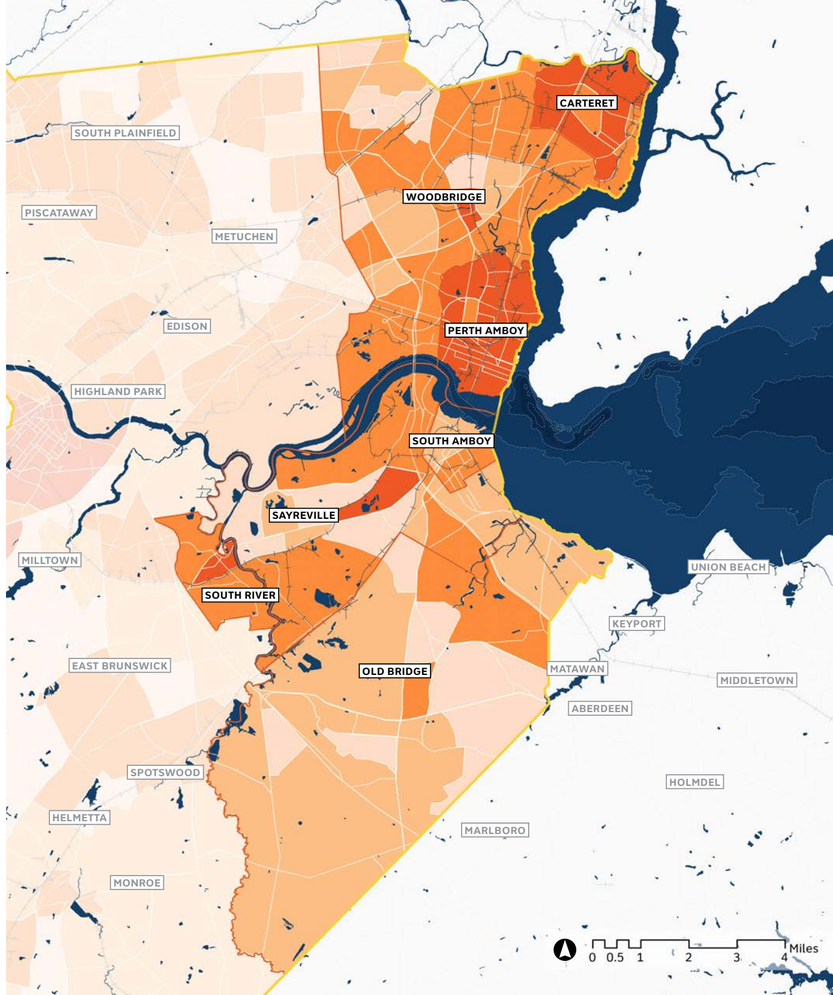
Most of **Old Bridge** is relatively low in social vulnerability with a population that is over 70 percent White and an overall poverty rate of 5 percent. There are some areas with higher social vulnerability. These are generally neighborhoods with a growing immigrant population, composed mostly of Hispanic and Asian communities.

Likewise **Sayreville** is generally lower social vulnerability with a relatively low poverty rate (7 percent) with some contains pockets of higher vulnerability, largely driven by the Hispanic, Asian, and Black minority communities.

Social vulnerability varies across **South River**. Overall, the borough is 83 percent White, one of the highest in the region, and the poverty rate is low (7 percent). The area south of Main Street and immediately adjacent to the **South River** has a higher social vulnerability score. There is a high poverty rate in this area (19 percent) and large minority population (47 percent).

Most of **Woodbridge** has moderate social vulnerability scores. The township's poverty rate overall is low (5.5 percent); however the poverty rate in the area around downtown with is high (19 percent). The township overall has large Asian (24 percent of total population) and Hispanic (21 percent) communities.

Most of **South Amboy** has relatively low social vulnerability scores. The city overall has a low poverty rate (6.4 percent), is over 80 percent White, and large Hispanic population (21 percent).



LEGEND

Social Vulnerability Index by Census Tract

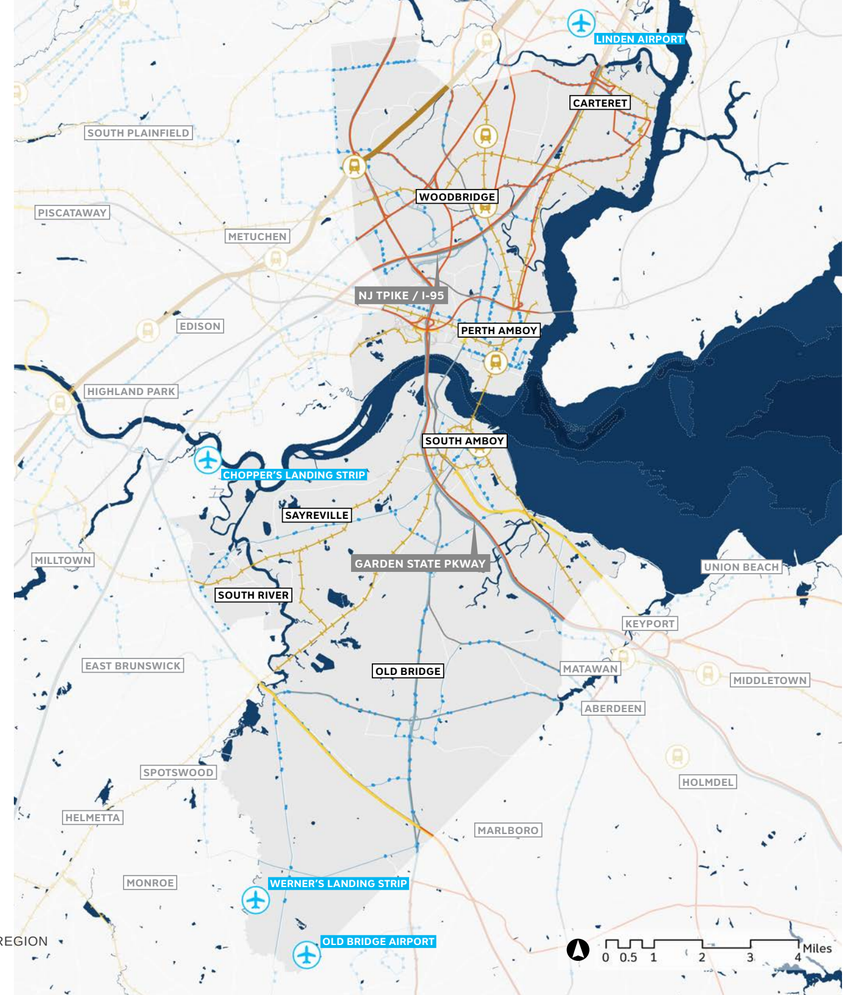
- ≤0.25 (Lower Vulnerability)
- ≤0.5
- ≤0.75
- ≤1.00 (High Vulnerability)

Data Source: *Centers for Disease Control and Prevention/ Agency for Toxic Substances and Disease Registry Social Vulnerability Index (2018)*

TRANSPORTATION NETWORK

The Raritan River and Bay Communities region is characterized by a transportation network connecting New York City to the Jersey Shore with the North Jersey Coast Line operated by NJ TRANSIT, as well as connections to the Northeast Corridor to travel into Philadelphia on NJ TRANSIT or Amtrak. There are several primary roadways including the New Jersey Turnpike (I-95) and the Garden State Parkway.

Along with these major transportation assets, several municipalities have robust walking and bicycling networks. Carteret, South River, South Amboy, and Perth Amboy all have sidewalks throughout their downtown cores and most residential streets. Perth Amboy recently implemented a shared-use path along a portion of their waterfront and Woodbride has recently invested in new bicycle lanes. Nevertheless, interstates, arterial roadways, and railroad tracks act as barriers in between more accommodating areas and are typically not conducive to walking and bicycling, with notable exceptions such as bicycle lanes along the Route 35 Victory Bridge.



LEGEND

REGIONAL TRANSPORTATION SYSTEMS

- Airports
- Hurricane Evacuation Routes
- Bus Routes and Stops
- Amtrak
- Rail Network and Stations
- Primary and Secondary Roads

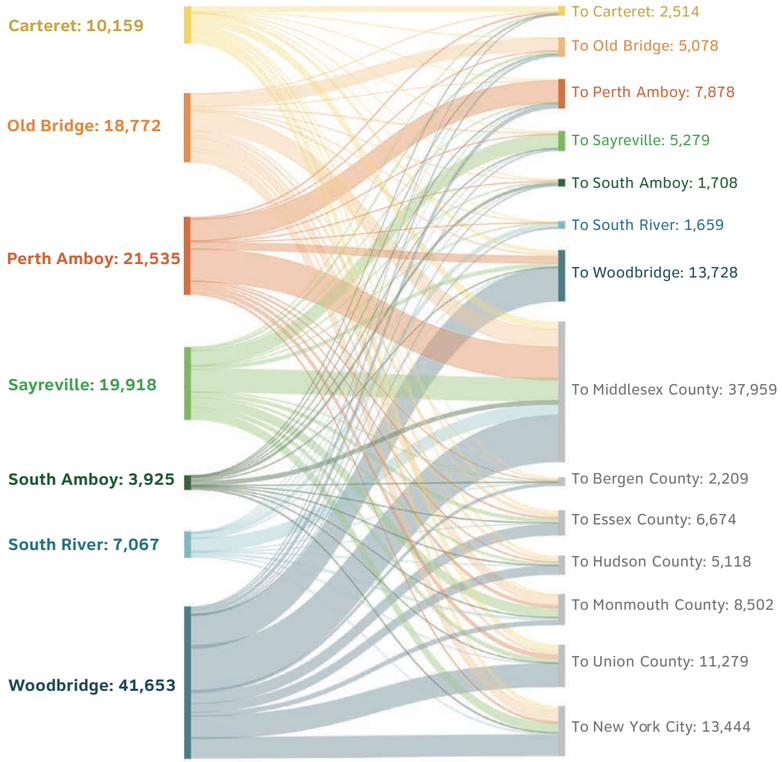
Data Source: *US Census (TIGER) (2019), Homeland Infrastructure Foundation-Level Data (HIFLD)*

The Raritan River and Raritan Bay act as barriers since there are few opportunities for crossings. Safe alternatives are further limited when accommodations for bicyclists and pedestrians are not built along bridges and other infrastructure. The regional focus of this project is beneficial since it may foster discussion on resolving connectivity issues that could impede flood resilience. There are numerous county-wide planning initiatives that are underway as well to consider regional transportation which this project will be coordinating with.

The growing region provides opportunity for a wide array of transportation networks to grow with it, not just private automobile-focused networks. Building on the region's history of water-based transportation, any new or expanded mobility systems must take into account multi-modal options for crossing the waters. Examples include Middlesex Greenway's expansion in Woodbridge and beyond, and planned ferry service between South Amboy and New York. Building out these networks will expand mobility for commuters, boost quality of life, and connect socially vulnerable populations by providing more ways to traverse within, into, and out of the region. Pedestrians, cyclists, and motorists are all people who live and work in the region – and the planning process must balance the safety and comfort of those using all these modes.

ORIGIN DESTINATION ANALYSIS

Commuter patterns for the region show that the majority of commuters in the area reside in Woodbridge, Perth Amboy, Sayreville, and Old Bridge, in descending order. Major commuting destinations for residents of the seven municipalities in the study are areas in the rest of Middlesex County, Woodbridge, New York City, Union County, Monmouth County, and Perth Amboy.



Data Source: *CTPP Dataset, US Census 2012. 2016 ACS 5-Year Data Profile.*

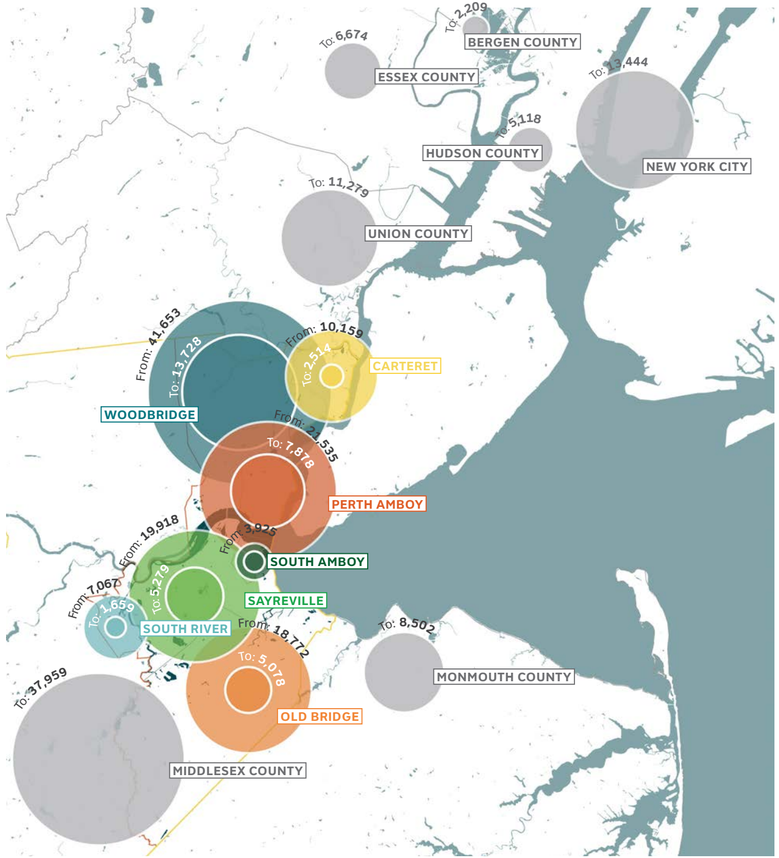
EMPLOYMENT CENTERS

Historically, the Raritan River was the source of trade and commerce in the region. In subsequent years, the river provided the region with a foundation for industry that has evolved into diverse employment opportunities both along the water and further within the Raritan River and Bay communities.

There are a total of approximately 76,000 jobs in the region, with the largest clusters in Woodbridge and Perth Amboy. The jobs offered within the region also appeal to those who live outside of it: more than half of the workers who work in the region study area live elsewhere.

WHERE DO OUR WORKERS LIVE?

Number of workers	Percent of workforce	Live in:
2,888	4%	Cartaret
5,076	7%	Old Bridge
9,099	12%	Perth Amboy
6,150	8%	Sayreville
2,788	4%	South Amboy
542	1%	South River
11,256	15%	Woodbridge
14,222	19%	Elsewhere in Middlesex County
22,054	29%	Elsewhere in NJ
2,362	3%	New York City



Data Source: *US Census (TIGER) (2019), Homeland Infrastructure Foundation-Level Data (HIFLD)*

INDUSTRY, UTILITIES, AND MOVEMENT OF GOODS

Historically the region was a hub for trade and commerce. While significant portions of the waterfront are still industrial, especially in Carteret, Perth Amboy, and Woodbridge, many parts of the industrial corridor are now recreation and preservation areas, along with commercial and residential neighborhoods, or are brownfields in the process of being remediated and redeveloped.

Nonetheless, much of the region continues to include industrial areas, and transportation infrastructure, and key assets, including several power plants, port facilities, major roadway rights-of-way and rail lines. Much of these industrial and commercial utilities are vulnerable to coastal flooding along Arthur Kill and Raritan Bay, as well as riverine flooding along the Raritan River. These transportation networks and industrial facilities are critical assets due to the importance of the shipping ports within and around the region. When a link in a supply chain is broken, there can be significant cascading impacts. The region's influence on the movement of goods and services regionally and nationally is significant and must be made resilient against any possible disruptions.

LEGEND

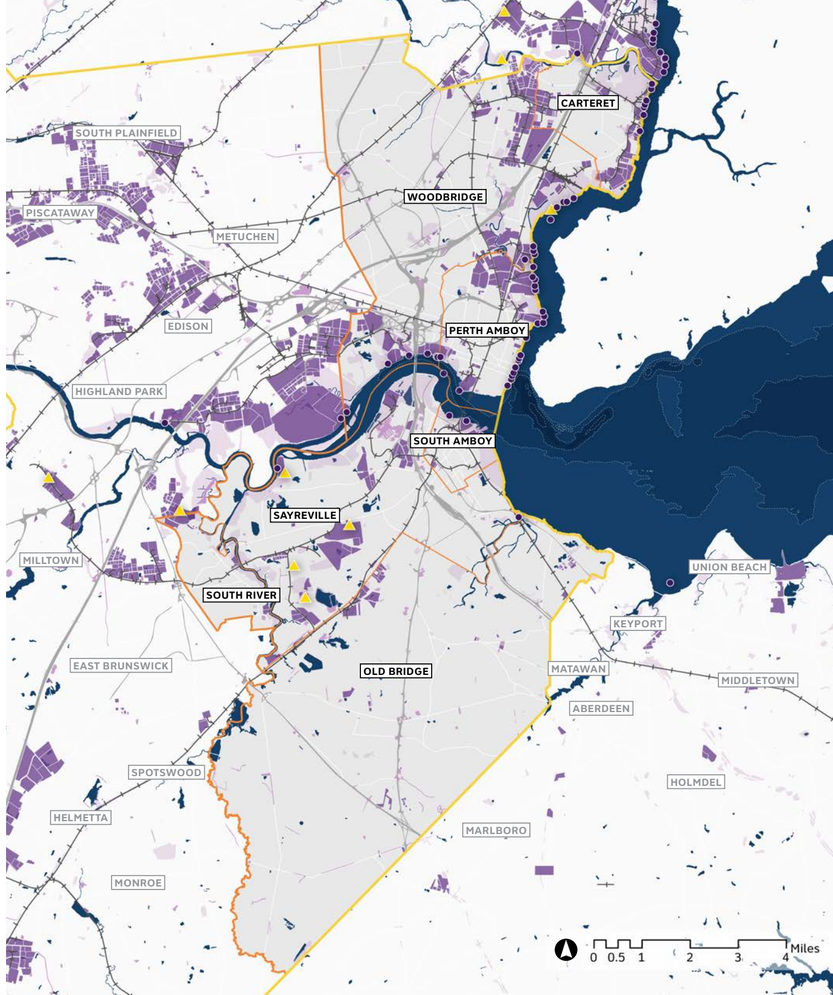
INDUSTRIAL AREAS

- Power Plants
- Port Facilities
- Industrial Parcels

FREIGHT

- Transportation and Utility Land Uses
- Major Roadways Right-of-Way
- Rail Lines
- Municipal Boundaries
- Middlesex County Boundary

Data Source: *U.S. Department of Transportation Bureau of Transportation Statistics (2018), NJDEP Land Use/Land Cover of New Jersey (2015), NJDEP GIS Environmental Open Data, NJDEP GIS Utilities Open Data (2020)*

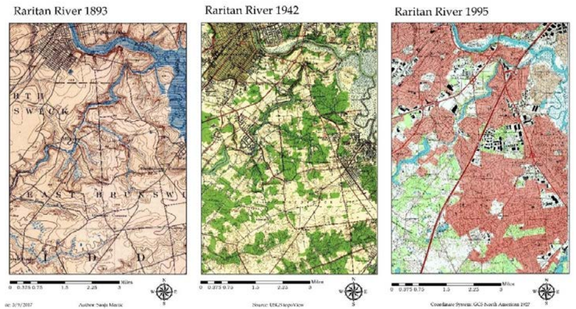


CONTAMINATION AND WATER QUALITY

The region contains many low-lying contaminated sites, brownfield redevelopment sites, and areas of historic fill vulnerable to coastal flooding along Arthur Kill and Raritan Bay as well as riverine flooding along Raritan River. Development began to use the approach of filling in low-lying wetland areas to elevate land beginning in the 1900s, and much of the fill was a mix of dredging material to expand land use.

An increase in urban development over the past century has also led to piping, culverting, and general construction that has hidden streams and rivers within the Lower Raritan Watershed. The EPA has discovered that nitrates travel on average 18 times further in buried urban streams than they do in open streams before they are taken out of the water column.[1] This means large water bodies in the region, including Raritan River and Raritan Bay, receive more pollutants than if the waterways upstream were open and healthy and serving to filter pollutants as stormwater runoff travels its course – adversely affecting the Lower Raritan Watershed as a result.

1 Beaulieu, J. J., Golden, H. E., Knightes, C. D., Mayer, P. M., Kaushal, S. S., Pennino, M. J., Arango, C. P., Balz, D. A., Elonen, C. M., Fritz, K. M., & Hill, B. H. (2015). Urban Stream Burial Increases Watershed-Scale Nitrate Export. PLOS ONE, 10(7). https://doi.org/10.1371/journal.pone.0132256



This graphic shows gradual encroachment of development and associated disappearance of tributaries to the South River and Raritan River over a period of approximately 100 years.

***Source**: USGS topoView. Author: Sanja Martic. Date 03/09/2017. Retrieved from: https://lowerraritanwatershed.org/2019/02/26/the-problem-with-hidden-streams/*

INDUSTRIAL CONTAMINATION

Within the Lower Raritan Watershed, the legacy of industry still remains to affect the social, environmental, and economic landscapes. Industry in the Raritan River and Bay region was historically situated on the Raritan River, but only recently has the issue of historic pollutant containment come into focus for the area's residents.

Recently, the US Government Accountability Office published a report that identifies the nation's Superfund sites deemed most "at risk" of climate crises including flooding, coastal inundation, and wildfire. According to the EPA, thousands of contaminated Superfund sites exist nationally due to hazardous waste being dumped, left out in the open, or otherwise improperly managed. These sites include manufacturing facilities, processing plants, landfills and mining sites. Of the 945 sites on the GAO list, 24 (4%) Superfund sites are located in the Lower Raritan Watershed.[2]

WATER QUALITY

There are numerous Combined Sewer Overflows (CSOs) within Perth Amboy, which is the only municipality in the region with a combined sewer system. CSOs can lead to water quality pollution following heavy rainstorms, which will increase with climate change.

According to the NJDEP, CSOs are:

> "shared underground piping networks that direct both sewage and stormwater to a central treatment system before being discharged into a waterway. During heavy rainfall or significant snowmelt, the systems overflow, causing discharges of mixed sewage and stormwater to the waterway. Combined sewer systems are remnants of the country's early infrastructure and are located in older urban areas."[3]

Combined sewer systems present challenges for cities because the water that overflows to rivers or creeks during rain events has not been treated, so it contributes to poor water quality in our waterbodies. Furthermore, sometimes the sewer system becomes so overwhelmed that the combined sewage backs up into streets through catch basins and causes localized flooding. This localized flooding associated with the combined sewer system is a risk today. This adds additional health hazards to flood risk and existing social vulnerabilities.

Researchers at Rutgers University have also discovered a high correlation between amounts of impervious surface cover and the degree of water quality impairment. Impervious surface is defined as the area that prohibits penetration of water into underlying ground layers and as a result, rain and snow are unable to infiltrate into the ground and runs off.[4] Specifically, watersheds with more than 10% impervious cover are considered to have impaired water quality; those with > 25% impervious cover are considered degraded. The Lower Raritan Watershed exceeds 22.4% impervious cover.

2 United States Government Accountability Office, "Superfund and Climate Change," GAO-20-73 (Washington, D.C.: Oct. 2019). https://www.gao.gov/assets/gao-20-73.pdf

3 NJDEP, "What is a Combined Sewer Overflow?", https://www.nj.gov/dep/dwq/cso-basics.htm

According to Rutgers University, land use in the main stem Raritan River watershed is primarily urban and suburban, with industrial and commercial centers throughout. The South River begins in Spotswood and flows into the Raritan River at Sayreville. Land use in the upper part of this area is primarily agricultural and forested.

Land use in the main stem Raritan River watershed is primarily urban and suburban, with industrial and commercial centers throughout. The South River begins in Spotswood and flows into the Raritan River at Sayreville. Land use in the upper part of this area is primarily agricultural and forested.

New industrial and residential development is rising in these areas, as well as existing, older development in the South River subwatershed. Construction activities, increased use of impervious surfaces and stream bank modification have all contributed to stilt loads and local flooding. There is an increasing amount of runoff from urban services, roads, and storm sewers. These conditions have reduced water quality and fish habitat.

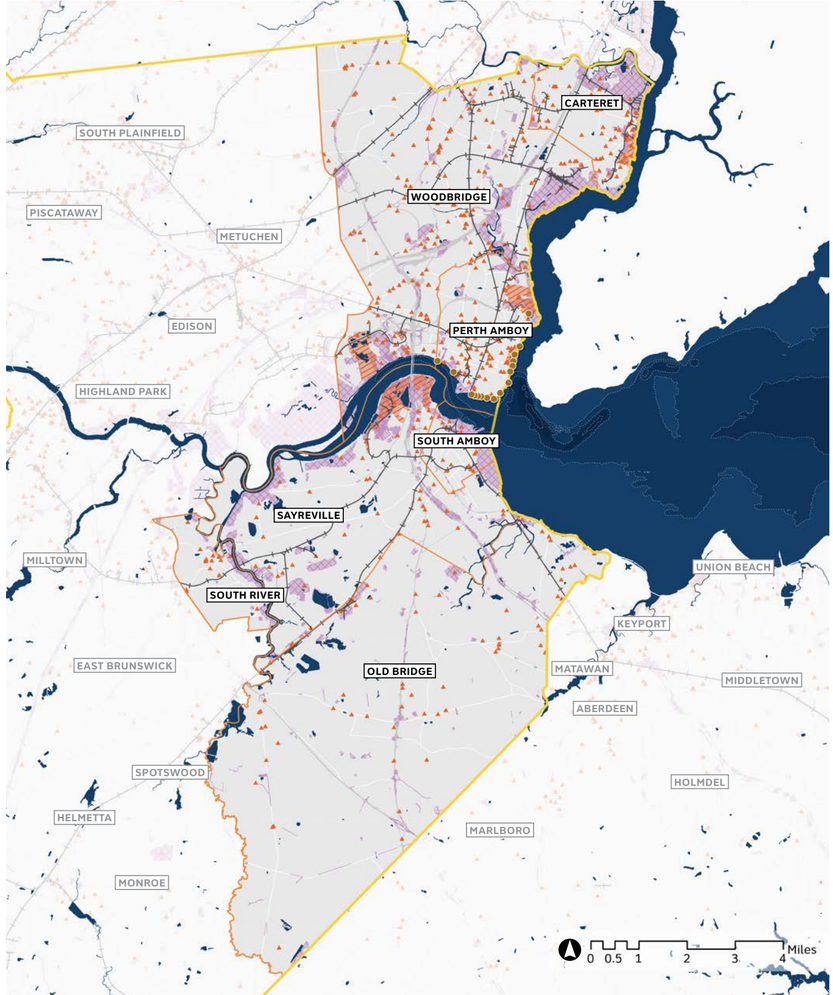
4 Sustainable Raritan River Initiative Rutgers, The State University of New Jersey, "State of the Raritan Report, Volume 1." Dec 2016. http://raritan.rutgers.edu/wp-content/uploads/2017/01/SOR-Final-2017-01-30.pdf

LEGEND

CONTAMINATION & WATER QUALITY

- Contaminated Sites
- Combined Sewer Overflows
- Brownfield Redevelopment Sites
- Historic Fill
- Major Roadways Right-of-Way
- Rail Lines
- Municipal Boundaries
- Middlesex County Boundary

***Data Source:** U.S. Department of Transportation Bureau of Transportation Statistics (2018), NJDEP Land Use/Land Cover of New Jersey (2015), NJDEP GIS Environmental Open Data, NJDEP GIS Utilities Open Data (2020)*



OPEN SPACE, PARKS, AND WETLANDS

The region has extensive natural and open space areas, predominantly characterized by wetlands and forests. Although not contiguous, there are several state, local, and non-profit owned open spaces and trails, including Middlesex County Trails in John A. Phillips Open Space Preserve and New Jersey State Park Service Trails in Cheesequake State Park.

Despite the seemingly large areas of open space in the region, there are drastic differences in the accessibility of green space between municipalities. In South Amboy, 97% of residents live within a 10-minute walk of a park. In Old Bridge, however, that number is 20% (Trust for Public Land, 2021).

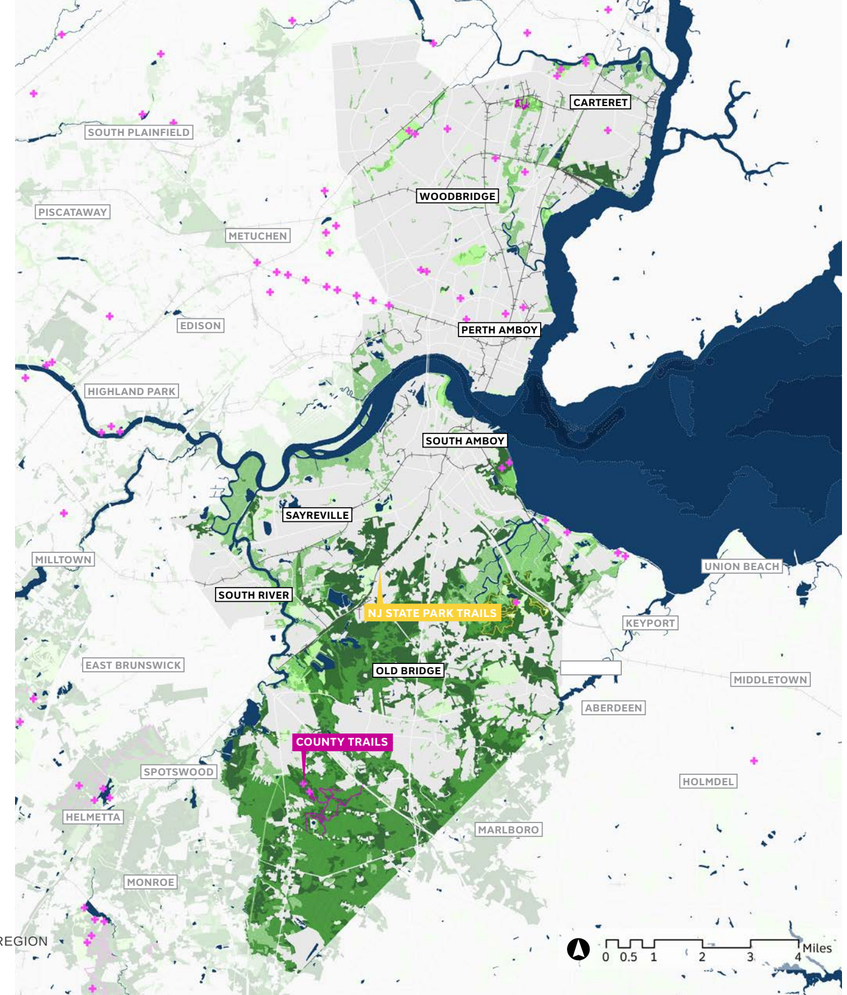
Access to open and green space is an important indicator of overall community health. Its impact on mental and physical health, as well as neighbors' relationships with one another, their community, and even crime, is extremely well documented. For example, numerous studies have connected community gardens to a reduction in crime (Shipley, 2019). An important element of resilience planning will be understanding how easily people in the region currently access open and green space, how they use that space, and how they might want it to change.

LEGEND

OPEN SPACE NETWORK

- Middlesex County Trails
- New Jersey State Park Service Trails
- Park Amenities
- State, Local and Nonprofit-owned Open Spaces
- Wetlands
- Forests

Data Source: *Middlesex County Office of Parks and Recreation (2016), New Jersey State Park Service, New Jersey Department of Environmental Protection Land Use/Land Cover (2015)*



ECOLOGICAL FEATURES

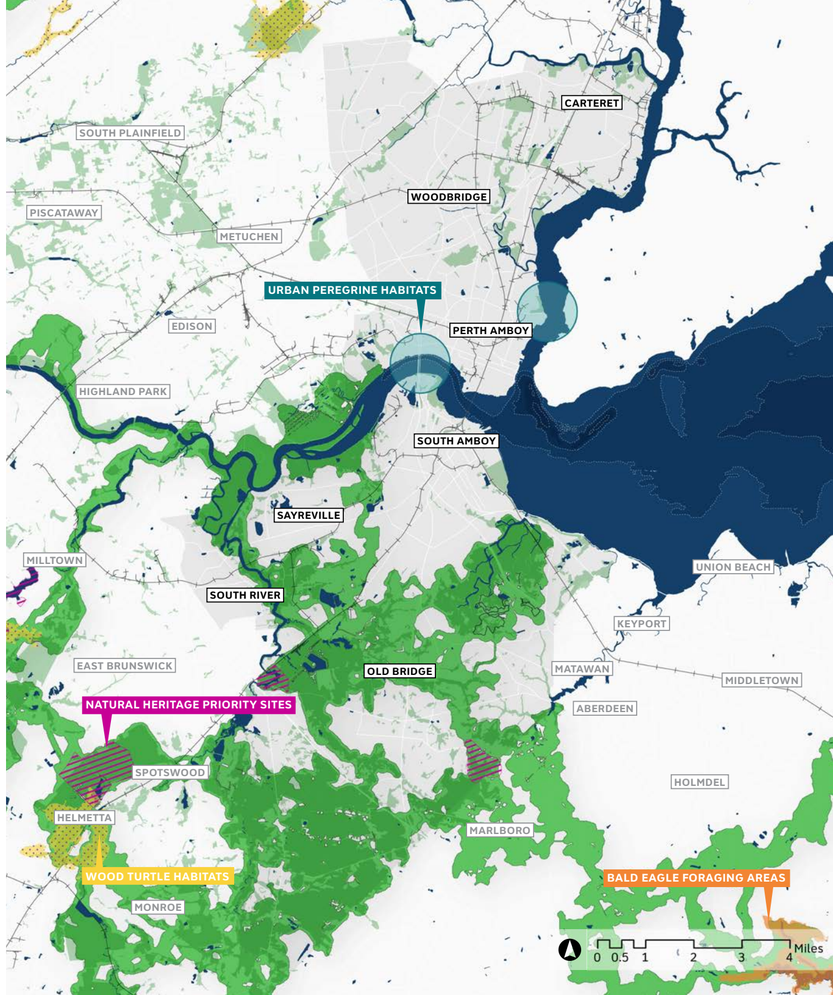
The study area south of the Raritan River is part of the New York New Jersey Harbor Estuary, and includes networks of Terrestrial Wildlife Habitat Cores and Corridors, several Natural Heritage Priority Areas and species identified by NJDEP's Endangered and Nongame Species Program for supporting biological diversity and enhancing wildlife populations within healthy, functioning ecosystems. These include urban peregrine and wood turtle habitats in the Raritan River watershed, as well as bald eagle foraging areas southeast of the study area. Wildlife supporting forested riparian and wetland habitat along the Raritan and its tributaries and in the denser, urbanized areas, is more fragmented.

LEGEND

ECOLOGICAL FEATURES

- Urban Peregrine Habitats
- Wood Turtle Habitats
- Bald Eagle Foraging Areas
- Natural Heritage Priority Site
- Terrestrial Wildlife Habitat Cores and Corridors (CHANJ)
- Wetland Areas

Data Source: *New Jersey Department of Environmental Protection Connecting Habitat Across New Jersey (CHANJ), NJDEP Endangered and Nongame Species Program (ENSP)*



REGIONAL LAND USE

The types of land use in coastal and waterfront areas will play a role in shaping the resilience strategies for our region. As shown in this land use map, predominant land uses in the study area are low-density residential areas, industrial areas, and natural and open spaces, including wetlands and forested areas.

LEGEND

LAND USE

Residential
- Residential (Low Density, Rural and Single Unit)
- Residential (High Density, Multiple Dwelling Units)

Commercial
- Commercial

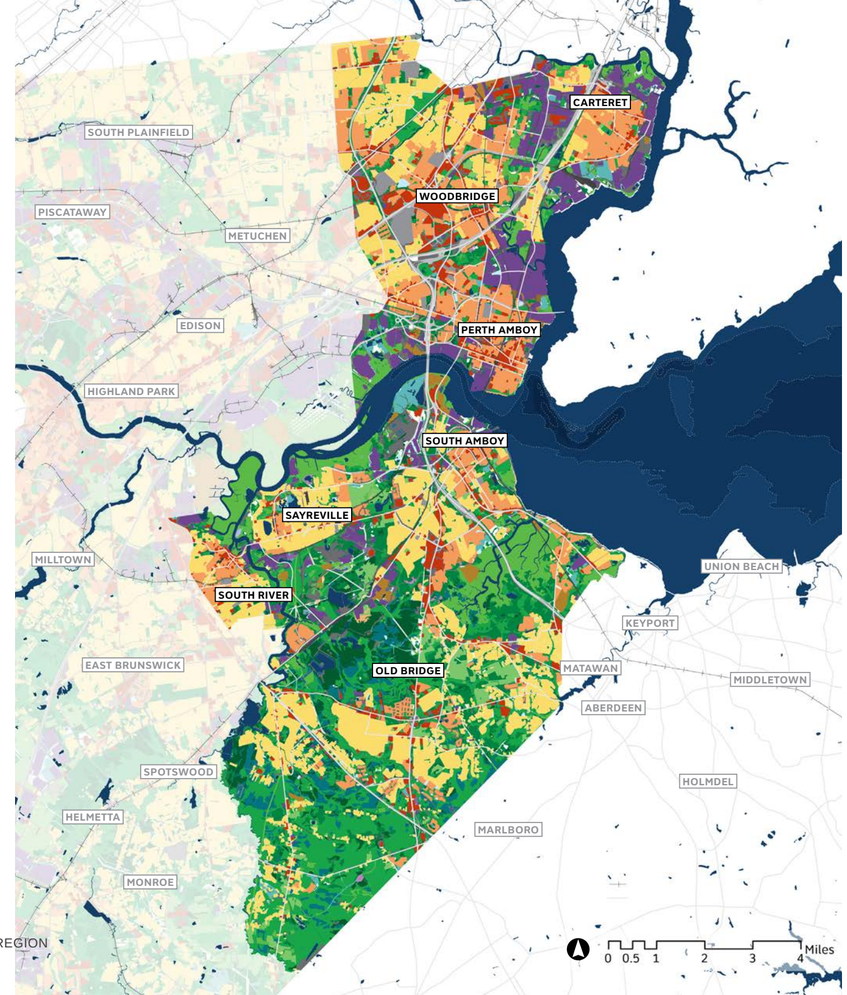
Industrial
- Industrial
- Industrial and Commercial Complexes
- Extractive Mining

Natural and Open Space
- Coniferous and Mixed Forests
- Deciduous Forests
- Wetlands
- Plantations, Croplands and Pastureland
- Recreational Land
- Transitional Areas
- Altered Lands
- Beaches

Transportation
- Major Roadway
- Transportation/Communication/Utilities

Water
- Artificial Lakes, Dredges Lagoons
- Tidal Rivers, Inland Bays, Other Tidal Waters

Data Source: *NJDEP Land Use/Land Cover of New Jersey (2015)*



REDEVELOPMENT AREAS

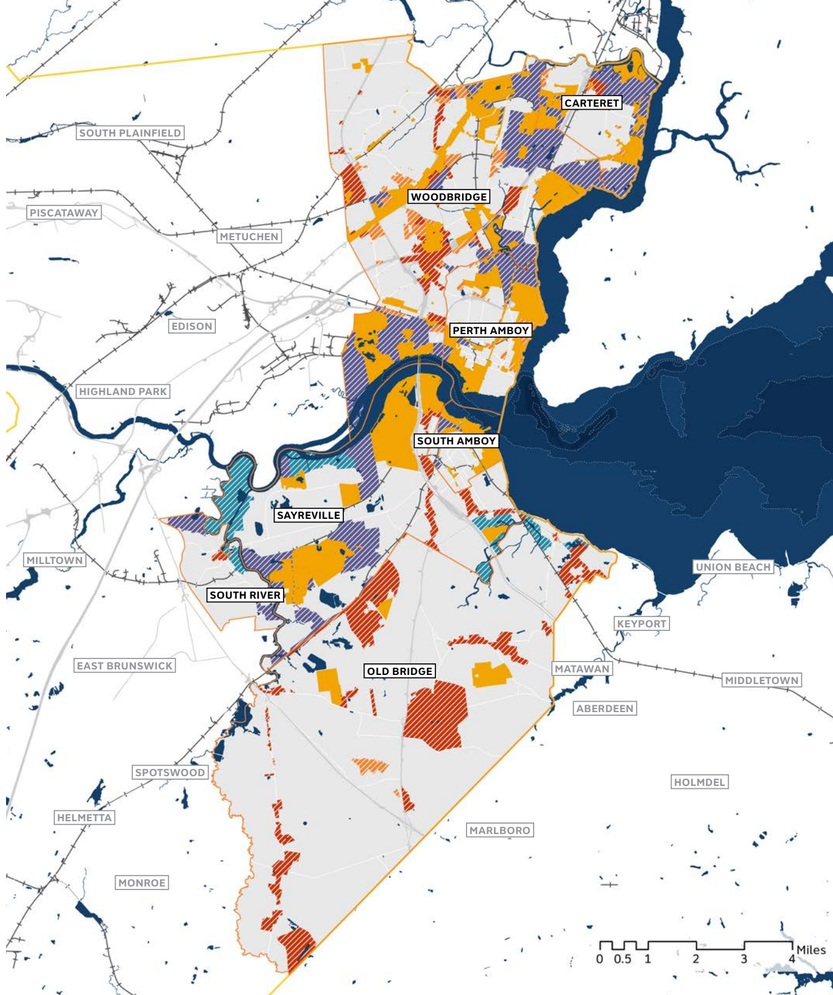
Redevelopment Areas throughout the Region are a major driver of potential growth and new development. Designated Redevelopment Areas show locations where transformative projects may take place through new mixed-use, multi-family residential, industrial, or commercial development. The Composite Zoning shows locations that are zoned for commercial economic development, multi-family residential development, water-related commercial uses, and industrial development. The locations shown on this map are the areas where the most significant growth and change in land use may take place.

LEGEND

Redevelopment Areas
- Redevelopment / Rehabilitation

Composite Zoning
- Commercial/Economic Development
- Multi-Family Residential Development
- Water-Related Commercial Development
- Industrial Development

Data Source: *Middlesex County GIS and HGA*



04 - OUR COMMUNITIES

Although our region is interconnected and interdependent in many ways, each of the boroughs and towns are also unique. This chapter provides general information about each municipality's people, development, and economy. Demographics, information about a place's people, provide a starting point for understanding the communities in our region, but this information does not paint a complete picture. Development trends in each municipality alert us to possible increased flood risk if we build in flood-prone areas in future years and provide insights into how it is growing and changing. The largest industries and employers provide significant economic input into the region, and their vulnerabilities and risks will need to be evaluated in the risk assessment phase of this project. The municipalities of the Raritan River and Bay Communities region are presented in geographic order, from the north to the south.

CARTERET

In 1906, the Borough of Carteret was founded with the name Roosevelt. Carteret is located across the Arthur Kill river from Staten Island and is south of the Rahway river across from Linden. On land, Carteret is surrounded by Woodbridge township. Carteret's name comes from Sir George Carteret, one of the first proprietors of New Jersey. Carteret is a very diverse borough, with a large number of people identifying as Hispanic or Latinx. Carteret also has a large Sikh community.

Key Facts About the People of Carteret

Population: 23,965

Median age: 35.2

Median household income $67,068

Median Property Value: $245,500

Race and Ethnicity:

- 35.4% Hispanic or Latinx
- 27.5% White
- 20.5% Asian
- 15.1% Black or African American
- 1.3% Other
- 0.2% Native Hawaiian and other Pacific Islanders

Jobs: 10,220 (19% live in Carteret)

Top industries: Truck transportation, warehousing and storage, logistics, local and state government, manufacturing, retail.

***Data Source**: 2018 5-year ACS Data, 2018 IMPLAN data*

DEVELOPMENT TRENDS

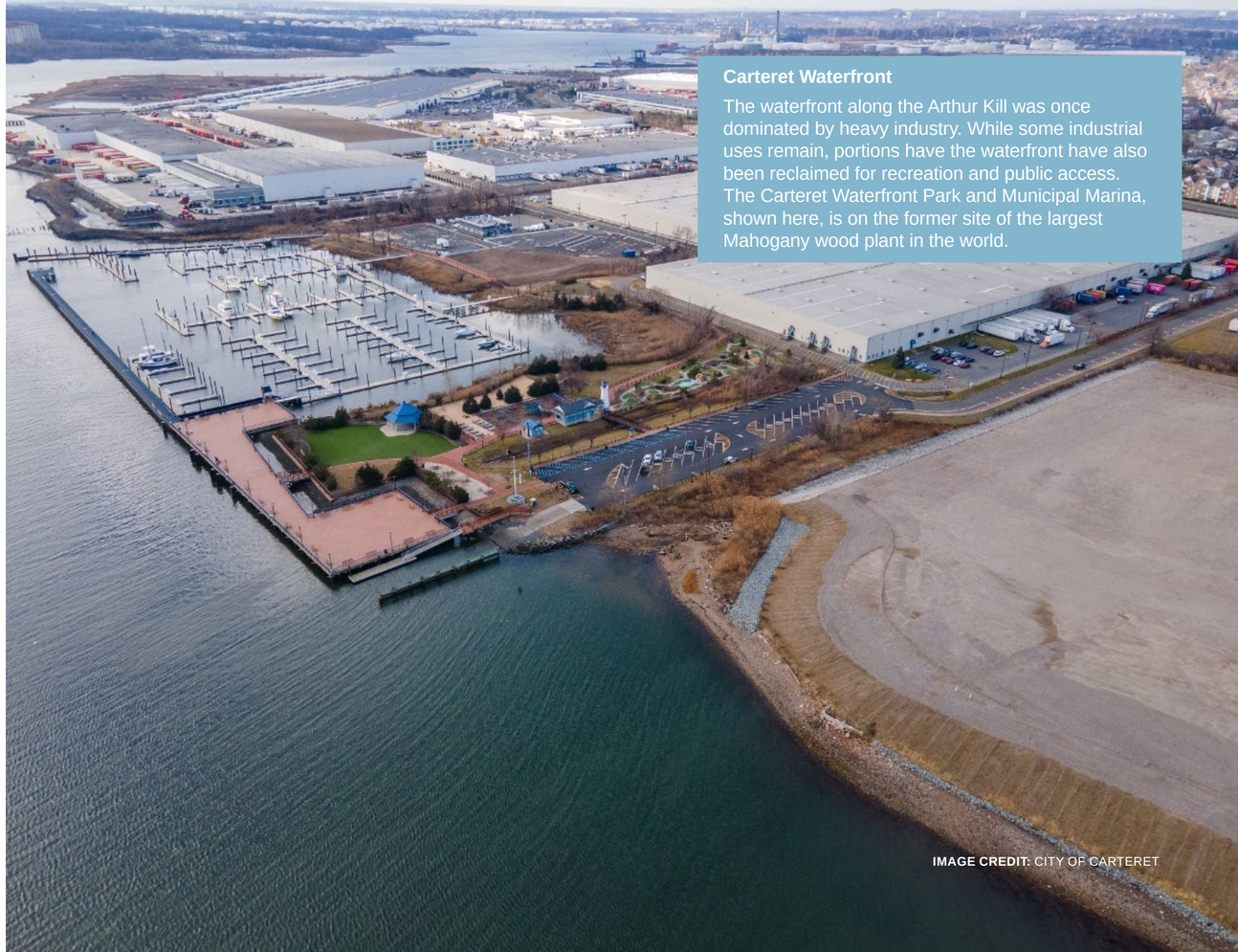
Between 2000 and 2019, 1,323 new housing units were authorized by building permits, along with 67 demolitions for a net increase of just under 1,250 new units. Most of that activity was prior to 2015. Since 2015, only 60 new housing units have been issued certificates of occupancy according to NJ Department of Community Affairs (DCA). The most significant redevelopment that has taken place in the Borough over the last decade is industrial, warehousing, and distribution projects along Roosevelt Avenue in the southern portion of the Borough and near the New Jersey Turnpike. There are also plans for industrial development in the Salt Meadow Redevelopment Area, a brownfield site that has been in the process of being capped and remediated. The plans include providing a conservation easement along the perimeter of the property to give public access to the Rahway River.

POPULATION TRENDS

Carteret's population has been trending up since 1990 to its current level, which is the all-time high for the Borough. The Borough nearly doubled in population during the 1950s, reaching a population of 20,502 in 1960. Between 1960 and 2000 the population fluctuated, but did not see meaningful growth or decline.

JOBS AND MAJOR INDUSTRIES

According to 2018 IMPLAN data, there are approximately 10,200 people employed in Carteret across industry sectors. A large employer and a producer of annual economic output is Carteret's truck transportation industry. Other industries contributing to Carteret's jobs and output economy include architectural and engineering services, copper manufacturing, bottled and canned soft drinks and water manufacturing, toilet preparation manufacturing, various warehousing and wholesale industries, and miscellaneous support services such as packaging and labeling services.



Carteret Waterfront

The waterfront along the Arthur Kill was once dominated by heavy industry. While some industrial uses remain, portions have the waterfront have also been reclaimed for recreation and public access. The Carteret Waterfront Park and Municipal Marina, shown here, is on the former site of the largest Mahogany wood plant in the world.

IMAGE CREDIT: CITY OF CARTERET

WOODBRIDGE

Founded in 1669, Woodbridge is the oldest original township and the sixth most populous municipality in New Jersey. Woodbridge is in the northeast corner of Middlesex County, at the entrance of Raritan Bay and Arthur Kill. The township's area is about 25 square miles and borders Carteret, Edison, Perth Amboy, and Sayreville in Middlesex County. It also borders Clark, Linden, and Rahway in Union County. Woodbridge is home to the Ernest Oros wildlife preserve and a variety of small public parks. Woodbridge is the most populous municipality in the region. It is also a socially diverse township, including a large and growing Indian population.

Key Facts About the People of Woodbridge

Population: 100,089

Median age: 38.9

Median household income $79,720

Median Property Value: $294,200

Race and Ethnicity:

- 58.4% White
- 25.3% Asian
- 12.6% Black or African American
- 19.8% identify as Hispanic or Latinx

Jobs: 25,445 (25% live in Woodbridge)

Top Industries: Employment services, real estate, retail, financial services, food service.

***Data Source**: 2018 5-year ACS Data, 2018 IMPLAN data*

DEVELOPMENT TRENDS

Future development can be expected through infill development, redevelopment pursuant to the Local Redevelopment and Housing Law, and non statutory redevelopment of existing sites. The Township used the process pursuant to the Local Redevelopment and Housing Law to promote the rebuilding, restoration, and growth of the areas that were in a state of decline or disinvestment. Many of these areas are along the Township's waterfronts on the Raritan River and the Arthur Kill. In 2020 alone, over 1.5 million square feet of warehouse space was under construction with additional developments in the Port Reading section of the K3 Area. Significant wetland restoration and enhancement of over 30 acres of freshwater wetlands and 12 acres of tidal wetlands has also taken place in the ER Area, beginning in 2015.

In the last 15 years, plans prepared for the Watson Crampton, South Roberts, and Saints Field neighborhoods recommended rezoning several areas from higher-density R-6 zoning to conservation zones. The areas were rezoned in 2016 to the OSC/R Zone that permits unimproved open space and existing residential structures. The OSC/PQP Zone also rezoned numerous properties that were previously meant for high-intensity uses and replaced them with improved/unimproved open space as well as government and Board of Education Buildings.

Recent large-scale residential growth include inclusionary development and 100% affordable developments such as Woodbridge's Court-approved affordable housing settlement agreement with the Fair Share Housing Center. This agreement prompted hundreds of residential units to be developed and come online in the last three years. Also, new multifamily developments are occurring near train stations and through that statutory redevelopment processes.

POPULATION TRENDS

Like many suburban communities in New Jersey, Woodbridge Township saw considerable population increases in the early 1900s and again in the 1950s, when the population grew by 120%. The most recent 2019 population estimates indicate a slowdown in population growth, with an estimated increase of 3% since 2000 and 0.6% since 2010, representing an increase in of 2,942 persons over the 19-year period. Between 2000 and 2019 there were 792 residential demolitions and 3,407 residential building permits issued, for a net of 2,615 new units permitted. Certificate of occupancy data for the Township over the last five years indicates 784 new units have been completed and occupied. The majority of those new units were in multifamily construction.

The recent population and development trends indicate that future population growth within the Township will likely be the result of infill development and future redevelopment efforts. Woodbridge has historically employed the redevelopment process pursuant to the Local Redevelopment and Housing Law to revitalize significant portions of the Township, and much of the recent growth can be seen within these redevelopment areas (e.g. The Station Village at Avenel, which consists of 500 residential units, was completed in 2017 and was the result of the Avenel Arts Village Redevelopment Plan). It can be expected that the Township will continue to evaluate underutilized or obsolete parcels and prepare redevelopment plans where appropriate.

The development trends also indicate that single-family development is slowing and multifamily development is on the rise. Given this recent trend, future residential development will likely continue within compact, multifamily construction.

There is also anticipated population growth through several affordable housing sites that have yet to be realized, including the development at Hess Woodbridge, located along Main Street, Mutton Hollow Road, and US Highway 9. The Township anticipates that at full build-out, this site will be development with 647 residential units, including an affordable housing component. While this site will be a significant addition to the Township of Woodbridge, it is not within the current FEMA mapped floodplain.

JOBS AND MAJOR INDUSTRIES

According to 2018 IMPLAN data, there are approximately 25,400 people employed in Woodbridge across industry sectors. Many of Woodbridge's largest employers are in the employment services, real estate, retail, finance, and insurance industry sectors. Other notable industries contributing to Woodbridge's economic output includes truck transportation, legal services, management of companies and enterprises, and clothing retail.

MAIN STREET WOODBRIDGE

***Image Credit:** Town Square Publications*

PERTH AMBOY

Founded in 1718, the City of Perth Amboy is located at the mouth of the Raritan River and is surrounded on three sides by water – the Raritan River to the south and the Arthur Kill to the north and east. The city is neighbored by Woodbridge to the west. With 52,000 people in about six square miles, Perth Amboy is the sixth most populous municipality in Middlesex County and the most densely populated. Thomas Mundy Peterson was the first African American to vote under the 15th Amendment. Thomas Mundy Peterson voted in a local election held at Perth Amboy City Hall on March 31, 1870.

Key Facts About the People of Perth Amboy

Population: 52,179

Median age: 32.9

Median household income: $44,024

Median Property Value: $245,800

Race and Ethnicity

- 79.2% White
- 1.3% Asian
- 8.4% Black or African American
- 80.4% identify as Hispanic or Latinx

Jobs: 21,052 (46% live in Perth Amboy)

Top Industries: Hospitals, local and state public education and governmental services, home health care services industries.

Data Source: *2018 5-year ACS Data, 2018 IMPLAN data*

DEVELOPMENT TRENDS

Between 2000 and 2019, Perth Amboy permitted about 1,800 new housing units and about 200 demolitions, for a net increase of 1,600 new units. Since 2015, Perth Amboy has issued 238 new residential certificates of occupancy. According to NJ DCA data, Perth Amboy permitted major new warehousing projects in 2004, 2006, 2014, and 2019. New warehousing projects have been a significant source of new redevelopment and development projects in Perth Amboy, throughout the Raritan Bay Region, and along the New Jersey Turnpike corridor in response to the rise in e-commerce volume in recent years.

POPULATION TRENDS

In 2018, the American Community Survey estimated Perth Amboy's at 52,179. The City's population was steady between 1920 and 1990 with an 8% decreased during the 1950s followed by several decades of steady population before rising back to its 1920 level by 1990. Between 1990 and 2000, the City grew by 12.7% and then saw a further 7.4% growth during the 2000s. Growth has slowed since 2010, but the current population is estimated to be the City's all-time high.

JOBS AND MAJOR INDUSTRIES

According to 2018 IMPLAN data, there are approximately 21,100 people employed in Perth Amboy across industry sectors. Many of Perth Amboy's largest employers are in the hospitals, local and state public education and governmental services, and home health care services industries. In addition, though not amongst its major employers, much of the municipality's annual economic output include owner- and tenant-occupied housing, hospitals, local public education, real estate, and multiple manufacturing industries such as petroleum refineries, cheese manufacturing, animal food manufacturing, and basic organic chemical manufacturing.

Perth Amboy Waterfront

Like in Carteret, the waterfront along the Arthur Kill in Perth Amboy was once dominated by heavy industry. While some industrial uses remain, portions of the waterfront have also been reclaimed for recreation and public access, while retaining many of the historic maritime assets that give the waterfront its unique character.

PERTH AMBOY'S HISTORIC WATERFRONT

Image Credit: *Marco Ricca for The New York Times (2017)*

SOUTH AMBOY

Founded in 1798, South Amboy is bordered on three sides by the Borough of Sayreville and the Raritan Bay to the east. South Amboy has an area of one square mile of land and an almost 1:1 ratio of water to land area. South Amboy is the smallest municipality in the region and also has the highest proportion of white residents.

Key Facts About the People of South Amboy

Population: 8,921

Median age: 44.7

Median household income $64,293

Median Property Value: $272,500

Total Housing Units: 3,395

Race and Ethnicity:

- 83.7% White
- 3.95% Asian
- 8.6% Black or African American
- 17.6% identify as Hispanic or Latinx

Jobs: 6,526 (30% live in South Amboy)

Top Industries: Local and state government, food service, security services, real estate.

***Data Source**: 2018 5-year ACS Data, 2018 IMPLAN data*

DEVELOPMENT TRENDS

New development is underway within the South Amboy Beach Club Redevelopment Area. In the summer of 2020, the development known as the Manhattan Beach Club broke ground on an 1,875-unit development located on 55 acres fronting on the Raritan Bay with the project's first phase producing produce 500 luxury rentals. An adjacent tract of land is also planned to be the site of a 450-500-unit luxury residential complex. To the north of the Beach Club, a new ferry terminal is proposed, that will operate up to three ferries between the city and downtown Manhattan. The ferry terminal will also provide parking for 750 vehicles.

In the city's Northern Waterfront Redevelopment Area (NWRA), there has been discussion of focusing development on light industrial uses and green energy, which can contribute to job growth and economic development. A 150,000 square foot warehouse has been recently approved and construction will begin this year. In addition, the City plans to redevelop the former Jersey Central Power and Light site.

The remaining large tract of vacant land is within the Mocco Redevelopment Area, an area not susceptible to flooding, that provides opportunity for future development. South Amboy is also in the process of updating its Land Use Ordinance to implement recommendations from the 2017 Master Plan, including several rezonings.

POPULATION TRENDS

While South Amboy experienced a population decline in the 1970s and 1980s – a trend that coincides with the decline in manufacturing in New Jersey – the population began to grow again in the 2000s with the realization of the Southern Waterfront Redevelopment Area. This growth trend will continue with the 1,875 residential units that will come online in the Beach Club Redevelopment Area over the next two decades. Between 2000 and September 2020, there were only 42 residential demolitions and a total of 1,061 residential building permits issued, exemplifying South Amboy's continued population growth. In the last five years 195 certificates of occupancy have been issued for new units. It is anticipated South Amboy will continue to see significant population growth in the coming years, specifically along the City's waterfront. There are also opportunities for limited population growth within the City's central downtown corridor along South Broadway. The new zoning ordinance that is currently being written revises the standards to allow for additional multi-family units above ground floor retail.

JOBS AND MAJOR INDUSTRIES

According to 2018 IMPLAN data, there are approximately 6,500 people employed in South Amboy across industry sectors. Many of South Amboy's largest employers are in the local and state public education and government services, food and beverage services, investigation and security services, and electronic equipment repair industry sectors. An additional driver of economic output is owner- and tenant-occupied housing.

SOUTH AMBOY ALONG RARITAN BAY

***Image Credit:** Trip Advisor via World Traveller (2020)*

SAYREVILLE

Founded as a Borough in 1919, Sayreville is located on the south banks of the Raritan River and is near the Raritan Bay. The Borough is about 18 square miles and is located across the Raritan River from Woodbridge and Perth Amboy. It is also bordered by Old Bridge, East Brunswick, Edison, South Amboy, and South River in Middlesex County.

In many way, Sayreville demographically mirrors the population of the New Jersey, with a slightly lower median household income than the state and slightly higher percentage of White residents.

Key Facts About the People of Sayreville

Population: 44,051

Median age: 39

Median household income $80,386

Median Property Value: $295,300

Race and Ethnicity:

- 66.9% White
- 15.9% Asian
- 9.4% Asian Indian
- 12.1% Black or African American
- 13.4% identify as Hispanic or Latinx

Jobs: 6,812 (42% live in Sayreville)

Top Industries: Warehousing and storage, local government, manufacturing, transportation.

***Data Source**: 2018 5-year ACS Data, 2018 IMPLAN data*

DEVELOPMENT TRENDS

Since 2000, Sayreville has issued 1,879 building permits for housing units while demolishing 95 units for a net increase of just under 1,800 housing units. Two new developments were completed in 2015 and 16 respectively that received certificates of occupancy for 277 units. Since 2016, the Borough has certified 17 new units. A new townhouse development with an affordable housing component is under construction adjacent to the Camelot at La Mer development near the Garden State Parkway in the eastern portion of the Borough.

Other new developments in the pipeline include:

- An affordable housing development near River Road in the northern portion of town near the flood hazard area,
- The Riverton mixed-use development that will include 2,000 residential units and hundreds of thousands of square feet of commercial, retail, hotel, office, and other non-residential uses at full anticipated build-out near the base of the Driscoll Bridge in the northeast portion of the Borough,
- Additional inclusionary developments with market rate townhouses and affordable units in several locations,
- Potential warehouse development along Main Street in the “Fulton’s Landing” redevelopment area.

POPULATION TRENDS

Sayreville saw substantial growth through the middle of the 20th Century with its population rising from just over 10,000 in 1950 to over 32,000 in 1970. A slight population decline took place in the 1970s and 80s, with sustained growth since the 1990s. The estimated population in 2019 is 44,173, a 3.4% increase since 2010. Residential development in the late 20th Century through present in Sayreville has mostly taken the form of townhouse developments on former greenfield sites.

JOBS AND MAJOR INDUSTRIES

According to 2018 IMPLAN data, there are approximately 6,800 people employed in Sayreville across industry sectors. Sayreville’s largest employers are in warehousing and storage, local and state public education and government services, and iron, steel, stationary, and plastics product manufacturing industries. Other industry sectors contributing to Sayreville’s annual economic output include electric fossil fuel power generation and various warehousing and wholesale sectors.

SAYREVILLE MARINA

***Image Credit:** Morgan Marina*

SOUTH RIVER

Founded in 1898, South River is bordered by the South River, an offshoot of the Raritan River. South River has an area of three square miles. It is bordered by Sayreville in the east and East Brunswick in the south, west, and north. The Borough contains Grekoski's Park as well as Dailey's Pond.

In 2017, 11.3% of South River's populations' incomes were below the poverty line. Almost half of the city's households speak a language other than English at home.

Key Facts About the People of South River

Population: 16,274

Median age: 37.4

Median househld income $62,972

Median Property Value: $277,600

Race and Ethnicity:

- 82.6% White
- 5% Asian
- 10.2% Black or African American
- 24.6% identify as Hispanic or Latinx

Jobs: 4,388 (50% live in South River)

Top Industries: Employment services, local and state government, real estate.

***Data Source**: 2018 5-year ACS Data, 2018 IMPLAN data*

DEVELOPMENT TRENDS

Physical and significant environmental constraints along the waterfront suggest that future development within the Borough will be predominately in the Main Street Rehabilitation (MSR) District. The development potential of this mixed-use corridor and the regulations associated with the Rehabilitation District are intended to incentivize and encourage redevelopment of this area at a higher density than what exists today. The Lower Main Street Redevelopment Area's Plan provides additional incentives for development, allowing buildings up to five stories as opposed to the three stories permitted in the underlying MSR District. Future development can also be expected within the Waterfront Revitalization (W-R) District, which runs along a portion of the Borough's South River waterfront.

In November 2020, the Planning Board voted to approve a mixed-use four-story building comprised of ground floor commercial and 36 upper floor apartments on the former Lincoln School site, which is bound by Henry Street to the north, Maple Street to the east, Prospect Street/Reid Street to the south, and William Street to the west.

POPULATION TRENDS

South River's population and housing stock grew immensely during the early half of the 20th century. Additional population booms came during the 1950s and 1960s, and the Borough's most recent noticeable growth took place during the 1990s, when it grew by nearly 12%. Recent trends show a slowing of growth. Between 2000 and 2019, the Borough grew by less than 800 people. During the 19-year period, there were 105 residential demolitions and 352 residential building permits issued, for a net of 247 new units permitted. The new certificate of occupancy data over the last five years indicates 20 new units have been completed and occupied. It is anticipated future population growth will be limited and will be a result of revitalization efforts within the MSR District/Lower Main Street Redevelopment Area.

JOBS AND MAJOR INDUSTRIES

According to 2018 IMPLAN data, there are approximately 4,400 people employed in South River across industry sectors. South River's largest employers are in employment services, local and state public education, and government services sectors. A few industry sectors also contribute to South River's annual economic output, including soap and other detergent manufacturing, animal (except poultry) slaughtering and employment services.

SOUTH RIVER ALONG MAIN STREET (COUNTY ROUTE 535) LOOKING EAST

***Image Credit:** Wikimedia Commons via Matté (2015)*

OLD BRIDGE

Founded in 1869, the Township of Old Bridge is located across the Raritan Bay from Staten Island, New York, and contains a wide variety of rivers and brooks within its 40 square miles. It borders East Brunswick, the Monroe Township, Sayreville, and Spotswood in Middlesex County. Old Bridge gets its name from the fact that the first bridge spanning the South River was built there and it became referred to as “the Old Bridge.”

Only 3.0% of Old Bridge’s population is below the poverty line, the lowest in rate in the region.

Key Facts About the People of Old Bridge

Population: 66,594

Median age: 41.2

Median household income $83,750

Median Property Value: $331,100

Race and Ethnicity

- 72% White
- 4% Black or African American
- 10.3% Asian
- 12.3% Hispanic or Latinx
- 1.4% Other

Jobs: 16,083 (38% live in Old Bridge)

Top Industries: Local government, medical services, retail, real estate, and food service.

***Data Source**: 2018 5-year ACS Data, 2018 IMPLAN data*

DEVELOPMENT TRENDS

A significant amount of development is anticipated as a result of the Township’s ongoing efforts to comply with their fair share of the affordable housing obligation pursuant to the Mount Laurel doctrine and the New Jersey Fair Housing Act. Much of this growth could occur within the Route 9 Mixed Use Inclusionary Housing Zone, which is located within the floodplain. Additional development is projected in the Crossroads Redevelopment Area and in the Inclusionary Housing 1 (IH1) Zone off northbound State Highway 18.

In addition to affordable housing-related development, there are several areas of the Township effected by the floodplain that are zoned for growth, including a development known as “Oaks I.” This development includes 1,384 residential units and 600,000 square feet of non-residential uses. It was offered as part of Old Bridge’s bid to Amazon to construct their “HQ2” within the Township’s boarders.

While the Old Bridge waterfront was historically used for commercial activity, the Township has made considerable efforts to reduce development along the waterfront and encourage preservation.

POPULATION TRENDS

Old Bridge has seen consistent population growth since the early 1900s with population booms during the 1950s and 1960s where the population more than doubled during each decade. In looking at recent trends, the population increased by 8% between 2000 and 2010 (+/- 5,000 people), but according to the American Community Survey 5-Year Estimates, population growth has ceased, showing an increase of less than 1% between 2010 and 2019. The location of the population growth between 2000 and 2019 is difficult to determine and not obviously attributable to a particular geographic location. There were, however, 3,073 residential building permits issued during that time period and only 169 demolitions. In the last five years, the Township saw 240 unit completed and occupied, as indicated by the latest certificate of occupancy data. It is anticipated that significant future population growth will be predominantly associated with the Township’s affordable housing program.

JOBS AND MAJOR INDUSTRIES

According to 2018 IMPLAN data, there are approximately 16,100 people employed in Old Bridge across industry sectors. Many of Old Bridge’s largest employers are in the local public education and government services, health care, and retail industries. Marketing research and other miscellaneous professional, scientific, and technical services also contribute to the workforce. Additionally, owner- and tenant-occupied housing, hospitals and health care, real estate, finance, and insurance, inorganic chemical manufacturing as well as waste management and remediation services are also large contributors to Old Bridge’s annual economic output.

OLD BRIDGE WATERFRONT PARK

***Image Credit:** Middlesex County*

05 - PLANNING INITIATIVES

The Resilient NJ - Raritan River and Bay Communities project will develop a roadmap for implementation of flood-related resilience measures for the region to address current and future flood risks. The roadmap will continue to advance and will complement initiatives that have already been completed or are currently underway in the region. Many initiatives have been led by local, state, federal, or regional infrastructure entities; one goal of the project is to form partnerships across these entities that did not already exist so that solutions can be implemented at the appropriate scales.

The Consultant Team coordinated with the Steering Committee to conduct a review of ongoing resilience-related planning initiatives and projects in the region, as well as statewide initiatives. This chapter includes findings of the review and highlights several major initiatives and projects expected to alter the social and risk landscapes of our region.

RESILIENCE BUILDING - A SHARED RESPONSIBILITY

In New Jersey, like elsewhere in the country, resilience is a shared responsibility across multiple levels of government. Decisions around land use and floodplain management are subject to a hierarchy of rules and regulation at various scales of jurisdiction. As a "home rule state," local municipalities in New Jersey have considerable freedom to develop and implement policies that best serve their local needs. Nevertheless, they are still subject to Federal and State laws and guidance on construction, environmental impacts, and understanding climate risk. With resilience layered in at multiple levels of government, this can make for a confusing web to navigate.

The table below summarizes the major responsibilities at various levels of government. The following sections provide additional detail on major initiatives at the State level and within each region.

Federal	State	County/Regional	Local
• The Federal Emergency Management Agency (FEMA) creates **maps of flood risk** and sets national **floodplain construction standards**. • FEMA also administers the National Flood Insurance Program (NFIP), through which people in participating municipalities can purchase **flood insurance**. Reduced rates are available for municipalities that adopt higher construction standards through the Community Rating System (CRS) • FEMA also provides **hazard mitigation and disaster recovery funding**. To be eligible for hazard mitigation funds, states and local entities must developed a Hazard Mitigation Plan (HMP). • The U.S. Army Corps of Engineers (USACE) conducts flood risk reduction studies and implements **flood risk reduction projects**. • The National Oceanic and Atmospheric Administration (NOAA) manages the federal **Coastal Zone Management Program.** • Additional federal agencies and offices are involved in setting policy on climate change and implementing environmental regulations.	• NJ Dept. of Environmental Protection (NJDEP) coordinates federal, state and local floodplain management programs, which includes statewide **floodplain construction standards** and model local ordinances. • NJDEP is leading development of statewide climate resilience planning initiatives, including Resilient NJ. • NJDEP administers the Blue Acres program that **purchase flood-prone properties** and preserves them as open space. • State law requires municipalities to develop master plans that guide growth and change in the community. • Coordination with federal programs (NJDEP coordinates with USACE; and NJ Office of Emergency Management (NJOEM) coordinates with FEMA on hazard mitigation and disaster recovery funding) • New Jersey Department of Community Affairs (NJDCA) enforces construction codes and **administers the CDBG funds** received by the State for Superstorm Sandy assistance. • New Jersey Board of Public Utilities (NJBPU) regulates utilities, including **water supply and wastewater management**. • NJDEP implements environmental regulations (wetlands, stormwater, brownfields, etc.) and administers the state.	• Counties are responsible for managing their own roads, infrastructure, parks, and utility authorities and can adopt site plan and subdivision standards as development impacts their assets. • Middlesex County is in the process of updating its Hazard Mitigation Plan, and is creating a county-wide strategic business plan. • Regional water utilities are responsible for water supply, wastewater treatment, and development of Long-Term Control Plans to mitigate impacts on water quality. • Regional energy utilities and transportation infrastructure agencies have advanced their own planning for climate risks and implementation of flood mitigation projects.	• As a home rule state, land use, zoning, development regulation rest in local decision makers • Municipalities are required to have a Flood Damage Prevention Ordinance • Municipalities are required to have Municipal Separate Storm System (MS4) "Stormwater Management" plans • Municipalities must adopt a Master Plan that meets statewide requirements • Municipalities develop hazard mitigation plans and capital improvement programs to address infrastructure and flood protection needs • Municipalities submit grant applications to support funding • Municipalities are able to raise funding for implementation through property taxes, municipal bonds, and improvements associated with redevelopment projects

IMAGE CREDIT: HENRY LIN (2019)

STATEWIDE INITIATIVES

Under the Governor Phil Murphy Administration, New Jersey has taken a proactive approach in preparing for climate change by introducing Executive Orders that create new statewide planning and policy mechanisms and require municipalities to consider climate change and \resilience in their state-mandated master planning process.

- Executive Order 89 requires the state to develop a **Statewide Climate Change Resilience Strategy** and created an **Interagency Council on Climate Resilience**. As part of the strategy, the State is developing a Coastal Resilience Plan to address issues specific to New Jersey's coastal zone.
- Executive Order 100 launched **New Jersey Protecting Against Climate Threats (NJPACT)**, an initiative aimed at modernizing land use requirements to incorporate climate change. The EO directed NJDEP to identify specific rules, guidance documents and other regulatory mechanisms to revise by integrating climate change considerations, including seal level rise. **Administrative Order 2020-01** implements EO 100 and set deadlines for NJDEP rule changes, including the Coastal Zone Management Rules, Freshwater Wetlands Rules, Flood Hazard Control Act Rules, and Stormwater Management Rules. It also instituted a Chief Resilience Officer and Bureau of Climate and Flood Resilience.
- The New Jersey Department of Environmental Protection (NJDEP) initiated a regulatory program in 2015 requiring utilities operating combined sewer systems to develop **Long-Term Control Plans (LTCP)** that identify projects to be implemented in the coming decades to reduce combined sewer overflows. As described in the *Our Region* section, combined sewer systems carry both wastewater from homes and businesses and stormwater from rainfall in the same pipe network, and these systems often release combined sewage (wastewater and stormwater) into bodies of water when it rains. The primary goal of the Long-Term Control Plans is to improve water quality in New Jersey's waters by preventing discharge of combined sewage through measures such as large underground stormwater storage tanks or tunnels, green infrastructure, or capacity improvements. These projects also have the potential to reduce flooding associated with rainfall by providing spaces for stormwater to flow. The Long-Term Control Plans produce additional opportunities for communities through the implementation of green infrastructure, which can have environmental benefits, and creation of park space over stormwater storage tanks.
- In March 2019, the Stormwater Utility Law, officially known as the 'Clean Stormwater and Flood Reduction Act', was signed into law. This law authorizes local and county governments and certain utilities the ability to create stormwater utilities. A stormwater utility is a public utility that assesses fees and uses the revenue from these fees to maintain infrastructure designed to control stormwater flooding and reduce pollutants from entering into waterbodies.
- The State has also began tackling its legacy of pollution and environmental racism through the Environmental Justice Bill (S232, September 2020). That bill states that if companies want to build a new facility, expand and existing facility or renew a permit for existing facility's major source of pollution in an "overburdened community," it must be reviewed by DEP. Includes various facilities, including waste transfer stations and large sewage treatment plants. It defined overburdened communities as those were 35% households low income or 40% residents minority or 40% households LEP.
- New legislation passed in the State Assembly (**New Jersey Assembly Bill 2785**) requires the land use plan element of municipal master plans to include climate change-related hazard vulnerability assessments. Municipalities are required to maintain and update a master plan and this new bill brings resilience to the forefront of those plans so that resilience is addressed not only at the State scale, but at local levels, as well.

PROJECT PROFILE

Blue Acres Program

In 2007, the New Jersey Department of Environmental Protection (NJDEP) established the Blue Acres Buyout program to purchase properties severely or repeatedly damaged by storms and flooding. After Hurricane Sandy, this project focused on homes near the Woodbridge River and, as the sites are reviewed, continues to accept properties for buy outs. The program is managed by NJDEP, and the state owns land after purchasing from homeowners. However, it is up to the municipalities to maintain the property. This municipal responsibility has prompted different approaches to community engagement and action plans; specifically, Woodbridge has emphasized minimizing holdouts and facilitating community-scale buyouts in order to maximize ecosystem restoration and flood risk reduction benefits. These decisions are intended to restore bought-out properties to mitigate flood risks, provide natural resources, and enable passive recreation benefits while working in collaboration with Rutgers University and the Land Conservancy of NJ on land restoration and conservation.

A home in Sayreville, New Jersey being taken down as part of the Blue Acres Program and an example of an emptied lot after home removal in Sayreville.

***Image Credit:** Top image by Rosanna Arias/FEMA (2014),Bottom Image by Photo credit: Brooke Maslo (2019)*

REGIONAL INITIATIVES

There have been numerous resilience-related planning initiatives in the Raritan River and Bay Communities (RRBC) region over the last two decades, but the bulk of resilience planning began after Hurricane Sandy. The region was impacted especially hard by flooding during Sandy, and the storm motivated additional resilience planning and climate-related initiatives. There have been more than 70 studies, reports, and action plans focused in the region since 2012, covering a wide range of topics. In addition to resilience, planning in the region has addressed riverfront activation, watershed management, and open space. This section presents a high-level summary of the key themes and output of those initiatives.

RARITAN RIVER PLANNING

Before Hurricane Sandy struck the region in 2012, there was less of a focus on resilience and flooding in planning documents. However, there were several initiatives focusing on the Raritan River and its development and ecological health.

As early as 2002, a variety of planning initiatives focused on development along the Raritan River; however, the primary goal was to increase the River's viability as a tourism destination and recreation resource. In the **2003 Raritan Riverfront Strategy Plan**, Middlesex County laid out its plan to "establish the Raritan as a boating destination for the New Jersey/New York region." Guidelines from that report include:

- Environmental education, historical and cultural assets should be promoted as tourism assets.
- The communities should offer complementary attractions.
- The River should feature both natural and urban edges.
- A Greenway/Riverwalk system would be a component of regional linkage.
- Landfill closures offer long-term open space/pedestrian opportunities.

These themes remain relevant in goals and discussions to this day, even as the focus of planning has evolved to include climate change and sea level rise.

Rutgers University was (and remains) a key stakeholder in carrying out research and planning in the region, and they performed several planning studies in 2009 and 2010 related to the Raritan River. Their 2009 report, **The State of the Raritan River**, outlines the projects that were currently underway at that time and the major organizations working in the area. At the time, water quality and ecological health were the major concerns in the Raritan Watershed. The goals of 2002 had not been forgotten – the ecological health of the river is a prerequisite to many of the uses planned in the Riverfront Strategy Plan.

The City of Perth Amboy and the Middlesex County Utilities Authority (MCUA) recently updated their Long- Term Control Plan for combined sewer outfall (permit compliance. The plan was published in October of 2020 and is currently in review by NJDEP. The plan covers water quality objectives for Perth Amboy and MCUA, and evaluates and selects an alternative for achieving those objectives.

WATERSHED PLANNING

One of the key themes of planning initiatives for the Raritan River and Bay Communities is the emphasis on watershed-level planning. Historically, planning in this area has taken place on a municipal level or county level. However, flood-related projects are typically most effective when they account for cascading impacts on a watershed level as the primary delineator. In 2020, Rutgers University published **A Watershed-Based Approach to Flood Hazard Mitigation in the Raritan Region** in which they conducted interviews with numerous regional stakeholders. Amongst stakeholders, there was consensus that governance structures and funding limitations would pose challenges for this goal. Nonetheless, the RNJ project must seek watershed-level strategies to maximize the effectiveness of the flood risk reduction scenarios.

OPEN SPACE

Another key theme across the regions' planning initiatives is increasing outdoor programming and recreation opportunities through open space improvements. Proposed strategies include utilizing vacant lots, improving waterfront access, and making the waterfront a destination for community members to visit. However, many of the vacant lots are contaminated, and would require testing and remediation which can be a costly endeavor. Also, the resilience of existing waterfront infrastructure is already a challenge, raising concerns for implementing programming in environmentally vulnerable areas.

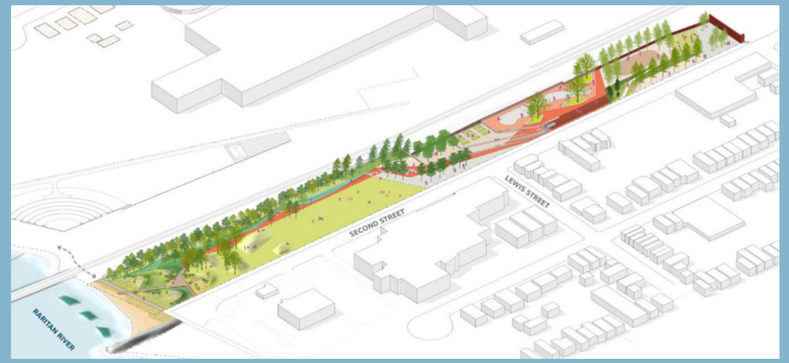
Diversity in both use and community engagement is also a widely held goal in the Region. Currently, municipalities are increasing their community outreach regarding projects and education about flooding threats. However, despite these attempts, there is interest in expanding public outreach to reach larger amounts of the community.

PROJECT PROFILE

Second Street Park (Borinqueneers Park)

Perth Amboy

In May 2014, the Middlesex County Improvement Authority (MCIA) and City of Perth Amboy partnered with a team of community planners and landscape architects from Rutgers University to convert a contaminated site into a community park. For many years, the six-acre property was used to recycle scrap metals. By 2016, under funding from the US EPA's Brownfields Program, MCIA and Perth Amboy had secured seven million dollars in funding for remediation and construction. In 2018, remediation of the site began. Designs of the park include the following components: waterfront edge with a living shoreline incorporating native plants, a pier with river views, concession stands and seating areas, green spaces for picnics and gatherings, a large plaza with a water feature, modular space for a variety of community programs, and a storm water management system. In order to determine what community members prioritized, the Rutgers design team developed a community planning process with a range of outreach strategies to obtain public input and explore design alternatives for the Second Street Park. The Rutgers team also conducted interviews with City and County officials and created a committee of community leaders, teachers, local activists, and area residents to guide the planning process.



Second Street Park was renamed by the Perth Amboy City Council as the Borinqueneers Park and broke ground in 2021. The park recognizes Puerto Rico's 65th Infantry Regiment (known as the Borinqueneers).

***Image Credit:** SCAPE Studio*

ONGOING INITIATIVES

MIDDLESEX COUNTY HAZARD MITIGATION PLAN

Initially created to satisfy the FEMA Disaster Mitigation Act of 2000, in 2011, the Middlesex County Multi-Jurisdictional Hazard Mitigation Plan (HMP) was created to continue receiving federal disaster assistance and grant funds from the federal government. In 2016, the plan was updated because of the 5-year maintenance cycles FEMA required and to improve the plan's readability and use. The HMP reorganized the hazards being considered by consolidating similar hazards and looking at the 2014 assessments from the municipalities involved. These evaluations considered factors including how often the hazard occurs, the degree of property and infrastructure damage, the number of people impacted, and the community's projected time for recovery. The new HMP also incorporated risk assessments on a county level. The plan has four goals for Middlesex County: Education and outreach; Data collection, use, and sharing; Capabilities, coordination, and opportunities; and Opportunities for mitigation. To stay up to date with the FEMA requirements, Middlesex County is working on their 2020-2025 HMP and is collaborating with the Middlesex County Office of Emergency Management and a team from Rutgers University associated with the New Jersey Climate Institute. A draft hazard analysis has been prepared and is under review.

DESTINATION 2040

In 2018, Middlesex County began development of a new strategic plan titled Destination 2040, which will serve as a business plan for county operations. The plan will outline a 20-year outlook and strategic initiatives to undertake over the next 3-5 years. The plan will cover economic and workforce development; healthy, safe and inclusive communities; land use, development, and housing; sustainability and community resilience; and transportation and mobility.

As part of this effort, multiple planning elements are being advanced, including a Community Farms Preservation Program, and Open Space and Recreation Plan, a Bicycle and Pedestrian Master Plan, a Right of Way Plan, and a Coordinated Human Services Transportation Plan.

http://www.middlesexcountynj.gov/destination2040

IMAGE CREDIT: VIA DOWNTOWN NEW JERSEY

RESILIENCE PROJECTS

In addition to the planning initiatives discussed above, there are many additional resilience projects that have already been completed, are currently in design or construction, or are being planned by the RRB municipalities, state and federal agencies, and regional infrastructure entities. The chart below summarizes recent, ongoing, and proposed resilience-related projects in the region.

NAME	STATUS	SPONSOR(S) / AGENCY(S)	MUNICIPALITY	CATEGORY	NOTES
NY & NJ Harbor & Tributaries Focus Area Feasibility Study (HATS)	Planning	USACE	Middlesex County, Old Bridge, South River, Perth Amboy, Woodbridge	Coastal Mitigation, Flood Risk Management	Investigated measures to manage future flood risk in ways that support the long-term resilience and sustainability of the coastal ecosystem and surrounding communities, and reduce the economic costs and risks associated with flood and storm events for the New York-New Jersey Harbor and Tributaries (NYNJHAT) study area. Alternative concepts proposed would help the region manage flood risks expected to be exacerbated by relative sea level rise (RSLC).
Rahway River Basin, New Jersey Coastal Storm Risk Management Feasibility Study	Planning	NJDEP / USACE	Middlesex County, Carteret, Woodbridge	Coastal Mitigation, Flood Risk Management	Investigated alternatives to manage coastal storm risk in the Rahway River Basin, given existing and anticipated future conditions and presented a recommended plan that would contribute to national economic development by reducing the risk of storm surge damages by more than the cost of the project over a 50-year period, while minimizing impacts to the environment.
Route 9 and 35 Victory Circle Elimination Project	Complete	State of New Jersey Department of Transportation	Middlesex County	Transportation Infrastructure	Included the construction of the new Route 9 bridge, the rehabilitation of the Edison Bridge in Woodbridge, and the elimination of the Route 9 and 35 Victory Circle.
South Amboy Ferry Terminal	Planning	US Department of Transportation	Middlesex County, South Amboy	Transportation Infrastructure	Proposed ferry terminal along South Amboy Waterfront as part of larger Manhattan Beach Club development
Tremley Point Connector Road	Unknown	New Jersey Turnpike Authority	Middlesex County	Transportation Infrastructure	Connector road from the New Jersey Turnpike Interchange 12 to Tremley Point.
Blue Acre Buyouts	Ongoing	NJDEP / FEMA	New Jersey	Buyouts	Buyout of repetitive loss, residential properties to restore flood-plain
Carteret Riverwalk	Construction	Borough of Carteret	Carteret	Green Infrastructure / Public Space	The walkway is built in part through an easement Carteret was granted as part of a settlement with United States Metals Refining Company, which previously owned and operated a 180-acre tract at 400 Middlesex Avenue. The easement gives the borough of Carteret the ability to construct, operate and maintain the walkway for public access use in perpetuity.
Carteret Marina Renovation	Complete	Borough of Carteret	Carteret	Economic Development	The marina opened for the first time this summer 2019 and is located along the Arthur Kill River at Carteret's Waterfront Park, 200 Middlesex Avenue. There are 185 slips, gas and diesel fueling stations, a sanitary pump-out and a 17-foot draft. The marina was fully funded through $42 million in local, state, and federal grants, lawsuits and settlements with chemical companies.
DuPont Chemical Site Brownfield Remediation	Complete	Borough of Carteret	Carteret	Green Infrastructure / Public Space	The site, a 33-acre parcel adjacent to the Arthur kill channel along the eastern portion of the borough, has sat abandoned for close to sixty years making a large portion of the waterfront redevelopment area dormant and inaccessible to the public. The Dupont property is adjacent to the Waterfront Park and includes much of the land directly behind the A. Duie Pyle warehouse. Waterfront Park has about 800 feet of waterfront which would nearly triple with the inclusion of the 1,500 feet on the Dupont property.
Noe Street Park	Complete	Borough of Carteret	Carteret	Green Infrastructure / Public Space	Park will be a regional stormwater detention pond to mitigate flooding as well as provide passive recreation. The borough acquired a block of residential properties damaged by Hurricane Sandy for the project. It will also help to reduce water pollution from heavy rainfall.
Borinqueneers Park (Second Street Park)	Construction	City of Perth Amboy	Perth Amboy	Brownfield Redevelopment	The City will consider living shoreline and green infrastructure measures for transformation of brownfield area into a community park on Raritan Bay
Waterfront Development and Advisory Committee	Ongoing	Mayor and Council of Perth Amboy	Perth Amboy	Waterfront Development	Created by Mayor of Perth Amboy to study and prioritize projects to stabilize, replace, enhance, and restore facilities and infrastructure damaged by Sandy. Projects focused on waterfront repairs and restoration

NAME	STATUS	SPONSOR(S) / AGENCY(S)	MUNICIPALITY	CATEGORY	NOTES
Bulkhead Repair and Beach Renourishment	Complete	NJDEP	Perth Amboy	Erosion Protection	Project includes beach replenishment, a new perimeter wall, new bulkhead, along with new ramp access to the south pier.
Harbortown Infrastructure and Walkway	Unknown	State of New Jersey Department of Environmental Protection	Perth Amboy	Transportation Infrastructure	Infrastructure and walkway improvements at Harbortown development near Rudyk Park
Middlesex Greenway Waterfront Spur	Conceptual	City of Perth Amboy	Perth Amboy	Green Infrastructure	Located at Raritan Riverfront/Riverview Drive
Middlesex County Park	Construction	Perth Amboy OECD, Middlesex County	Perth Amboy	Green Infrastructure / Public Space	The County of Middlesex is installing a new park on the corner of High Street and Washington State. The Perth Amboy OECD will be providing support for the development of the park and providing updates as they become available. Phase one, which will be completed in Spring 2019, is centered on site work and preparation: the ground will be graded to support two “levels” for the finished park. Phase two will feature all kinds of amenities and improvements.
Perth Amboy CSO Mandate	Construction	City of Perth Amboy, MCUA	Perth Amboy	Stormwater Infrastructure	The City of Perth Amboy (City) and the Middlesex County Utilities Authority (MCUA) are submitting this document to meet certain conditions of the New Jersey Pollutant Discharge Elimination System (NJPDES) individual permit for Combined Sewer Overflow (CSO) control. In current NJPDES individual permits, the New Jersey Department of Environmental Protection (NJDEP) has mandated that permittees prepare a CSO Long Term Control Plan (LTCP). The permit conditions closely reflect the requirements of the National CSO Control Policy established by the United States Environmental Protection Agency (EPA).
Perth Amboy Station Renovation	Construction	NJ Transit	Perth Amboy	Transportation Infrastructure	The renovation of Perth Amboy Station include making the station fully accessible with elevators, ramps and high-level platforms in addition to other upgrades throughout the historic facility.
Perth Amboy High School	Construction	NJSDA	Perth Amboy	Education / Shelter	The new Perth Amboy High School will be a 576,000-square-foot facility for a maximum of 3,300 students in grades nine through twelve. The school will support three distinct educational programs within one facility. The new school will be constructed on an 11.63 acre site that was formerly the site of the Delaney Homes Public Housing development.
Route 35 Road Diet	Unknown	NJ Transit	Perth Amboy	Green Infrastructure	Two-way to one way conversion at Convery Boulevard/Route 35 (entire length)
Rudyk Park Multipurpose Semi-Permeable Plaza	Unknown	City of Perth Amboy	Perth Amboy	Green Infrastructure / Public Space	Will include stormwater management buffer at Rudyk Park
Raritan River Bridge Replacement	Construction	NJ Transit	Perth Amboy, South Amboy	Transportation Infrastructure	Replacement of existing swing bridge which carries NJ Transit’s NJCL trains over Raritan River. The existing 1908 bridge was damaged during Sandy
Middlesex County Utilities Authority Flood Mitigation and Permanent Restoration of the Sayreville Pump Station	60% complete	FEMA	Sayreville	Repairs and Mitigation	FEMA HMP (406) proposal for pump station improvements and construction of a floodwall for Sayreville Pump Station
South River Ecosystem Restoration and Flood Resiliency Enhancement Project	Planning	NFWF	South River, Sayreville	Damage assessment, fiscal impact analysis, floodplain neighborhood acquisition plan, redevelopment site	The Borough of South River has been the recipient of Community Development Block Grant (CDBG) Federal funding to help address the damage done to the residential and commercial structures in the Borough by Super-storm Sandy. In 2013, $10,000 in CDBG funding was utilized to document and report the devastation inflicted by Superstorm Sandy. In 2014, $20,000 in CDBG funding supported the fiscal impact analysis of acquiring flood-prone properties impacted by Superstorm Sandy. Also, in 2014, $50,000 was awarded in CDBG funding to create a flood-plain neighborhood acquisition plan to address Superstorm Sandy’s impacts. And, in 2015, $49,045 was received in CDBG funding for redevelopment site investigation to address the im-pact of Superstorm Sandy.
Alvin P. Williams Memorial Park	Complete	Woodbridge Township and Middlesex County Improvement Authority	Woodbridge	Green Infrastructure / Public Space	Located on Cliff Road in Woodbridge Township, this 36 acre park was dedicated on October 27, 2001. In 1999, the Middlesex County Board of Chosen Freeholders entered into a partnership with Woodbridge Township and the Middlesex County Improvement Authority to remediate, restore and develop the Sewaren Peninsula into a multi-use park facility. The blighted site on which this park was constructed had been spoiled by the disposal of dredged material.
CPV Woodbridge Energy Center	Complete	Woodbridge Township, CPV	Woodbridge	Energy	CPV Woodbridge is built on a remediated Brownfield located in a New Jersey. Brownfield Development Area (BDA), CPV Woodbridge facilitated the cleanup and conversion of a long-contaminated, former military armament site and includedthe development of the Woodbridge Riverside park, offering first-time public access to the Raritan River from Woodbridge Township.

NAME	STATUS	SPONSOR(S) / AGENCY(S)	MUNICIPALITY	CATEGORY	NOTES
Roots for Rivers	Planning	Nature Conservancy, Sustainable New Jersey	Woodbridge	Green Infrastructure	Woodbridge awarded grant money for stream bank stabilization, native plantings, and flood management along Camel Creek in Woodbridge (Block 450.01 Lot 34, ~4.6 acre site).
Blue Acres Habitat Restoration Project: Woodbridge Township Open Space and Flood Plain Restoration Plan	Planning	Nature Conservancy, Sustainable New Jersey	Woodbridge	Green Infrastructure	Woodbridge awarded grant money for stream bank stabilization, native plantings, and flood management along Camel Creek in Woodbridge (Block 450.01 Lot 34, ~4.6 acre site).
Reconstruction of Route 35 Culvert	Unknown	Middlesex County	Woodbridge	Transportation Infrastructure	Flood mitigation at Heards Brook between North and South Park Drive
Reconstruction of Cove Creek Culvert	Unknown	Middlesex County	Woodbridge	Transportation Infrastructure	Flood mitigation at Saints Boulevard
Reconstruction of Port Reading Avenue and Woodbridge Creek Culvert	Unknown	Middlesex County	Woodbridge	Transportation Infrastructure	Flood mitigation at Port Reading Avenue
Woodbridge Town Center Advanced Microgrid	Planning	Woodbridge Township	Woodbridge	Energy	The Township of Woodbridge has taken new steps on its road to becoming a more resilient community with its inclusion as one of the 13 New Jersey Board of Public Utilities (BPU) Town Center Distributed Energy Resource Microgrid Feasibility Study Incentive Program. The Township has been working with the team of CHA, Greener by Design, and GI Energy to build on the initial study conducted under the Gardinier Environmental Fund grant through Sustainable Jersey's Small Grants program to further develop a microgrid design that will make the community more resilient, while incorporating energy conservation, efficiency, and renewable energy.
Watson Crampton Buyouts	Complete	Woodbridge Township	Woodbridge	Buyouts, Stormwater Infrastructure	In the Watson Crampton neighborhood there are 195 eligible properties under the Blue Acres Program. As of May 29, 2015, 121 properties applied for the buy-out. Of the 121 properties, 72 have accepted the state's offer and closed on their property while nine have rejected the state's offer, and 68 remain eligible with no action taken. There are five properties that have not applied but the State has secured funding for them should they change their minds. One property has been accepted under the Rehabilitation, Reconstruction, Elevation and Mitigation (RREM) program.
Woodbridge Marina Boat Slip Expansion	Planning	Woodbridge Township	Woodbridge	Economic Development	Marina renovation to include mixed-used development/restaurants.
Woodbridge Waterfront Park	Construction	Woodbridge Township, CPV	Woodbridge	Brownfield Remediation / Open Space	Woodbridge Waterfront Park is being built out as part of the CPV Woodbridge Energy Center. The park will include a system of boardwalks and trails and over 100 acres of wetland enhancement and creation.
Laurence Harbor Beach Replenishment	Complete	USACE	Old Bridge	Erosion Protection	Post-Sandy beach renourishment project
MCUA Restoration, Upgrade, and Flood Mitigation of the Edison Pump Station	60% complete as of March 2021	MCUA	Carteret, Perth Amboy, Woodbridge (and Edison)	Flood Mitigation	Perimeter floodwall around Edison Pump Station, located in Woodbridge, at 23 ft elevation to protect from 500-year flood event. The pump station pumps sanitary sewage from Carteret, Perth Amboy, Edison, and Woodbridge to the Central Treatment Plant in Sayreville. Funding from FEMA Public Assistance Program.
MCUA Flood Mitigation and Permanent Restoration of the Sayreville Pump Station	60% complete as of March 2021	MCUA	All Municipalities	Repairs and Mitigation	FEMA HMP (406) proposal for pump station improvements and construction of a floodwall for Sayreville Pump Station. Construction and restoration are ongoing.

APPENDICES

PERTH AMBOY

Jobs and Major Industries

2018 IMPLAN Data

Total employment: 21,052

Top 10 industries by employment:

1. Hospitals: 2,640 employees
2. Local government (education): 1,325 employees
3. Home health care services: 985 employees
4. Warehousing and storage: 760 employees
5. Transit and ground passenger transportation: 735 employees
6. Local government (other services): 649 employees
7. State government (education): 579 employees
8. Tenant-occupied housing: 487 employees
9. Retail – Food and beverage stores: 454 employees
10. Limited-service restaurants: 445 employees

Top 10 industries by annual output:

1. Petroleum refineries: $803.4 million
2. Hospitals: $494.0 million
3. Owner-occupied dwellings (home ownership): $371.4 million
4. Cheese manufacturing: $275.2 million
5. Tenant-occupied housing: $228.4 million
6. Miscellaneous basic organic chemical manufacturing: $155.9 million
7. Local government (education): $138.9 million
8. Wired telecommunications carriers: $97.2 million
9. Miscellaneous real estate: $94.9 million
10. Miscellaneous animal food manufacturing: $93.8 million

OLD BRIDGE

Jobs and Major Industries

2018 IMPLAN Data

Total employment: 16,083

Top 10 industries by employment:

- Local government (education): 1,003 employees
- Hospitals: 879 employees
- Retail – General merchandise stores: 671 employees
- Miscellaneous real estate: 628 employees
- Marketing research and all other miscellaneous professional, scientific, and technical services: 599 employees
- Limited-service restaurants: 555 employees
- Offices of physicians: 546 employees
- Nursing and community care facilities: 518 employees
- Offices of other health practitioners: 504 employees
- Local government (miscellaneous services): 492 employees

Top 10 industries by annual output:

1. Owner-occupied dwellings (home ownership): $281.2 million
2. Tenant-occupied housing: $172.9 million
3. Hospitals: $164.5 million
4. Miscellaneous real estate: $140.3 million
5. Local government (education): 105.2 million
6. Offices of physicians: $93.0 million
7. Central Bank, commercial banking, savings institutions, and credit unions: $89.3 million
8. Insurance agencies, brokerages, and related activities: $88.4 million
9. Miscellaneous basic inorganic chemical manufacturing: $84.8 million
10. Waste management and remediation services: $72.6 million

Additional Development Trends

The Township of Old Bridge regulates their land use and development through 33 zoning districts and six redevelopment areas. Twenty-seven of the zones and two of the redevelopment areas are impacted by the 1% and/or 0.2% chance of annual flooding. The affected areas include several of the Township's higher density residential zones. These zones allow for residential development at densities ranging from 4 to 14 units per acre. While there is still vacant land within these zones, a majority of the land has been built out.

The Environmentally Sensitive/Recreation (ER) Zone encompasses a large portion of the Township. The purpose of the zone is to preserve and protect the groundwater table and water recharge areas for water supply purposes as well as to protect the ecological system and the health and safety of the occupants of the land. The zone additionally strives to preserve freshwater wetlands and support existing and proposed parklands by only allowing for active and passive recreation uses. Given the large extent of this zone and the fact that the majority of Old Bridge's housing stock was constructed in the mid-20th century, opportunities for development are focused into certain areas of the Township.

The Route 9 Mixed Use Inclusionary Housing (RT 9 MU IH) Zone, which is also affected by the floodplain, is anticipated to see significant growth and development in the coming years. The 342-acre area located along southbound Route 9 is expected to see the construction of 2,148 residential units with a portion of these units being deed restricted as affordable, as well as a mix of commercial, office, and light industrial uses. As of July 2020, construction of the roads and infrastructure for a project located on Block 6303 Lots 3.11 and 7 had begun. This specific project will consist of 1,384 residential units as well as 600,000 square feet of retail, commercial, and office space.

Block 20000 Lot 79.11 is a property within the former Planned Residential Retirement Community (PRC) Zone, which is a Sub-District of the Crossroads Redevelopment Area. The property was recently rezoned to an Affordable Housing (AH) sub-district, which contains 14.5 acres along Marlboro Road. This area is expected to be developed with a three-story apartment building containing 72 affordable residential units.

A large residential project was completed in late 2020 in the Inclusionary Housing 1 (IH1) Zone off northbound State Highway 18. The development, called Avalon Bay, consists of 49 townhouse units and 203 multi-family apartment units.

In addition to affordable housing-related development, there are several areas of the Township effected by the floodplain that are zoned for growth. The Economic Development Opportunity 1 (EDO1) and the Economic Development Opportunity 2 (EDO2) Zones encourage medium-scale growth on minimum lot sizes of 1 and 3 acres, respectively. The purpose of these two zones is to permit office, retail, and light industrial uses that encourage job growth and provide a mix of goods and services.

The Special Development 1, 3, and 5 (SD1, SD3, SD5) Zones encourage large-scale service and light manufacturing uses. The Township has witnessed warehouse development in the SD3 recently (e.g. Kennedy International Warehouse on Waterworks Road, completed in 2018) and there is a significant amount of undeveloped land in which development can expand to. A development known as "Oaks I" consists of a portion of the SD3 Zone and received site plan approval in 2005 to construct 1,384 residential units and 600,000 square feet of non-residential uses. The development has recently begun construction of critical utility infrastructure on the site. The beginnings of road networks can be seen in aerial images. The site was also offered as part of Old Bridge's bid to Amazon to construct their "HQ2" within the Township's boarders.

The Riverton mixed-use development will include 2,000 residential units and hundreds of thousands of square feet of commercial, retail, hotel, office, and other non-residential uses at full anticipated build-out near the base of the Driscoll Bridge in the northeast portion of the Borough.

SAYREVILLE

Jobs and Major Industries

2018 IMPLAN Data

Total employment: 6,812

Top 10 industries by employment:

- Warehousing and storage: 620 employees
- Local government (education): 498 employees
- Iron and steel mills and ferroalloy manufacturing: 341 employees
- Miscellaneous plastics product manufacturing: 268 employees
- Local government (other services): 244 employees
- State government (education): 218 employees
- Truck transportation: 193 employees
- Tenant-occupied housing: 183 employees
- State government (hospitals and health services): 167 employees
- Miscellaneous food and drinking places (non-restaurants; includes bars): 147 employees

Top 10 industries by annual output:

1. Iron and steel mills and ferroalloy manufacturing: $327.7 million
2. Electric power generation – Fossil fuel: $161.0 million
3. Owner-occupied dwellings (home ownership): $139.7 million
4. Tenant-occupied housing: $85.9 million
5. Warehousing and storage: $74.5 million
6. Miscellaneous plastics product manufacturing: $70.8 million
7. Stationery product manufacturing: $52.9 million
8. Local government (education): $52.2 million
9. Wholesale – Drugs and druggists' sundries: $41.7 million
10. Truck transportation: $36.4 million

WOODBRIDGE

Jobs and Major Industries

2018 IMPLAN Data

Total employment: 25,445

Top 10 industries by employment:

1. Employment services: 3,660 employees
2. Miscellaneous real estate: 1,390 employees
3. Retail – Clothing and clothing accessories stores: 1,337 employees
4. Miscellaneous financial investment activities: 1,269 employees
5. Retail – General merchandise stores: 1,040 employees
6. Retail – Food and beverage stores: 1,031 employees
7. Insurance agencies, brokerages, and related activities: 916 employees
8. Full-service restaurants: 787 employees
9. Miscellaneous food and drinking places (non-restaurants; includes bars): 751 employees
10. Truck transportation: 649 employees

Top 10 industries by annual output:

1. Insurance carriers, except direct life: $157.9 million
2. Lessors of nonfinancial intangible assets: $156.8 million
3. Miscellaneous financial investment activities: $146.2 million
4. Owner-occupied dwellings (home ownership): $133.1 million
5. Truck transportation: $122.5 million
6. Legal services: $120.1 million
7. Management of companies and enterprises: $117.6 million
8. Retail – Clothing and clothing accessories stores: $116.1 million
9. Central Bank, commercial banking, savings institutions, and credit unions: $93.0 million
10. Wired telecommunications carriers: $87.3 million

Additional Development Trends

Land use in the Township of Woodbridge is governed by 26 land use zones, 63 redevelopment areas, and 20 rehabilitation areas. Given the Township's location along several waterways, including the Arthur Kill, Woodbridge River, Raritan River, and South Branch Rahway River, a significant amount of the Township's land use districts are located within the floodplain.

The Township of Woodbridge is predominantly built out with little vacant land available for new development. Future development can be expected through infill development, redevelopment pursuant to the Local Redevelopment and Housing Law, and non statutory redevelopment of existing sites.

As proven by the extensive number of redevelopment and rehabilitation areas within Woodbridge, the Township has utilized the redevelopment process pursuant to the Local Redevelopment and Housing Law ("LRHL" NHSA 40A:12A-1 et. Seq.) to promote the rebuilding, restoration, and growth of the areas that were in a state of decline or disinvestment. Many of these areas are along the Township's waterfronts on the Raritan River and the Arthur Kill. The Township's extensive industrial history on the waterfront left a need for revitalization as well as mechanisms for conservation. The redevelopment process was undertaken in many areas to encourage a new age of industrial development and job creation as well as to provide for brownfield remediation, contamination clean-up, and wetland restoration.

The Township of Woodbridge utilized the tools provided through the redevelopment process to allow their industrial waterfront to evolve and grow.

The various Redevelopment Areas located along the Raritan River waterfront have mostly been realized and built-out in accordance with their Redevelopment Plans. In several cases, such as the BUC Area, the standards of the Redevelopment Plans are designed to support the existing industrial development and allow growth within, rather than proposing sweeping new large-scale development. New warehouses have been constructed, such as in the Port Reading section of the K3 Area, and significant wetland restoration and enhancement has taken place in the ER Area where construction began in 2015 for the enhancement of over 30 acres of freshwater wetlands and 12 acres of tidal wetlands.

Block 28 Lot 10.03 in the K5 Area, which fronts on the Raritan River, has not been redeveloped since the Plan was written in 2008. While the site is an active light industrial development, there is the potential for growth and redevelopment at this location.The remainder of the land uses along the Raritan River and Arthur Kill are light industrial uses within the M-2 Heavy Industrial Zone. The uses permitted within the M-2 compliment those of the various waterfront Redevelopment Areas. These M-2 properties are also built out and active and there are no current plans for large expansions.

The Township additionally has 18 traditional zoning districts in flood areas, including most of the higher-density residential zones. Non-residential zones such as the B-1 and OR are also significantly impacted. These commercial zones allow for higher-intensity uses such as retail sales and services as well as office buildings and hotels/conferences centers. These areas are likely to see infill and smaller development projects as the areas are almost fully developed. The majority of these zones are located along the Woodbridge River and the South Branch Rahway River, as well as smaller tributaries and streams.

Despite the amount of flood-prone land that is located in high-density zones, Woodbridge has made dedicated efforts over the last two decades to adjust their zoning standards in order to discourage development within the floodplains. The OSC/R Open Space Conservation/Resilience and the OSC/PQP Open Space Conservation/Public Quasi Public Zones were both implemented in the last 15 years.

The OSC/R Zone is a direct result of the neighborhood studies that were prepared under the Post Sandy Planning Assistance Grant Program, administered by the New Jersey Department of Community Affairs, Office of Local Planning Services. The three plans that were prepared for the Watson Crampton, South Roberts, and Saints Field neighborhoods (all seriously affected by flooding during Sandy and central locations for the Blue Acres Buy Out Program) recommended the rezoning of several areas from higher-density R-6 zoning to a conservation zone. The areas were rezoned in 2016 to the OSC/R Zone, which is located within the three neighborhoods along the Woodbridge River. The zone only permits unimproved open space and existing residential structures.

The OSC/PQP Zone, which was implemented in the mid-2000s, rezoned numerous properties that had previously been zoned for high-intensity uses, such as the M-1 Industrial Zone and higher-density residential zones. The OSC/PQP replaced those intense uses with improved/unimproved open space as well as government and Board of Education Buildings.

Recent large-scale residential development within the Township has been seen through inclusionary development (developments that include a combination of market rate and affordable units) and 100% affordable developments as a result of Woodbridge's Court-approved affordable housing settlement agreement with the Fair Share Housing Center. Hundreds of residential units have come online in the last three years through developments such as Woodbridge Gardens and Warden Home Site. The Township is witnessing significantly fewer single-family subdivisions than in previous decades due to the lack of vacant land and an increase in multi-family development. The new multifamily development is occurring near train stations (e.g. Station Village) and through that statutory redevelopment process (e.g. Warden Home and Station Village).

The Township has seen significant warehouse development in recent years as well. Over 1.5 million square feet of warehouse space was under construction during 2020. Given the Township's unique situation with direct access to both the Garden State Parkway and the New Jersey Turnpike, it is anticipated the Township will continue to experience additional warehouse development in the coming years.

CARTERET

Jobs and Major Industries

2018 IMPLAN Data

Total employment: 10,220

Top 10 industries by employment:

1. Truck transportation: 1,261 employees
2. Warehousing and storage: 664 employees
3. Miscellaneous support services (including packaging and labeling, convention and trade show organizers, and others): 600 employees
4. Local government (education): 585 employees
5. Architectural, engineering, and related services: 369 employees
6. Retail – Miscellaneous store retailers: 328 employees
7. Local government (other services): 287 employees
8. State government (education): 256 employees
9. Copper rolling, drawing, extruding, and alloying: 227 employees
10. Bottled and canned soft drinks and water manufacturing: 222 employees

Top 10 industries by annual output:

1. Truck transportation: $237.9 million
2. Copper rolling, drawing, extruding and alloying: $196.1 million
3. Owner-occupied dwellings (home ownership): $164.0 million
4. Bottled and canned soft drinks and water manufacturing: $163.5 million
5. Toilet preparation manufacturing: $120.2 million
6. Tenant-occupied housing: $100.8 million
7. Architectural, engineering, and related services: $88.0 million
8. Warehousing and storage: $79.7 million
9. Wholesale – Drugs and druggists' sundries: $68.6 million
10. Miscellaneous support services (including packaging and labeling, convention and trade show organizers, and others): $67.2 million

SOUTH AMBOY

Jobs and Major Industries

2018 IMPLAN Data

Total employment: 6,526

Top 10 industries by employment:

1. Local government (education): 565 employees
2. Miscellaneous food and drinking places (non-restaurants; includes bars): 351 employees
3. Investigation and security services: 301 employees
4. Local government (miscellaneous services): 277 employees
5. State government (education): 247 employees
6. Miscellaneous real estate: 244 employees
7. Limited-service restaurants: 235 employees
8. Electronic and precision equipment repair and maintenance: 221 employees
9. Tenant-occupied housing: 208 employees
10. State goernment (hospitals and health services): 189 employees

Top 10 industries by annual output:

1. Owner-occupied dwellings (home ownership): $158.3 million
2. Tenant-occupied housing: $97.4 million
3. Local government (education): $59.2 million
4. Miscellaneous real estate: $54.6 million
5. Electronic and precision equipment repair and maintenance: $50.4 million
6. Local government (other services): $25.9 million
7. State government (education): $24.4 million
8. State government (hospitals and health services): $24.0 million
9. Management of companies and enterprises: $23.8 million
10. Miscellaneous food and drinking places (non-restaurants; includes bars): $21.7 million

Additional Development Trends

Land use in the City of South Amboy is governed by five zoning districts and seven redevelopment areas. Three of the zones and four of the redevelopment areas are impacted by the 1% and/or 0.2% chance of annual flooding. The affected areas include the Light Industrial (M-1), Single-Family Residential (RA), Medium Density Residential (RM), the Beach Club Redevelopment Area (BCD), the Northern Waterfront Redevelopment Area (NWRA), the Broadway/ Main Street Redevelopment Area (BMS), and the Southern Waterfront Redevelopment Area (SWRA). These areas are all focused near the City's waterfront.

While much of South Amboy is built-out, there are opportunities for development along the City's waterfront where a significant amount of land remains vacant and developable. New development is underway within the Beach Club Redevelopment Area. In the summer of 2020, the development known as the Manhattan Beach Club broke ground on an 1,875-unit development located on 55 acres fronting on the Raritan Bay. The first phase of the project will produce 500 luxury rentals. The City's waterfront at this location will also be home to a new ferry terminal, proposed within a 20,000 square-foot facility that will operate up to three ferries between the City and downtown Manhattan. The ferry terminal will also provide parking for 750 vehicles.

The Beach Club Redevelopment Area and its new development are also within walking distance of the City's train station, a stop on the NJ Transit North Jersey Coast Line, which provides direct service to Newark Airport, Newark Penn Station, and New York Penn Station.

There are additional opportunities for redevelopment in the City's Northern Waterfront Redevelopment Area (NWRA). While the current Redevelopment Plan calls for a mixed-use district, there has been discussion of focusing development on light industrial uses, which can contribute to job growth and economic development. No current plans are in place for this Redevelopment Area, leaving open future opportunities for development.

The portion of the single-family zone that is affected by the floodplain is developed with single-family homes. There are a few vacant lots that could support infill but with the current zoning larger development is not feasible. There has been discussion within the City about studying this area to determine if it meets the statutory criteria of an "area in need of redevelopment" pursuant to the Local Redevelopment and Housing Law, but this study has not yet moved forward. However, given the City's interest in potential redevelopment in this area, it's reasonable to consider this area as a location where future development may occur.

The remaining large tract of vacant land is within the Mocco Redevelopment Area. While this area is not susceptible to flooding, it provides an opportunity for significant future development within the City.

It should be noted the City is in the process of updating its Land Use Ordinance to implement recommendations from the 2017 Master Plan, which will include several rezonings.

SOUTH RIVER

Jobs and Major Industries

2018 IMPLAN Data

Total employment: 4,388

Top 10 industries by employment:

1. Employment services: 620 employees
2. Local government (education): 396 employees
3. Local government (miscellaneous services): 194 employees
4. Warehousing and storage: 176 employees
5. State government (education): 173 employees
6. Tenant-occupied housing: 146 employees
7. State government (hospitals and health services): 132 employees
8. Miscellaneous real estate: 114 employees
9. Personal care services (including hair, nail, and skin care, barber shops, etc.): 105 employees
10. Miscellaneous food and drinking places (non-restaurants; includes bars): 102 employees

Top 10 industries by annual output:

1. Owner-occupied housing (home ownership): $111.0 million
2. Tenant-occupied housing: $68.2 million
3. Soap and other detergent manufacturing: $67.4 million
4. Employment services: $64.1 million
5. Local government (education): $41.5 million
6. Animal, except poultry, slaughtering: $28.1 million
7. Miscellaneous real estate: $25.5 million
8. Warehousing and storage: $21.1 million
9. Local government (other services): $18.2 million
10. Grantmaking, giving, and social advocacy organizations: $17.5 million

Additional Development Trends

The Borough of South River's land use is governed by nine zoning districts, the Waterfront Revitalization District, the Main Street Rehabilitation District, and the Lower Main Street Redevelopment Area that constitutes an overlay over the Rehabilitation District. Four of its zoning districts and both the Waterfront Revitalization District and the Main Street Rehabilitation District/Redevelopment Area are impacted by the 1% and/or 0.2% chance of annual flooding. The affected zoning districts allow for the development of single- and multi-family residences as well as offices, retail, mixed-use, light industrial and warehousing uses, and parks and recreation/environmental preservation.

In 2013, the Borough adopted a Flood Damage Prevention ordinance, whose purpose is to promote the public health, safety, and general welfare and to minimize public and private losses due to flood conditions. The standards of the ordinance apply to any development found within all areas of special flood hazard within the Borough. Such standards include the requirement to provide anchoring, utilizing construction materials and utility equipment that are resistant to flood damage, using construction methods and practices that minimize flood damage, and new/replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of floodwaters into the systems and discharge from the systems into floodwater.

The ordinance additionally requires that all new construction and substantial improvements that have fully enclosed areas on the ground floor that are used solely for access or the storage of vehicles/materials shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allows for the entry and exit of floodwaters. Any encroachments into floodways, including fill, new construction, and substantial improvements are prohibited.

The Borough is mostly built-out with little room for new development beyond smaller infill and redevelopment projects. The vast majority of the land within South River that is vacant is within the Park, Open Space, Recreation and Conservation (PR) District, which limits development to parks and recreation facilities as well as preserved open space and stormwater management faculties. The PR District comprises most of the Borough's waterfront. Because of the built-out nature of the Borough and its significant environmental constraints along the waterfront, future development within the Borough can be expected predominately in the Main Street Rehabilitation (MSR) District.

The standards of the Borough's MSR District are designed to spur growth and investment in the area. The District allows for a variety of uses in mixed-use buildings on small, 2,500 square-foot lots with an impervious coverage of up to 95%. While the corridor is almost fully built out, some of the existing development consists of single-story, single-use buildings. There are additionally scattered vacant lots and parking lots that front on Main Street. The District's regulations allow for up to three stories in building height and are designed to create a "main street" feeling along the corridor. The corridor has the bones of a mixed-use corridor and the regulations associated with the Rehabilitation District are intended to incentivize and encourage redevelopment of this area at a higher density than what exists today.

The Lower Main Street Redevelopment Area is an overlay to the MSR District. It provides an option for developers to utilize either the standards of the underlying MSR District or those of the Lower Main Street Redevelopment Plan. The Redevelopment Plan provides additional incentives for development, allowing developers to build up to five stories as opposed to the three stories permitted in the underlying MSR District.

Future development can also be expected within the Waterfront Revitalization (W-R) District, which runs along a portion of the Borough's South River waterfront. While this area is particularly prone to flooding, the Waterfront Revitalization District aims to promote economic development while simultaneously protecting residents during periods of significant flooding. Due to the identified danger to human life, the District does not permit new single-family development but allows for any existing single-family residential dwellings that were damaged by flooding or flood-related natural disaster to be reconstructed as along as the damage to the building does not exceed 50% of the pre-disaster condition of the building.

The development standards for the W-R District encourage larger development than that of the MSR District/Lower Main Street Redevelopment Area. Larger lots of 20,000 square feet are required and uses such as shopping villages, offices, and larger mixed-use developments are permitted. The district prohibits the development of new single-family homes but allows for existing homes that are damaged by flooding to be rebuilt without expansion or intensification. Additionally, waterfront access via a public walkway is required.

Recent Development Approvals

In November 2020, the Planning Board voted to approve a mixed-use four-story building comprised of ground floor commercial and 36 upper floor apartments. The proposed development will be on the former Lincoln School site, which is bound by Henry Street to the north, Maple Street to the east, Prospect Street/Reid Street to the south, and William Street to the west. The property is within the Lincoln School Neighborhood Overlay District, which is in the Borough R-75 residential district.

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