WALNUT-OAK NEIGHBORHOOD PLAN

Keyport, New Jersey

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INTRODUCTION

In 2016, the Borough Council of the Borough of Keyport, County of Monmouth and State of New Jersey approved the preparation and submission of a Post-Sandy Planning Study and Report, which allowed for the preparation of the Walnut-Oak Neighborhood Plan, in addition to other planning documents. The Walnut-Oak Neighborhood Plan is intended to examine a number of factors which will affect the future viability of this area, from the present state of the infrastructure and the ongoing rebuilding efforts, to methods of providing a sense of unity and community.

The Walnut-Oak Neighborhood Plan Study Area extends from Keyport Harbor/Raritan Bay in the north; along the northwesterly side of the Chingarora Creek north of the Borough of Union Beach and Township of Hazlet; north of the Henry Hudson Trail; and east of and including Cedar Street and Fulton Street. The Neighborhood Plan has been prepared simultaneously to two additional Neighborhood Plans and a Debris Management Plan, prepared by various consulting firms, and will ultimately complement each Plan as an addendum of the Borough Master Plan.

This Neighborhood Plan provides an overview and history of the Walnut-Oak Neighborhood and an analysis of the existing regulations and development pattern within the Neighborhood and its associated bulk standards. The Plan determines specific recommendations that will make the Neighborhood more resilient to future storm events comparable to Superstorm Sandy, as well as regular flooding, and to reflect changes in the economy and demographics. As noted in the project scope, the Plan uses the sustainable development principles of the Leadership in Energy and Environmental Design (LEED) rating systems; specifically, LEED for Homes (LEED-Home) and LEED for Neighborhood Development (LEED-ND). The LEED-Home standards are applicable for homeowners who are renovating, as well as those considering a complete demolition and rebuild. The LEED-ND standards apply to the neighborhood as a whole and relate to maintaining and enhancing connectivity (and thereby "walkability") within the neighborhood for pedestrians and bicyclists, sustainable stormwater management, and enhancing neighborhood goods and services, parks and open space and schools within walking distance of the homes (1/4 mile or less). The subsequent section of the Neighborhood Plan provides design standards to assist homeowners with renovating and rebuilding.

Map 1: Overview Map of Walnut-Oak Neighborhood, Borough of Keyport

PLAN INTEGRATION, COORDINATION, AND BUILDING BLOCK APPROACH

PLANNING COORDINATION AND PROCESS

This Neighborhood Plan is part of the larger initiative taken on by the Borough of Keyport to better integrate planning processes with community development, local decision-making, and hazard mitigation efforts. This effort included the concurrent development of a series of Borough-specific working documents that create a framework for reducing vulnerabilities to hazards, increasing safety, and limiting damages to both public and private property. This Plan leverages the findings and analysis of the other planning efforts and fulfills a unique component of a comprehensive approach to hazard mitigation and community resilience.

The development of this Neighborhood Plan was led by the Borough Manager and the Planning Commission, and supported by a public engagement process that included an open public meeting and presentation. As a result, this Plan incorporates a wealth of local knowledge and ensures that recommendations align with the goals and preferences of the community.

The methodology and associated tasks incorporated into the development of the Neighborhood Plan Element are outlined below.

- Review of existing plans and studies, including but not limited to:
  - 2015 Borough of Keyport Strategic Recovery Planning Report
  - 2012 Borough of Keyport Master Plan Reexamination Report
  - 2010 Aeromarine Redevelopment Plan Solar Overlay
  - 2007 Borough of Keyport Natural Resource Inventory
  - 2005 Aeromarine Redevelopment Plan
  - 2014 Monmouth County Multi-Jurisdictional Hazard Mitigation Plan
  - 2006 Monmouth CountyBayshore Region Strategic Plan
- Existing conditions analysis to document trends and the current status of the community, including:
  - Population/Demographics
  - Land Use and Development
  - Regulations and Ordinances
  - Property analysis
  - Damage from Hurricane Sandy
  - Flood and sea level rise maps
- Public outreach and engagement efforts to incorporate local knowledge and values into the planning process. Public engagement included:
  - Open House
  - Meetings
  - Surveys
- Site visits and meetings with local officials.

NEIGHBORHOOD PLAN GOALS AND OBJECTIVES

The planning principles employed in this Neighborhood Plan are based on evaluations by the Borough professional staff and interaction with Township property owners through public meetings and surveys.

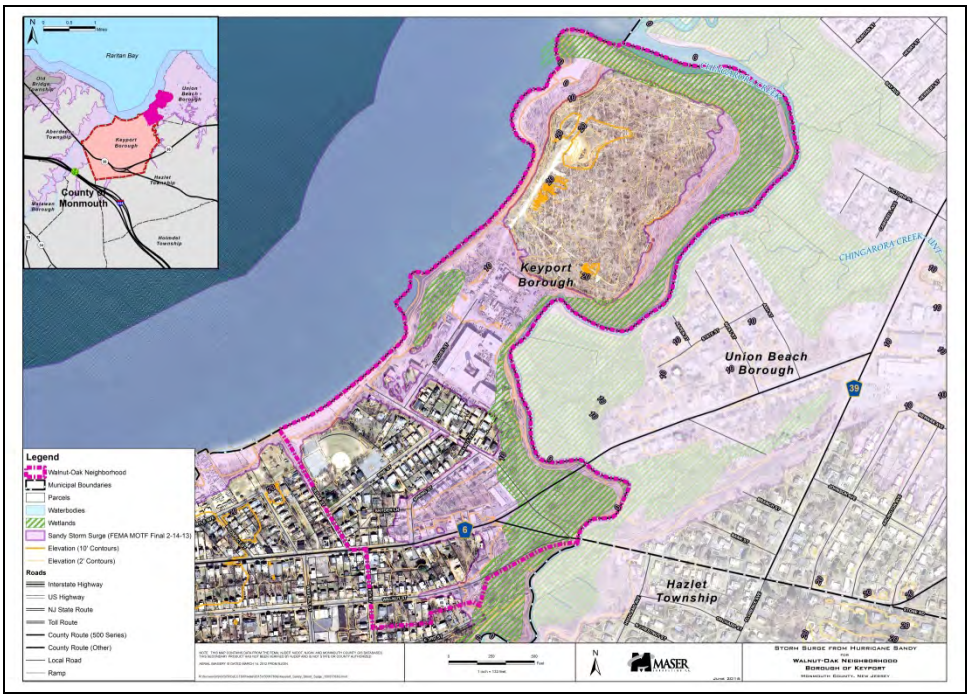
- To empower the resident of the Walnut-Oak Neighborhood, in partnership with the Borough and other entities, to implement thoughtful, innovative, and resilient projects that will advance the visual and functional "branding" of Walnut-Oak as a cohesive Bayshore community within the Borough of Keyport.
- To provide practical and affordable recommendations to make Walnut-Oak more resilient to existing and future threats while improving quality of life, access to parks and open space and safety for pedestrians and bicyclists.
- To fully engage stakeholders about the impacts of climate change and to develop pathways to resilience based on sound science.
- To leverage investments to help the community implement the recommendations of this Neighborhood Plan.

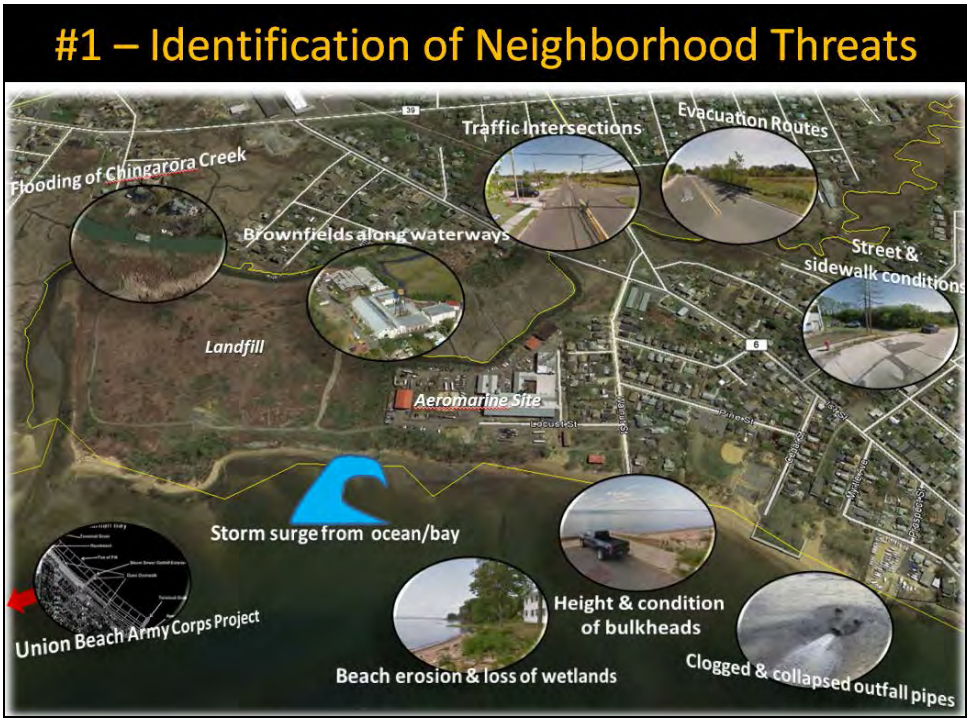
PUBLIC OPINION

The Borough provided several opportunities for the public to voice opinions, concerns, comments, and questions about the Neighborhood Plan throughout the course of the year-long planning process. Public meetings were held for all of the Post-Sandy Phase II Planning Grant Neighborhood Plan projects with representatives from the Borough and the project consultants available to make presentations and answer questions. Separate meetings were also held with the Township Planning Board, to which the public was invited. In addition to filling out surveys at the initial public open house, residents were able to submit comments by e-mail or by hand to a Township official or Planning Board member.

PUBLIC OPEN HOUSE – JUNE 30, 2016

A public open house was held for all of the Post-Sandy Phase II Planning Grant Neighborhood Plan projects on June 30, 2016 at the Consolidated Firehouse at 34 First Street, Keyport, New Jersey. Maser Consulting, the lead consultants for the Walnut-Oak Neighborhood Plan, presented to the public a display with observations of the neighborhood conditions and impact from storm damage. Officials from the Township and approximately ten residents took part in the discussion about the present state, existing conditions, storm damage, and ideas for the future of the Walnut-Oak Neighborhood. Below are the visuals created and distributed at this meeting.


Raritan Bay
County of Monmouth
Keyport Borough
Union Beach Borough
Hazlet Township
CHINGAROA CREEK
Legend
Walnut-Oak Neighborhood
Municipal Boundaries
Parcels
Waterbodies
Wetlands
Sandy Storm Surge (FEMA MOTF Final 2-14-13)
Elevation (10' Contours)
Elevation (2' Contours)
Roads
Interstate Highway
US Highway
NJ State Route
Toll Route
County Route (500 Series)
County Route (Other)
Local Road
Ramp
MASER
Storm Surge from Hurricane Sandy
Walnut-Oak Neighborhood
Borough of Keyport


#1 – Identification of Neighborhood Threats
Flooding of Chingarora Creek
Traffic Intersections
Evacuation Routes
Brownfields along waterways
Street & sidewalk conditions
Landfill
Aeromarine Site
Storm surge from ocean/bay
Union Beach Army Corps Project
Height & condition of bulkheads
Beach erosion & loss of wetlands
Clogged & collapsed outfall pipes

#2 – Neighborhood Visual Character Preferences

#3 – Parks, Open Space, & Recreation Preferences

#4 – Aeromarine Redevelopment Area

Aeromarine Area Redevelopment Plan (2005)

The originally adopted Redevelopment Plan for the Aeromarine site at the north end of the Borough anticipated residential and recreational uses based on the marketability of the waterfront

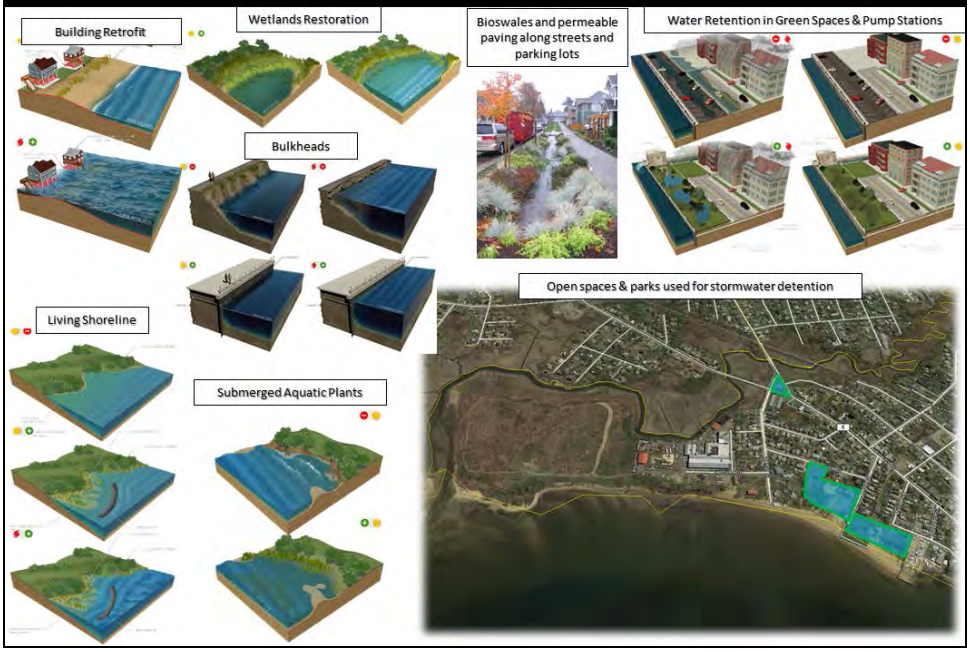
Aeromarine Area Redevelopment Plan Solar Overlay Amendment (2010)

The 2010 Amendment allows for the development of a ground-based solar panel energy facility on the landfill portion of the site.

During the surge from Superstorm Sandy, the site essentially became an island, with the elevated landfill portion being the only portions that were not flooded.

Potential Use	Like ("L"); Neutral ("N"); Dislike ("D")
Residential	
Solar Farm	
Park (Passive)	
Recreational (Active) /Marina	
Other	

#5 – Flood Control/Stormwater Strategies



NOTES FROM THE PUBLIC OPEN HOUSE

Comments during the public open house on June 30, 2016 were synthesized and recorded below. These comments have helped to inform the Walnut-Oak Neighborhood Plan.

- "Flooding during Hurricane Sandy exceeded the height of the drainage pipes."
- "Silting in Chingarora Creek near the CVS has made water stagnant and creek no longer flows fully. We need to find a way to let it flow again."
- "There is over-crowding of families in garden apartments. The Borough needs more single-family homes so that there is less of a burden on schools and home values can increase."
- "There are a number of vacant residential properties in the area that are dilapidated and bringing down the value of surrounding properties. Need to find out which properties are bank-owned where something can be done."

RESULTS FROM PUBLIC COMMENT SHEETS

A comment sheet was provided at the public open house on June 30, 2016 that allowed residents and other participants to provide answers to questions that were asked of them and give additional feedback on the presentation. Only five (5) comment sheets were returned in total. Residents were permitted to take the survey home and the survey and reference boards were also posted to the Borough's website. Survey respondents answered a series of questions regarding their relationship with, impression of, and aspiration for the Walnut-Oak Neighborhood.

Out of the five (5) respondents, two (2) live in the Walnut-Oak Neighborhood and three (3) live in another neighborhood in Keyport; however, none work in Walnut-Oak. Most respondents recognized a wide range of physical and environmental threats to the neighborhood, from the "flooding of the Chingarora Creek" to "neighborhood character", and with particular emphasis on "storm surge from the Atlantic Ocean/Raritan Bay".

Those who participated in the survey were also asked their opinion of existing conditions, such as streetscape. There are a wide variety of streetscapes within the small Walnut-Oak Neighborhood. Respondents preferred a range of streetscapes, including historic, dense character and elevated lots above the street. The respondents were partial to all of the parks, open spaces, and recreation facilities that are in the Walnut-Oak Neighborhood and Keyport that were presented, which range from naturalized areas to sports fields and courts to street-ends. The Keyport Harbor/Raritan Bay, beach, private yards, and street-ends with water views were the most used open spaces. People do a wide variety of activities in these open spaces, but especially walking/running, fishing, and enjoying the scenery.

Participants were questioned about the future of the Aeromarine site in the neighborhood. Although one person felt that the site should be developed with a variety of residential property types if it were designated for that purpose, others felt that there should only be single-family detached homes permitted or that there be no residential development at all. For any new buildings in the neighborhood, respondents felt that they should be limited to two (2) or three (3) stories in height.

The open house participants were also asked about their thoughts on the appropriateness of flood control and stormwater management strategies shown on board #5. Although such techniques will require further analysis by professionals, the participants felt that improved drainage systems and pump stations and wetlands restoration/enhancement were the most favorable. They were then asked to rate a series of

questions on a scale of "1 – Very Important" to "5 – Not at all Important". Protecting views of the water was the most important, followed by protecting the neighborhood from future flooding or storm surge, while redeveloping the Aeromarine and landfill site was neutral, and having commercial businesses was not important at all.

The full responses to the surveys may be found in Appendix I.

NEIGHBORHOOD HISTORY

The historical development of the study area is critical to understanding the present day infrastructural, environmental, and socioeconomic characteristics and challenges. Decisions that were made in the past continue to influence the physical, social, and collective memory structure of the Neighborhood.

Several different sources were used to obtain historical documentation of the Walnut-Oak Neighborhood. In addition to secondary historical documents and oral histories passed down from local officials and residents, there are a number of primary sources that were also retrieved to help determine changes in development that took place within the neighborhood study area over the course of the past century.

A series of historic aerial photographs of the Walnut-Oak Neighborhood of Keyport area were obtained online at www.historicaerials.com and maps.njpinebarrens.com. Historic Sanborn and topographic maps provide an accurate description of buildings and topography from those periods. Maps and data from the New Jersey Department of Environmental Protection (NJDEP) provide a historical review of changes to the local environment, particularly in wetlands. Additionally, a list of historic properties and districts was provided by the New Jersey Historic Preservation Office (NJHPO), as well as a list of Century Home properties through the Keyport Historical Society (KHS).

The area that is now Keyport was originally settled and owned by the Kearney family in 1714 as a plantation, known as Key Grove Farms, to export lumber and produce.[1] Oystering and crabbing was a significant part of the economy and a pastime for many local residents and fishermen. The plantation evolved into an important regional center on the Raritan Bay, and by the early 19th century became a major shipping and ship-building center. The plantation was eventually partitioned and auctioned, leading to Keyport's establishment in 1830.[2] The Town of Keyport was formed on March 17, 1870 from Raritan Township (now Hazlet), but was replaced by the Borough of Keyport on April 2, 1908.[3]

The Walnut-Oak Neighborhood was historically part of a section of eastern Keyport known locally as "Lockport". The growth of First Street, in particular, was initially supported by commerce from the Lockport Dock, later known as the Chingarora Dock, at the east end of Atlantic Street.[4] A small commercial center developed at the intersection, west of the Walnut-Oak neighborhood. However, "later construction occurred further east along First Street due to its position as the major route east to Union (now Union Beach) which a number of Keyport investors attempted unsuccessfully to develop during the middle of the 19th century. The district became a secondary commercial center to the Front Street area and one of the two early residential areas in town."[5] The remaining buildings are primarily residential along First Street, and entirely residential within the Walnut-Oak Neighborhood. There are a number of "higher style" residential buildings along First Street, while streets to the outer edges generally contain smaller-scale working class dwellings constructed at a later time. Many of the buildings have undergone some degree of alteration, including some that may have once been used as commercial businesses have now been converted to residential uses or are boarded up. The only remaining commercial buildings in the entirety of the Walnut-Oak Neighborhood are the former

[1] The History Girl! "The Keyport Historical Society: Preserving Keyport's Rich History." http://www.thehistorygirl.com/2014/11/the-keyport-historical-society.html

[2] Keyport Historical Society. "Keyport History." http://keyporthistoricalsociety.com/about/

[3] Snyder, John P. The Story of New Jersey's Civil Boundaries: 1606-1968, Bureau of Geology and Topography; Trenton, New Jersey; 1969. p. 181. Accessed July 10, 2012.

[4] McCabe, James and Bezio, Meghan. New Jersey Department of Environmental Protection, Historic Preservation Office. Historic District Survey Form. Historic Sites Inventory No. 1322-1. September 1980; updated June 2006.

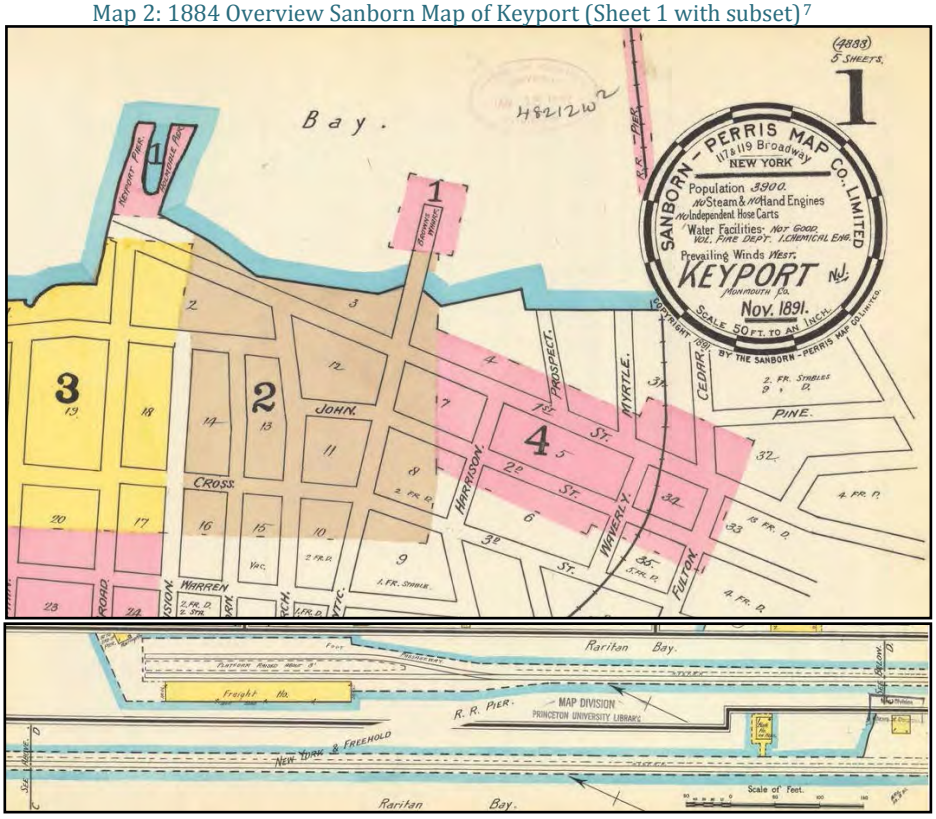
[5] Ibid.

Aeromarine Plane and Motor Company building and one building located at the southwest corner of Fulton Street and Second Street, just outside of the Neighborhood study area.

The New York & Freehold Railroad was built east of Atlantic Street in the mid- to late-19th century, immediately to the west of the Walnut-Oak Neighborhood between Cedar Street and Myrtle Street extending over a pier over Keyport Harbor/Raritan Bay, which can be seen in the following Sanborn Maps. Finished in 1880, the railroad improved the means of hauling produce to the Keyport docks. The railroad brought additional industrial and shipping uses to the eastern portion of Keyport. The pier and railroad tracks were eventually removed, but their remnants are still visible. According to the 1956 topographical map, a railroad line also extended from the Central Railroad into Union Beach to the north up to the Aeromarine building, between the homes on Walnut Street and the Chingarora Creek, where there is now a paper street.[6]

The maps below published by the Sanborn Map Company show the quick development of the eastern area of Keyport into the Walnut-Oak (Lockport) Neighborhood. Although the inset maps do not provide detail of the entirety of the Neighborhood, the maps expand from showing just east of Fulton Street and Cedar Street in 1896 to midway between Spring Street (then Spruce Street) and Walnut Street in 1901 and then south to East Third Street (then Howard Street) in 1908. The maps show the growth in the number of dwellings between 1901 and 1908 in the Walnut-Oak Neighborhood – most of which are one-and-one-half to two-and-one-half stories in height, built of wooden frame with front porches.

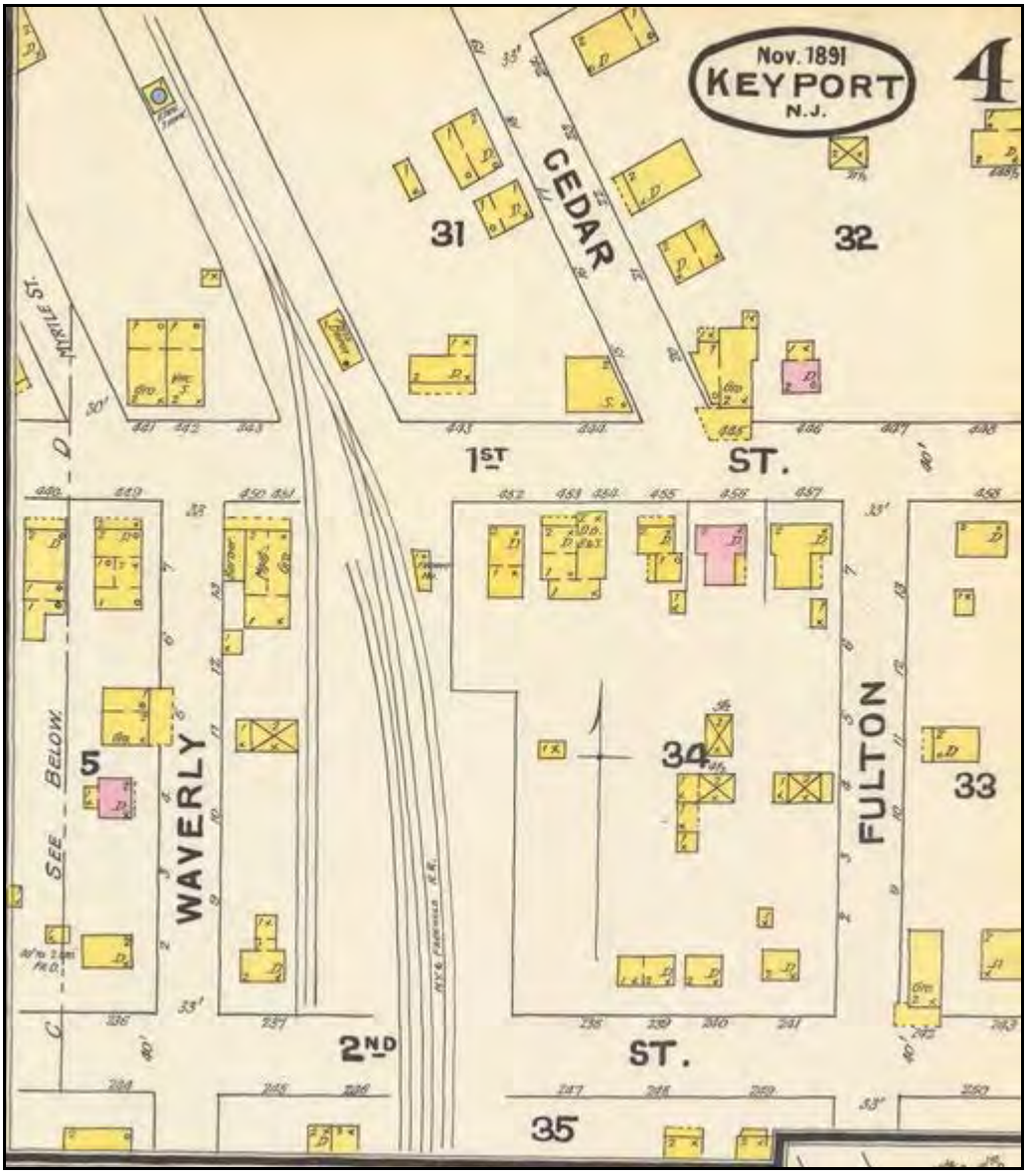
Map 2: 1884 Overview Sanborn Map of Keyport (Sheet 1 with subset)[7]



[6] www.historicaerials.com

[7] Princeton University Library. Sanborn Map Company. Sanborn Maps of New Jersey: Keyport. http://library.princeton.edu/libraries/firestone/rbsc/aids/sanborn/monmouth/keyport.html

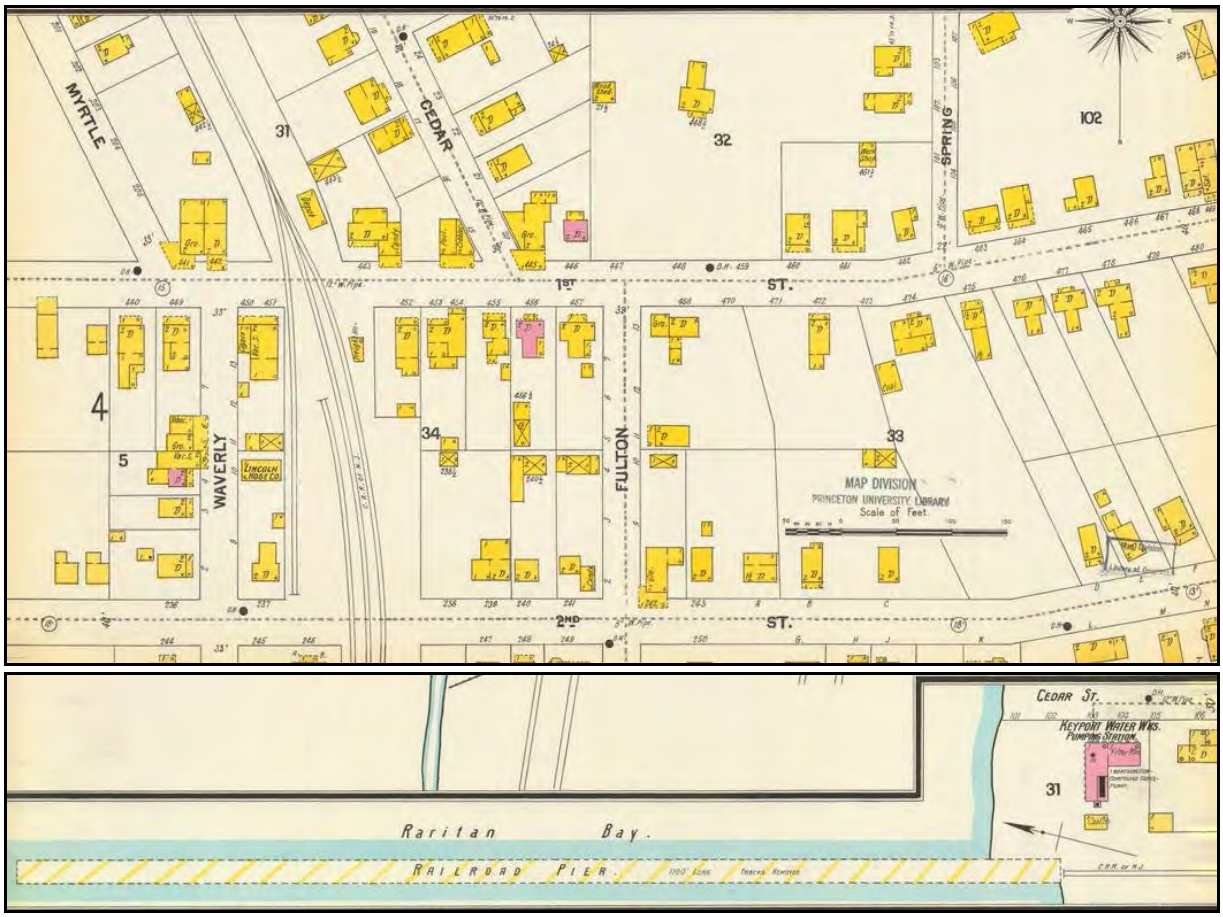
Map 3: 1891 Sanborn Map of Keyport (Sheet 4)[8]



The image below from the 1901 Sanborn Map shows the former Keyport Water Works pumping station and a coal house between the Central Railroad pier and Cedar Street along Raritan Bay. The following maps also show a wood frame construction in the center of the block between First Street, Oak Street, Spring Street (Spruce), and Walnut Street that no longer seems to exist, but which would have been in the existing depression of land where flooding is a consistent problem. Even up to the 1908 Sanborn Map, Snyder Lane does not appear on the map.

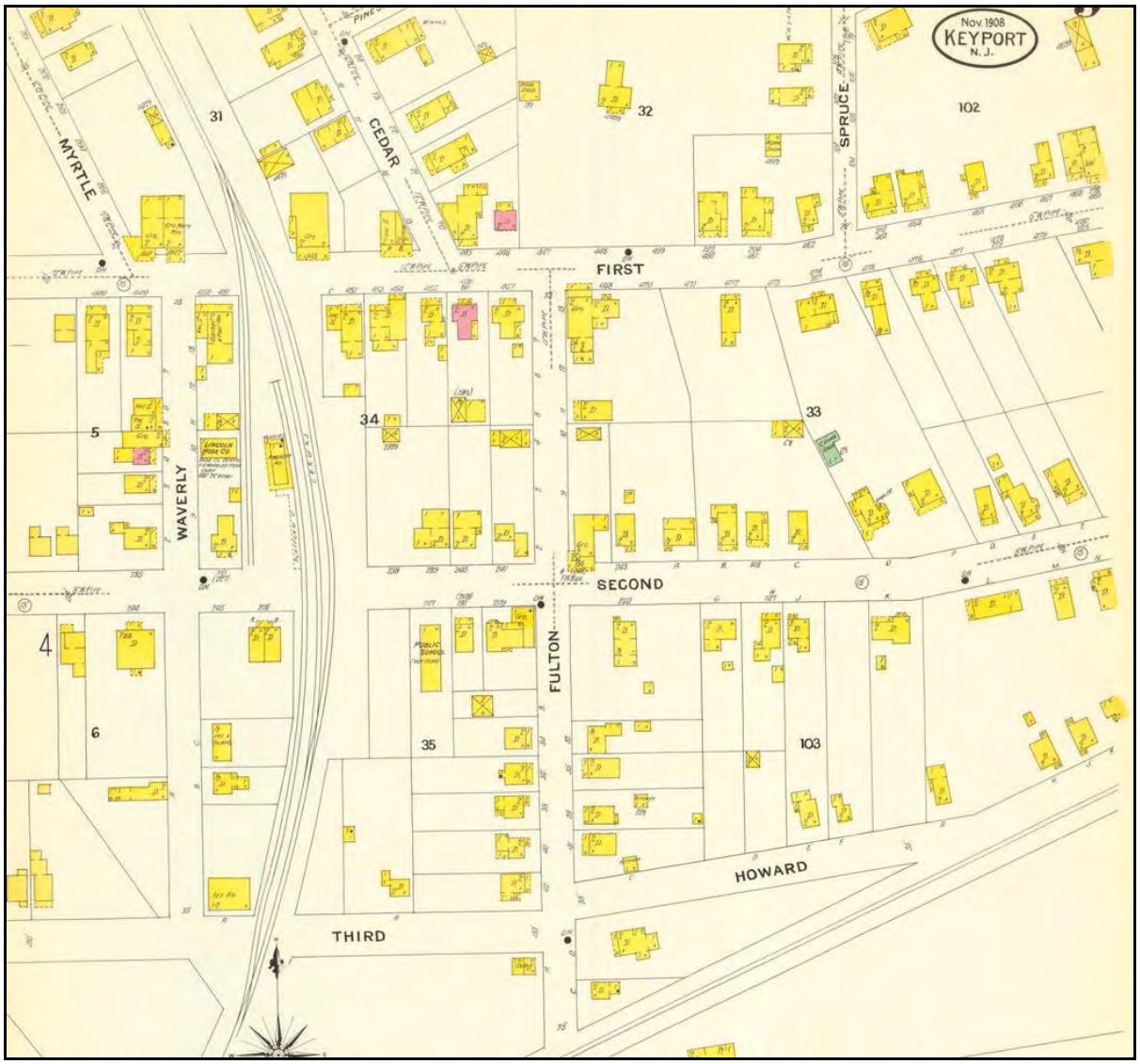
[8] Ibid.

Map 4: 1901 Sanborn Map of Keyport (Sheet 4 and Sheet 1 Subset)[9]



[9] Ibid.

Map 5: 1908 Sanborn Map of Keyport, subsection (Sheet 5)[10]



[10] Ibid.

AEROMARINE PLANE AND MOTOR COMPANY

The Aeromarine Plane and Motor Company had its beginnings dating to 1908, when Inglis M. Upperçu began financing a small firm's aeronautical experiments in Keyport, New Jersey.[11] Aeromarine itself was founded in 1914 and built primarily military seaplanes, flying boats, and engines, and after 1928, Klemm aircraft designs.

Figure 1: Aeromarine Plane and Motor Co. Entrance to factory, Keyport, N.J. (Keyport Historical Society)

The company was also known as the Aeromarin-Klemm Corporation between 1928 and 1930. The company had been fully operational until this time in a large industrial complex at the north end of the Walnut-Oak section of the Borough, known then as Lockport. The factory, shown in Figure 3, was built on the otherwise undeveloped peninsula between the Chingarora Creek and Raritan Bay (see area outlined in red on Map 6). The area on the peninsula to the north of the Aeromarine complex was mostly low-lying wetlands with two coastal ponds in the center, which were used by the company to test pontoon planes. The adjacent land was used as a runway for the planes.

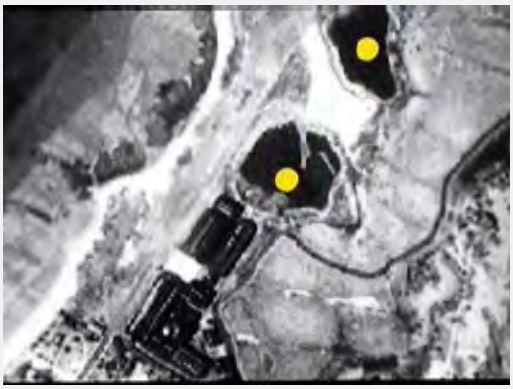


Figure 2: Ponds where pontoon planes were tested[12]

Figure 3: 1914 View of factory building from east side[13]

[11] Keyport Historical Society. "Aeromarine" Gallery. http://keyporthistoricalsociety.com/aeromarine1/

[12] History of Aeromarine-Klemm Aircraft in Keyport, NJ. Jersey Bayshore Country TV. https://www.youtube.com/watch?v=WfHA31DOHJs

[13] Ibid.

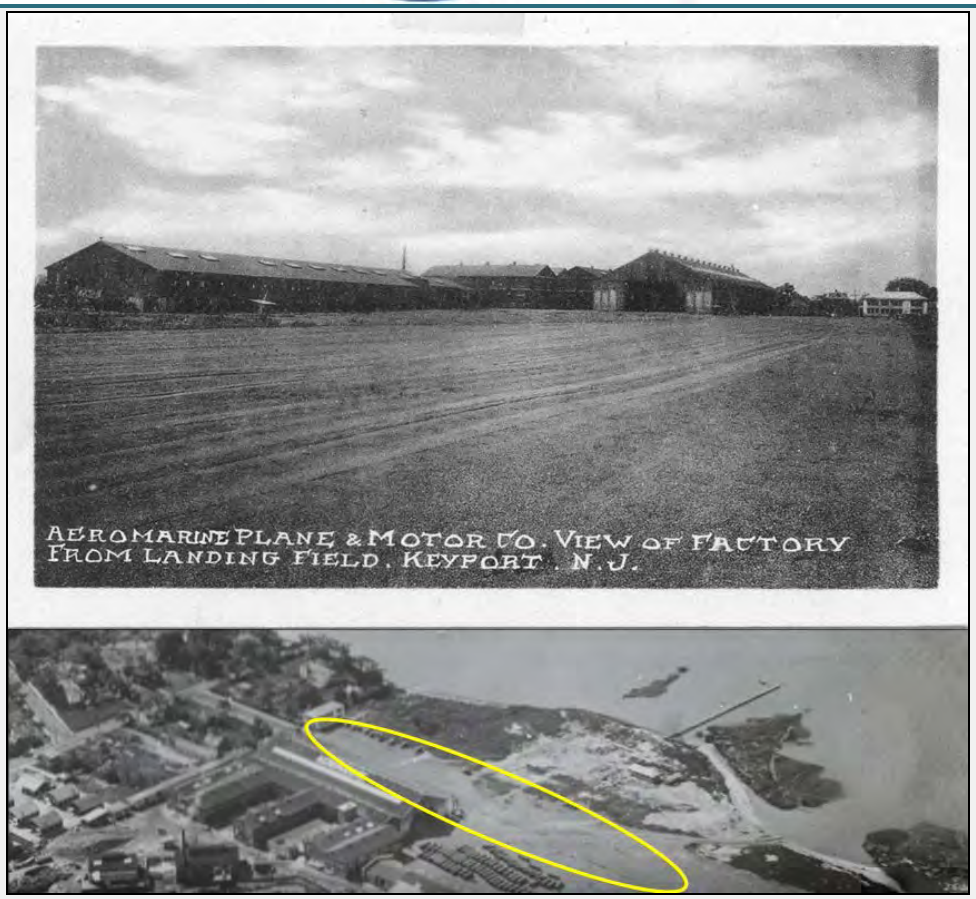


Figure 4: Aeromarine Plane & Motor Co. View of Factory from Landing Field. Keyport, N.J. (Keyport Historical Society) with aerial image of runway[14]

The company was also the first to successfully land an aircraft onto a military vessel and even started a commercial airline with its seaplanes to destinations such as Miami, Havana, and Bimini. Despite its achievements and success for a number of years, the company was forced to close in 1930 due to the impact of the Great Depression. The Uppercu-Burnelli Corporation took over the production of Aeromarine engines for a short time thenceforth. By at least 1947, a railroad entered the site along the western side of the industrial complex from the Central Railroad to the south until sometime between 1969 and 1972, although it is unclear how long the company may have operated there.

[14] Ibid.

Figure 5: Aeromarine Plane and Motor Co. Final Assembly. Keyport, N.J. (Keyport Historical Society)

Beginning in the 1960s, the northern end of the property operated as a landfill. The ponds were filled in with debris and the land was elevated with fill to be one of the highest points in the neighborhood. The landfill was closed in 1979 and largely forgotten in the eye of the public except for the large mound.

In later years, various small commercial and industrial enterprises have existed in the former industrial complex, while the landfill to the north was capped and overgrown.

The first legible aerial photography found to be available for Walnut-Oak is from 1930. By this time, the majority of the Borough, including the Walnut-Oak Neighborhood, was built approximately to its current extent. Despite the built-out nature of the neighborhood by 1930, there are several major differences between this time and present day. According to the First Street Historic District Survey Form description by the NJDEP Historic Preservation Office, "[t]he general appearance of the district has not changed substantially through time, though the clocks, railroads, and streetcars which were formerly a major part of this section of Keyport no longer exist." In addition to the changes to the streetscape, there have been natural and manmade alterations to the surrounding environment.

In 1930, the Chingarora Creek visibly wrapped around the peninsula through the wetlands and was adjacent to, if not connected to, the southern pond. Along much of the Raritan Bay coastline in the Neighborhood were sand beaches, as well as extensive wetlands and sandbars extending nearly 400 feet beyond the beach. To the southwest of the Neighborhood, just west beyond Cedar Street at Myrtle Avenue along the beachfront, there were two large piers jutting out into the Raritan Bay nearly 600 feet. The Central Railroad ran along the southwestern border of the neighborhood extending to the northern pier. The current park/open space on the south side of Cedar Street was at that time developed with the Keyport Water Works pumping station and coalhouse. The block on the north side of Cedar Street appears to have had the existing park and was less densely developed than it is today. Although difficult to decipher, it appears that by this time and given the age of the housing, Snyder Lane was built extending west from Spring Street into the center of the block.

1930 was also early in the period of the Great Depression, which had a long-lasting impact on nearly every community in the country. The Aeromarine Company, which was a major manufacturer, employer, and leisure travel service, went out of business this same year. New development in the area also seemed to have subsided during this period, as it transitioned from the Golden Age to World War II.

Map 6: 1930 Aerial Map of Walnut-Oak (maps.njpinebarrens.com)

By 1940, Aeromarine had gone out of business, but the manufacturing complex remained intact in the northern part of the Walnut-Oak Neighborhood. The inland ponds on the peninsula, once used for testing pontoon planes, appear to have been breached with water from the Chingarora Creek, connecting the bodies of water. Additionally, the wetlands along the Raritan Bay coastline receded, leaving the land behind them slightly more exposed. Some of this may have been caused by earlier hurricanes, such as the Hurricane of 1938, which brought extreme damage and many deaths throughout the Northeast from sustained tropical storm-source winds, high waves, and storm surge.[15]

[15] The Weather Doctor Almanac 2008. The Great Hurricane of 1938: The Long Island Express Part 2. Accessed August 12, 2016. http://www.islandnet.com/~see/weather/almanac/arc2008/alm08sep2.htm

Map 7: 1940 Aerial Map of Walnut-Oak (www.historicaerials.com)

In 1947, the two piers to the south of Cedar Street had been partially removed. Nearly 200 feet of what appear to be dilapidated piers remained extending from the coastline. The wetlands along the Walnut-Oak coastline have remained relatively intact since 1940. On the other hand, the Union Beach side of the Chingarora Creek along the Raritan Bay was losing mass as the mouth of the creek widened. The south inland pond lost most of its water, with only a small tributary and surrounding wetlands. A few new homes appeared on the block between Cedar Street and Walnut Street along the Bay.

Map 8: 1947 Aerial Map of Walnut-Oak (www.historicaerials.com)

The image below shows the mouth of the Chingarora Creek in 1947. Since 1930, and especially 1940, the north side of the mouth of the Creek can be seen becoming visibly wider as the Union Beach side continuously lost sand and the wetlands behind it.

Figure 6: Mouth of the Chingarora Creek with Keyport to the south – 1947 (www.historicaerials.com)

In 1951, more of the piers to the south of Cedar Street had been removed, as well as some of the onshore buildings adjacent to the pier. The railroad extension to the piers was likely no longer utilized, although the tracks are still visible.

A large bulkhead was put in at the end of Cedar Street prior to 1951, which still remains today. A road through the Aeromarine property appears much more defined, extending north through the peninsula. While the south pond looks to have filled in again and further opened up to the Chingarora Creek, there is clear disturbance in the area between the two ponds that looks to have been filled with dirt or sand. The mouth of the Chingarora Creek was also becoming visibly much wider as sand and bottom substrate on the Union Beach side were continuously washed out into the Bay and the wetlands retreated.

Map 9: 1951 Aerial Map of Walnut-Oak (Keyport Historical Society)

Although the 1953 aerial image seems to show sediment being deposited and rebuilding along the mouth of the Chingarora Creek again, later images more or less confirm that it was a release of sediment from the existing beach being redistributed and washed out into the Raritan Bay. In this image, large sand bars are visible extending across the mouth of the Creek from Union Beach into Keyport, nearly closing the mouth entirely. Slightly to the south along the Bay, the bulkhead at the end of Cedar Street appears to have been enlarged at some point between 1951 and 1953.

Between 1951 and 1953, the south pond on the peninsula north of Aeromarine seems to have been drained again, with only a small tributary connecting to the Chingarora Creek. The north pond still remained, but also with a narrow channel into the Creek.

Map 10: 1953 Aerial Map of Walnut-Oak (www.historicaerials.com)

By 1957, essentially all of the wetlands that had once existed along the Oak-Walnut area of Keyport Harbor/Raritan Bay in the past had disappeared, with the exception of a small area directly northwest of the Aeromarine factory building and at the mouth of the Chingarora Creek. There is more visible disturbance around the middle and northern parts of the peninsula near the ponds. The south pond, which was not truly a pond by this point, had slightly more water in it once again likely a result of tidal flooding. Most of the rest of the Neighborhood appeared to remain the same, although the Veterans Memorial Park off of Myrtle Street to the west became visible.

Map 11: 1957 Aerial Map of Walnut-Oak
(www.historicaerials.com)

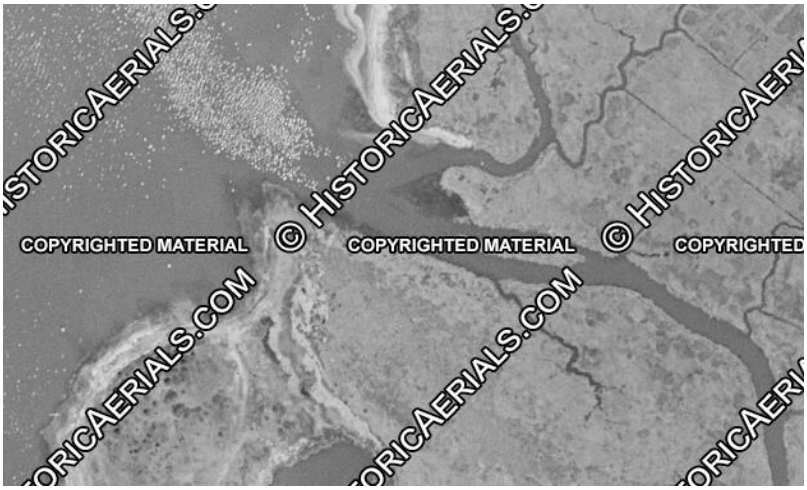


Figure 7: Mouth of the Chingarora Creek with
Keyport to the south – 1957
(www.historicaerials.com)

In the aerial images from 1963, sand can be seen having filled in the area that was formerly wetlands on the north side of the Chingarora Creek along Raritan Bay in Union Beach. Additionally, the beachfront area along Keyport Harbor in the Walnut-Oak Neighborhood appeared to have regained some sand, particularly at the end of Walnut Street, although this is difficult to confirm. Cedar Street Park was cleared of most of its trees between 1957 and 1963.

At the corner of Walnut Street and First Street (Block 138, Lot 11), construction was beginning on the one-story apartment buildings that currently sit empty since Hurricane Sandy. This area was previously undeveloped and has continuously proven to be difficult to manage with drainage and flooding.

Map 12: 1963 Aerial Map of Walnut-Oak (www.historicaerials.com)

Figure 8: Mouth of the Chingarora Creek with Keyport to the south – 1963 (www.historicaerials.com)

By 1969, the two ponds on the northern peninsula had been entirely filled in. Even prior to being filled with sediment, the ponds and surrounding area were being used as a dumping ground. The northern part of the peninsula was officially used as a municipal dump beginning in the 1960s.

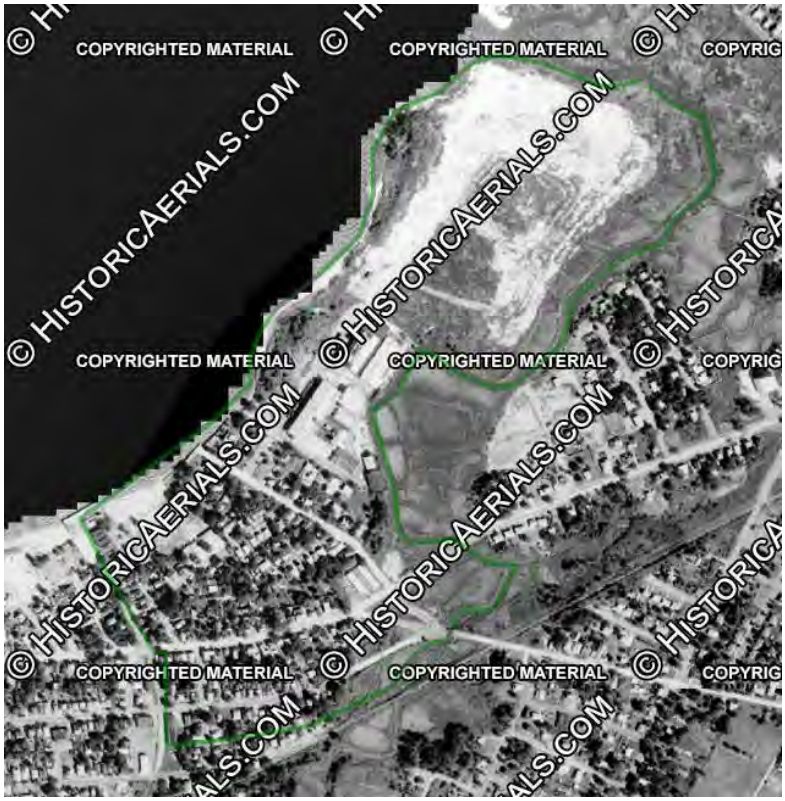
The apartment complex at the corner of First Street and Walnut Street was finished by this time. Cedar Street Park was still mostly cleared of trees and with an enlarged beach. Although some wetlands began to be reclaimed at the north side of the mouth of the Chingarora Creek in Union Beach, the sand from the beach was being redistributed downshore, filling in the mouth of the creek on the Keyport side.

Map 13: 1969 Aerial Map of Walnut-Oak (www.historicaerials.com)

Figure 9: Mouth of the Chingarora Creek with Keyport landfill to the south – 1969 (www.historicaerials.com)

By 1972, the railroad tracks going to both the Aeromarine site and to the former piers appear to have begun to be removed. The peninsula also continued to be filled with waste, although initially only along the north side. The area where the south pond had been was filled with sediment and overgrown with plants.

Map 14: 1972 Aerial Map of Walnut-Oak (www.historicaerials.com)



In 1979, the entire interior of the Aeromarine peninsula (northeast of the industrial buildings) had been cleared and filled with municipal waste. It was also in 1979 that the landfill was officially closed. Out of 62 acres, it is estimated that garbage is buried across 51 acres. Additionally, the rest of the railroad extensions into the Aeromarine site and the piers had been removed. Much of the land and wetlands area around the rail line between Second Street and north of Walnut Street/First Street had been cleared. The Central Railroad of New Jersey rail still ran across the southern boundary of the Walnut-Oak Neighborhood, but was no longer in use.

Cedar Street Park was created with its present-day amenities between 1972 and 1979. A new ballfield, playground, basketball court, and tennis courts are visible in the 1979 aerial image, as well as a dirt parking lot serving the park on Pine Street.

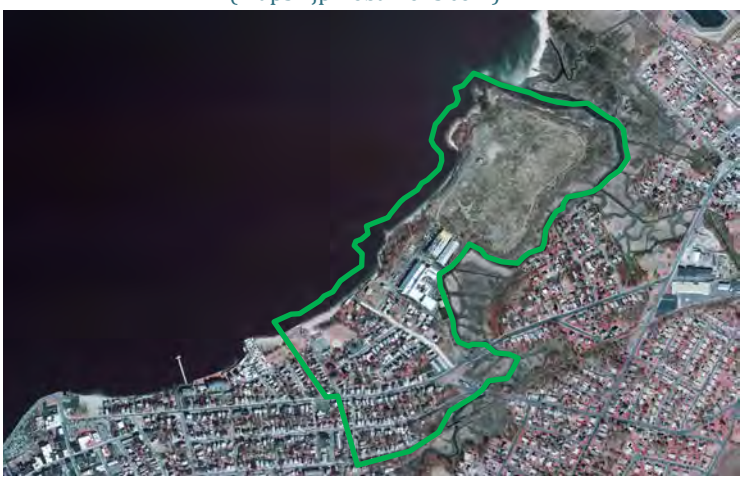
Map 15: 1979 Aerial Map of Walnut-Oak (www.historicaerials.com)

Figure 10: Mouth of the Chingarora Creek with Keyport to the south – 1979 (www.historicaerials.com)

By 1995, the rail line to the west had finally been removed and several new residential properties were built in its place. By contrast, the water works pump house building on the lot on the south side of the end of Cedar Street were removed and replaced with the existing open space/park. The former Aeromarine/Landfill site was eventually capped and revegetated, with one cleared space to the far north and dirt trails throughout.

Map 16: 1995 Aerial Map of Walnut-Oak (maps.njpinebarrens.com)

Map 17: 2002 Aerial Map of Walnut-Oak (maps.njpinebarrens.com)



Between 2002 and 2007, one large single-family residential house was built on an irregularly long lot parallel to and between Cedar Street and Myrtle Street on the former railroad line. To the south of the Neighborhood, the Bayshore Extension of the Henry Hudson Trail opened in 1999, replacing the former railroad tracks with a paved surface for walking and bicycling.

The landfill continued to regrow with vegetation around the entire site, reverting to a more natural site with patches of new-growth forest. However, it is unclear to what degree the landfill was leaching into the Chingarora Creek or Keyport Harbor, which surrounded the elevated site.

Map 18: 2007 Aerial Map of Walnut-Oak (maps.njpinebarrens.com)

The 2007 aerial also clearly shows sand being dispersed from the Chingarora Creek and the Union Beach side beach into Raritan Bay and forming numerous large sandbars across the coastline of Walnut-Oak to the west of the Aeromarine-Landfill site. A spit of land temporarily formed at the north tip of the peninsula out into the Bay, while the Union Beach side continued to lose massive amounts of wetlands and former streams that ran into the Chingarora Creek began to meet Raritan Bay instead. The sandbars did not remain for long and the shoreline has continued to erode.

Between 2007 and 2012, and even throughout the previous decade, very little had changed in the Walnut-Oak Neighborhood. However, the landfill peninsula continued to naturalize, becoming denser with new-growth forest. Today, several small businesses occupy some of the former Aeromarine complex at the north end of the neighborhood, south of the landfill. The entrance gate is still a reminder of what the industrial park once was, and which had once created an economic boon for the Borough of Keyport.

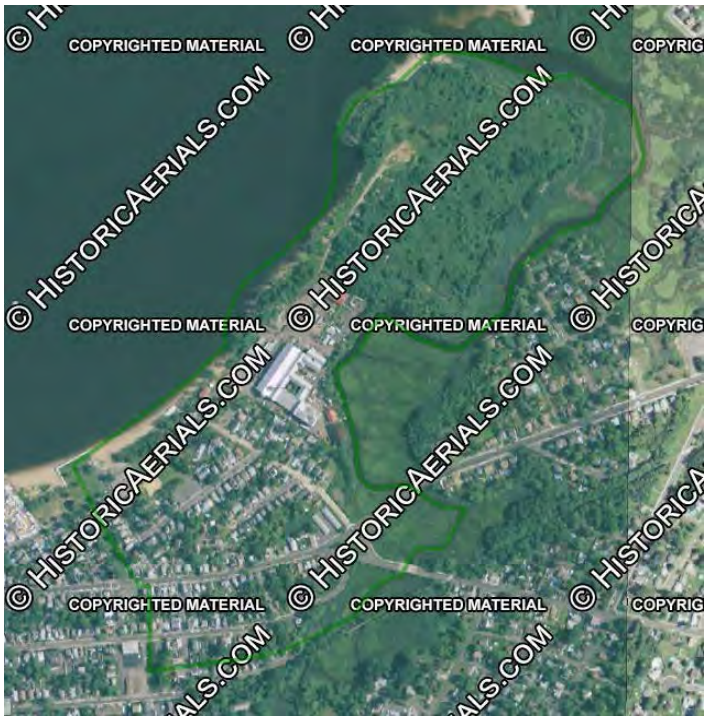
Figure 11: Mouth of the Chingarora Creek with Keyport to the south – 2007 (maps.njpinebarrens.com)

Figure 12: Mouth of the Chingarora Creek with Keyport to the south – 2012 (maps.njpinebarrens.com)

On October 29, 2012, Hurricane Sandy made landfall, mixing high winds with a super high tide and storm surge. The storm caused some of the worst damage ever recorded across the region and cast as the second-costliest in U.S. history. The Walnut-Oak Neighborhood was particularly affected by the storm surge, which crept up the Chingarora Creek, inundating many of the streets and homes inland from the Harbor. Many structures throughout the Neighborhood and Borough had to be knocked down, rebuilt, retrofitted, or have sat deteriorating since the storm. The landfill site was largely unaffected by the surge due to its elevation, but was cut off from the rest of the Borough. Although the aerial images do not show the severe extent of the damage, the structure and course of the Neighborhood has been altered for many years to come.

Map 19: 2012 Aerial Map of Walnut-Oak (maps.njpinebarrens.com)

Map 20: 2013 Aerial Map of Walnut-Oak (www.historicaerials.com)



HISTORIC PROPERTIES

The Borough of Keyport has a great depth and variety of historic properties and districts, some of which are also seen in the Walnut-Oak (formerly known as "Lockport") section of the Borough. Many buildings have a historic character relative to the particular era in which they were built; however, not all of them are officially recognized as an historic property. A comprehensive list of designated properties in the Borough is listed in Appendix II of this document, with properties in the Walnut-Oak Neighborhood highlighted.

There are no federally recognized historic properties within the Walnut-Oak Neighborhood, but there are several that are designated through the New Jersey Department of Environmental Protection Historic Preservation Office (NJHPO) and also recognized in the 1983 Monmouth County Historic Sites Inventory. There are currently five properties and one historic district included in this designation, which are as follows:

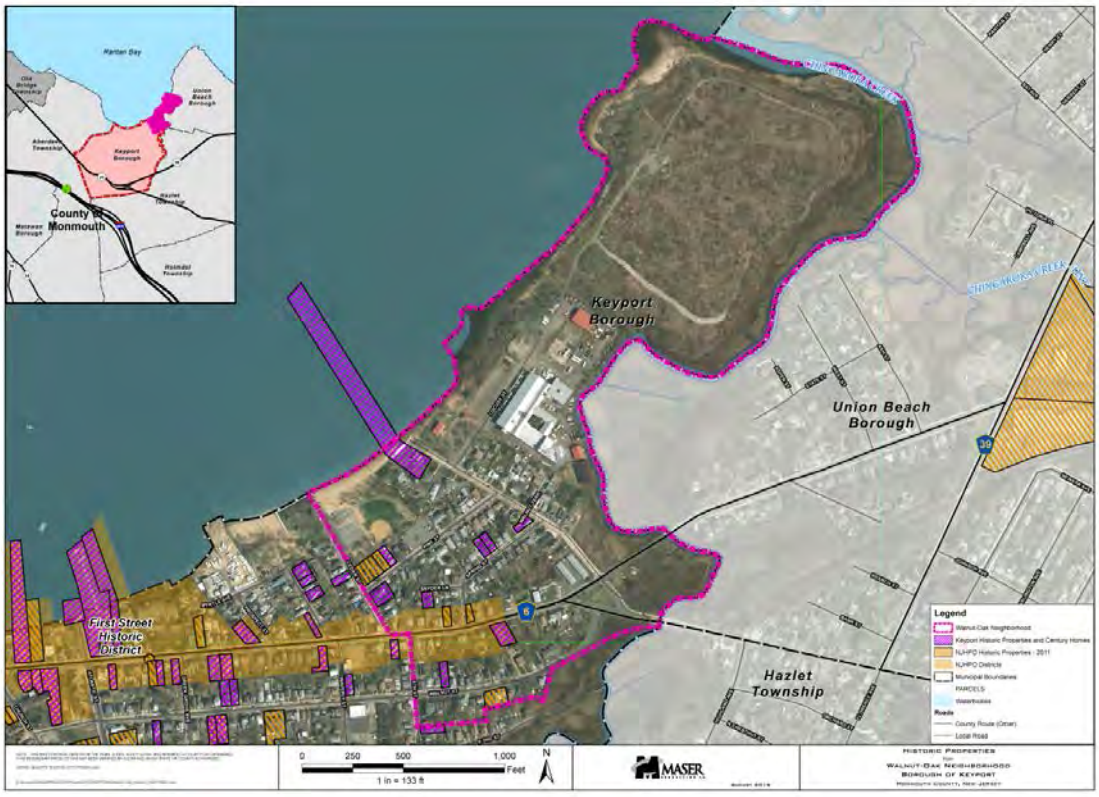
Address	Block	Lot	Circa
42 Cedar Street	137	1	1871
277 First Street	136	33	1889
289 First Street	138	1	1873-1889
12 Pine Street	137	2	1909
210 Second Street	134	12	1909
First Street Historic District (both sides from #51 through #309)			

The local historic society, Keyport Historical Society, also has its own recognition of historic properties, known as "Century Homes". The criteria to be honored as a Century Home and receive a plaque are that a structure must be one hundred years old or older and the original house deed must be presented. In this category, there eleven properties, which are as follows:

Address	Block	Lot	Circa
28 Cedar Street	127	7	1845
41 Cedar Street	136	1	1866
302 First Street	135	9	1845
35 Fulton Street	134	3	1855
38 Oak Street	136	23	1858
40 Oak Street	136	22	1856
14 Pine Street	137	2	1878
185 Second Street	135	31	1849/1888
2 Snyder Lane	136	28	1715/1925
20 Walnut Street	136	18.01	1854
60 Walnut Street	137	14	1850

According to the data provided, the oldest property that is designated within the Walnut-Oak Neighborhood and the entirety of the Borough of Keyport was built in 1715 and is located at what is now 2 Snyder Lane (Block 136, Lot 28).

Map 21: Historic homes and districts in and around Walnut-Oak



IMPACT OF SUPERSTORM SANDY

PREFACE

The premise of this study is to understand the impact of Hurricane Sandy on the Walnut-Oak Neighborhood, to allow for an effective recovery strategy from the impact of Hurricane Sandy, and to prepare the Neighborhood for future storms through resiliency efforts. It is because of the devastation wreaked on the region by the Hurricane and related events, both physically and economically, that funding has been made available to the Borough of Keyport to reinforce the community against damage of similar or greater proportions. Simultaneously, this allows the Borough to address regular flooding events and stormwater issues, as well as enhancements to the community character.

Many sources predict that sea level will continue to rise and storms may become increasingly stronger,[16] making flooding more of a regular event where it was not previously and undermining short-term recovery strategies. Therefore, long-term planning is necessary, recognizing the potential impacts of climate change and storms on coastal communities.

FORMATION

In the final weeks of October 2012, Hurricane Sandy made its way through the Caribbean Sea towards the southeastern United States. The storm had, at various times, strengthened to hurricane category and weakened again to a tropical storm, but, nonetheless, caused great damage and loss of life throughout the Caribbean. Despite its changing intensity, the storm continued to grow in size, with only one recorded tropical storm with a larger area of tropical storm-force winds (Olga, 2001) in the Atlantic Ocean basin in history.[17]

According to Dr. Jeff Masters, "Sandy's area of ocean with twelve-foot seas peaked at 1.4 million square miles--nearly one-half the area of the contiguous United States, or 1% of Earth's total ocean area. Most incredibly, ten hours before landfall (9:30 am EDT October 30), the total energy of Sandy's winds of tropical storm-force and higher peaked at 329 terajoules--the highest value for any Atlantic hurricane since at least 1969. This is 2.7 times higher than Katrina's peak energy, and is equivalent to five Hiroshima-sized atomic bombs. At landfall, Sandy's tropical storm-force winds spanned 943 miles of the the U.S. coast. No hurricane on record has been wider; the previous record holder was Hurricane Igor of 2010, which was 863 miles in diameter."[18] Hurricane Sandy, as shown in the figures below, was several times larger than Category 5 Hurricane Katrina in 2005, which was another storm of major proportions and devastation.

Other weather systems to the east in the Atlantic Ocean, north of the Bahamas, and to the southwest, in the southeastern United States, not only prevented the storm from going out to sea, but to take an unusual trajectory northwest into the mainland of the Mid-Atlantic of the United States – most notably affecting the states of New Jersey and New York.

[16] Emanuel, Kerry. (2005). Increasing destructiveness of tropical cyclones over the past 30 years. Nature, 436(7051), 686-688. http://www.schafferer.de/chameleon/outbox/public/4/NATURE03906.pdf

[17] Masters, Jeff. "Hurricane Sandy's huge size: freak of nature or climate change?" WunderBlog®. Weather Underground. November 13, 2012. https://www.wunderground.com/blog/JeffMasters/hurricane-sandys-huge-size-freak-of-nature-or-climate-change

[18] Ibid.

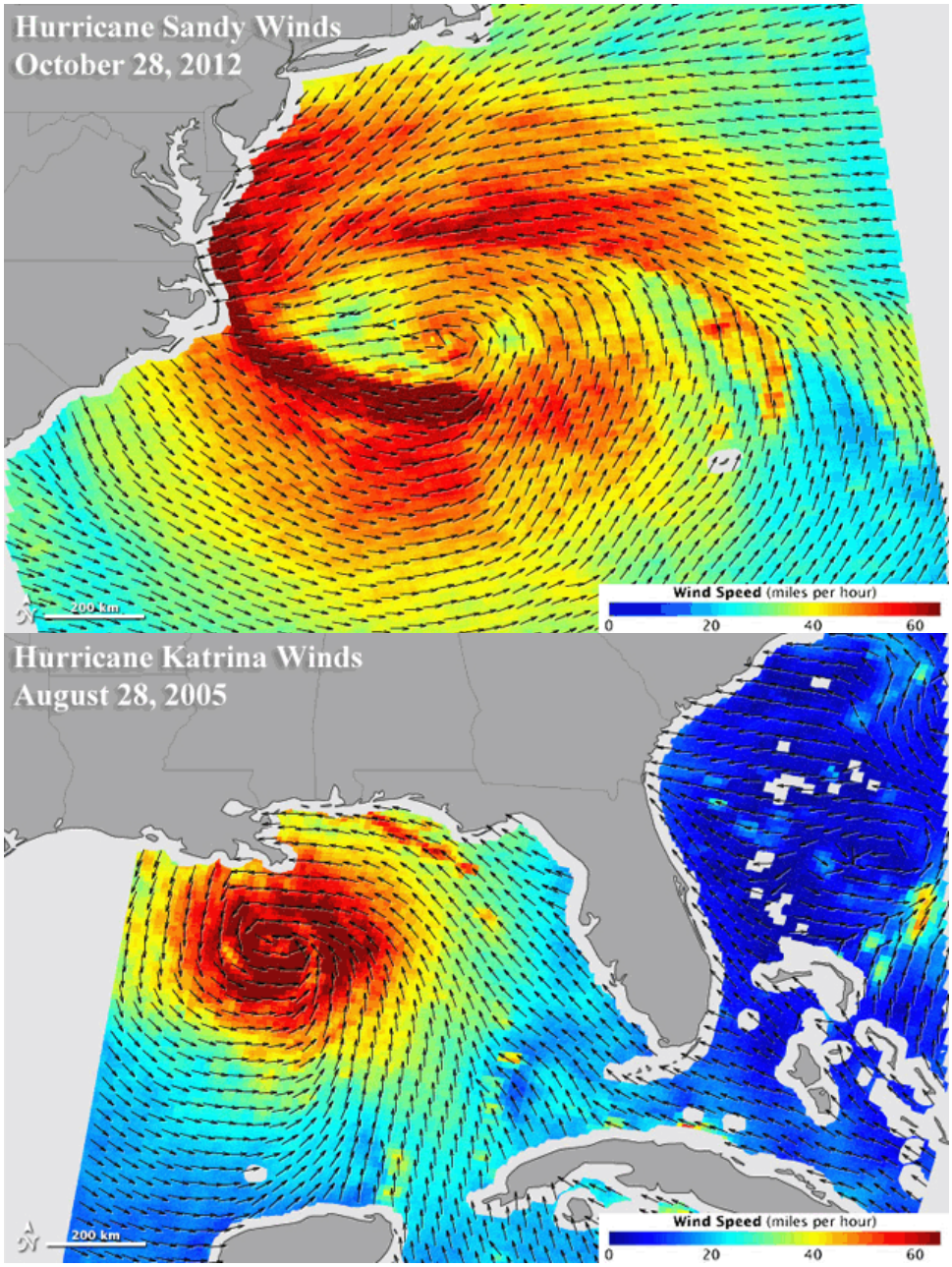
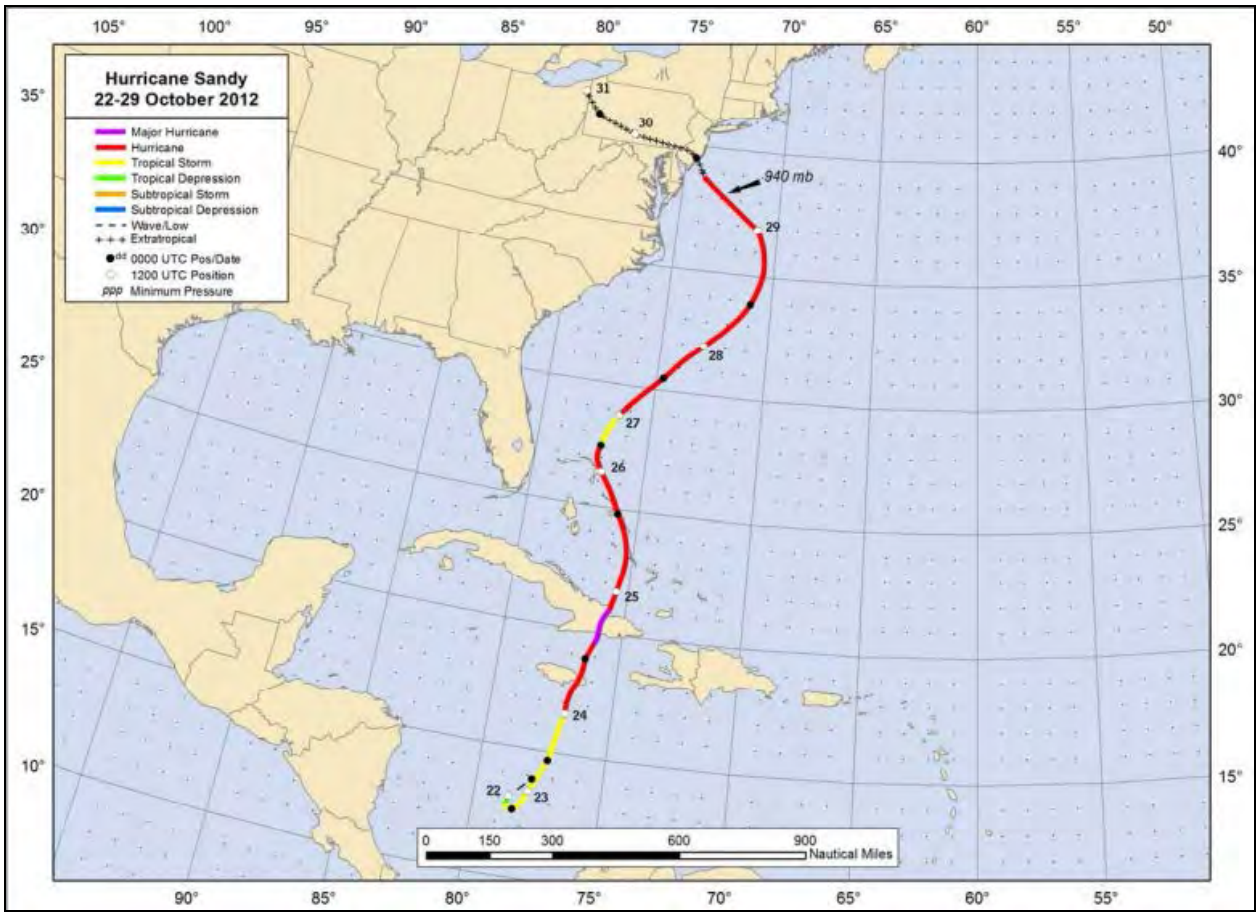


Figure 13: Hurricane Sandy's winds (top), on October 28, 2012, as a Category 1 hurricane with top winds of 75 mph. Hurricane Katrina's winds (bottom) on August 28, 2005, as a Category 5 hurricane with top winds of 175 mph. Wind speeds above 65 kilometers (40 miles) per hour are yellow; above 80 kph (50 mph) are orange; and above 95 kph (60 mph) are dark red. For Katrina, winds over 65 kilometers per hour stretched about 500 kilometers (300 miles) from edge to edge. Image credit: NASA.[19]

[19] Ibid.

Map 22: Path of Hurricane Sandy[20]



IMPACT

On October 29, 2012, Hurricane Sandy, also known as "Post-tropical Cyclone Sandy", made landfall with the State of New Jersey at Brigantine, northeast of Atlantic City, at approximately 2330 UTC with an estimated intensity of 70kt and a minimum pressure of 945mb.[21] Although the storm was only a post-tropical cyclone at that point, it was known colloquially as Superstorm Sandy due its enormous size and its extensive field of destruction. The storm had hurricane-force winds combined with a lunar high tide and relentless storm surge, which lingered for several days over parts of the Northeast due to the size of the storm. The effects of the wind and surge from Sandy were felt as far away as northern New England and Canada, even prior to landfall in New Jersey. Hurricane Sandy caused severe damage along the coastline from the effects of wind, flooding, and wave action.

[20] Eric S. Blake, Todd B. Kimberlain, Robert J. Berg, John P. Cangialosi and John L. Beven II. National Hurricane Center. "Tropical Cyclone Report Hurricane Sandy (AL182012) 22 – 29 October 2012." 12 February 2013. Page 4. http://www.nhc.noaa.gov/data/tcr/AL182012_Sandy.pdfIbid.

[21] Ibid. Page 127.

Figure 14: View of Veterans Park Beach and Keyport Harbor during Hurricane Sandy (Dougan, Axel)[22]
Figure 15: View of Terry Park and Keyport Harbor during Hurricane Sandy (Dougan, Axel)

In addition, a total of 147 deaths were recorded across the Atlantic basin directly related to Hurricane Sandy, 72 of which were in the Mid-Atlantic and Northeast of the United States.[23] "Direct" deaths occur as a direct result of cyclone forces, including drowning in storm surge, rough seas, rip currents, and freshwater floods; casualties from lightning and wind-related events. "Indirect" deaths, although not included, would be any fatality related to health or accidents that occur during the course of the storm that may or may not have been preventable otherwise. In the Borough of Keyport, New Jersey, no direct fatalities were reported, although there may have been some indirect fatalities.

Figure 16: View of Olsen's Boatyard and Keyport Harbor from Terry Park during Hurricane Sandy (Dougan, Axel)

Primarily, there was major infrastructural damage and a heavy economic burden for residents. The most damage occurred from storm surge, which came in from the Atlantic Ocean and bottlenecked in the Raritan Bay, overflowing the surrounding rivers and streams, including the Chingarora Creek, Luppatatong Creek, and

[22] Dougan, Axel. "Hurricane Sandy Keyport NJ." Nov. 2, 2012. https://www.youtube.com/watch?v=CL6bdv_Kxuw

[23] Eric S. Blake, Todd B. Kimberlain, Robert J. Berg, John P. Cangialosi and John L. Beven II. National Hurricane Center. "Tropical Cyclone Report Hurricane Sandy (AL182012) 22 – 29 October 2012." 12 February 2013. Page 1. http://www.nhc.noaa.gov/data/tcr/AL182012_Sandy.pdf

Matawan Creek. Although there was some rainfall, it was not a major factor of flooding and damage in the Mid-Atlantic region. Wave action was certainly a factor along the Keyport Harbor/Raritan Bay coastline, especially toward downtown Keyport, but the significant flooding from the rear along the creeks was mostly unanticipated and unprecedented.

The damage occurred primarily at the points of lowest elevation where the storm surge inundated the land and caused severe coastal and riverine flooding. Many of the inner neighborhoods are also at a very low elevation, due to development near and around creek beds that extend to the coast. In fact, most of the Walnut-Oak Neighborhood in Keyport has an elevation at or below ten (10') feet, with the exception of the western portion of the Neighborhood and the center of the former landfill, which are at higher elevations, upwards of twenty (20') feet.

Inundations of four (4') to nine (9') feet, expressed above ground level, were prevalent along the coastlines of Monmouth and Middlesex Counties in New Jersey.[24] According to the National Hurricane Center (NHC) of the National Oceanic and Atmospheric Administration (NOAA), "[t]he deepest water occurred in areas that border Lower New York Bay, Raritan Bay, and the Raritan River. The highest high-water mark measured by the USGS was 8.9 ft above ground level at the U.S. Coast Guard Station on Sandy Hook. This high-water mark agrees well with data from the nearby NOS tide gauge, which reported 8.01 ft above MHHW before it failed. Elsewhere, a high-water mark of 7.9 ft above ground level was measured in Keyport on the southern side of Raritan Bay and a mark of 7.7 ft was measured in Sayreville near the Raritan River."

Figure 17: Terry Park after Hurricane Sandy (Dougan, Axel)[25]

[24] Eric S. Blake, Todd B. Kimberlain, Robert J. Berg, John P. Cangialosi and John L. Beven II. National Hurricane Center. "Tropical Cyclone Report Hurricane Sandy (AL182012) 22 – 29 October 2012." 12 February 2013. Page 10. http://www.nhc.noaa.gov/data/tcr/AL182012_Sandy.pdf

[25] Dougan, Axel. "After Hurricane Sandy Keyport NJ." Nov. 2, 2012. https://www.youtube.com/watch?v=XJ-JV4HbjIQ

Further exacerbating the problem, only one week after Hurricane Sandy, a winter storm warning was issued by the National Weather Service, due to cold air, steady snowfall, and high winds.[26] [27] [28] A Nor'easter struck the tristate area on November 7th through the 8th, setting back recovery operations for cleanup of the Hurricane Sandy damage after dumping large quantities of snow, knocking down trees and powerlines, causing additional power outages, and coastal flooding. The Nor'easter was also an example of a common weather event that can cause flood damage itself.

Figure 18: Veterans Park Beach after Hurricane Sandy (Dougan, Axel)

Figure 19: End of Cedar Street at Keyport Harbor after Hurricane Sandy (Dougan, Axel)

DAMAGED PROPERTIES

Out of sixty-one (61) residential properties in the Borough of Keyport that were damaged by Hurricane Sandy, there were twenty-nine (29) within the Walnut-Oak Neighborhood or forty-eight percent (48%). Although there were additional commercial properties also affected, none of them were located in the Neighborhood in question. Most, but not all, were impacted by water intrusion. Many of the reports indicated water of from 4 to 6 feet in depth.

Nearly the entire length of Walnut Street was submerged by the storm surge from Hurricane Sandy in 2012. However, the properties at the southern end of Walnut Street, where it meets First Street by the Chingarora Creek, were the most affected, as they are at the lowest elevation near the wetlands. Six properties on Walnut Street were considered damaged by the storm; four of which are on Block 138 at Walnut and First Street. The properties directly along Keyport Harbor/Raritan Bay also experienced some storm surge, despite being generally setback from the water over the ten-foot (10') elevation. Two properties at the end of Walnut Street near the Harbor were damaged, including one that is uphill from the Harbor, across from Locust Street.

Block 138, on the south side of Oak Street, was heavily impacted by the Hurricane Sandy storm surge, especially towards the Chingarora Creek on the east side. There were eight damaged homes along the south side of Oak Street and only one along the north side. Most of the properties north of Oak Street are elevated at

[26] National Weather Service. Area Forecast Discussion. NWS Mt. Holly, NJ. Nov. 7, 2012. http://www.webcitation.org/6C0oZEfT4

[27] ClimateCentral.org. "Rare November Snowstorm Strikes in Wake of Sandy." November 8, 2012. http://www.climatecentral.org/news/snowstorm-strikes-northeast-just-one-week-after-hurricane-sandy-15217

[28] National Weather Service. National Oceanic and Atmospheric Administration. "Winter Storm Summary for November 07, 2012 to November 8, 2012 Event." Mount Holly, NJ. http://www.weather.gov/phi/11072012wss

least a couple of feet above street level, and some with a short bulkhead, generally sparing them flood damage. Eight properties out of ten on Block 138 along First Street, closest to the Chingarora Creek, were damaged.

In total, eighteen of twenty-three properties on Block 138, between Walnut Street, Oak Street, First Street, and Spring Street, had some sort of damage. This block, nearly in its entirety, experienced flooding from the overflowing of the Chingarora Creek to the east. With the exception of property directly abutting Spring Street and some of those along the southwestern portion abutting First Street, Block 138 has an elevation less than ten (10) feet. The central and southeast portion of the Block, particularly Lot 11, is below four (4) feet of elevation.

Other than Block 138, two properties on Block 137, two properties on Block 136, four properties on Block 135, and three properties on Block 134 were also considered damaged. Block 141 where the Aeromarine Industrial Complex is located was also heavily inundated with water, although the industrial building was not reported as damaged. The landfill was largely spared due to its elevation, but was cut off from the rest of the Neighborhood as the rest of the Block was underwater. It is believed that, had it not been for the elevated landfill, the interior neighborhoods along the Chingarora Creek would have been completely inundated by the storm surge.

These reports of damage were filed by insurance claims and recorded by the Borough of Keyport. Impacted properties in Walnut-Oak are shown in the table and map below. A full list of damaged properties in the Borough, which was generated for the Borough's Strategic Recovery Planning Report in March 2014, prepared by Maser Consulting, P.A. with a grant from the New Jersey Department of Community Affairs (NJDCA) Post Sandy Recovery Planning Assistance Program, can be found in Appendix III of this report.

The comparison images below are taken from the National Oceanic and Atmospheric Administration (NOAA) Hurricane Sandy Imagery, showing aerial photos of the Walnut-Oak Neighborhood in October 2012 and November 1, 2012.[29] Although the visible damage was not nearly as bad in Walnut-Oak as in other communities nearby, the post-Sandy imagery still shows boats thrown across yards, vehicles moved or missing, streets covered in sand, trees torn down, docks ripped out and moved, and significant erosion along the coastline and creek bed.

Figure 20: Cedar Street street-end at Keyport Harbor before (top) and post-Sandy (bottom)

[29] National Oceanic and Atmospheric Administration. Hurricane Sandy Imagery. 2012. http://storms.ngs.noaa.gov/storms/sandy/

Figure 21: Walnut Street, Pine Street to First Street before (top) and post-Sandy (bottom)

Figure 22: Aeromarine site before (top) and post-Sandy (bottom)

Figure 23: Chingarora Creek between Aeromarine/ landfill (left) and Union Beach (right) before (top) and post-Sandy (bottom)

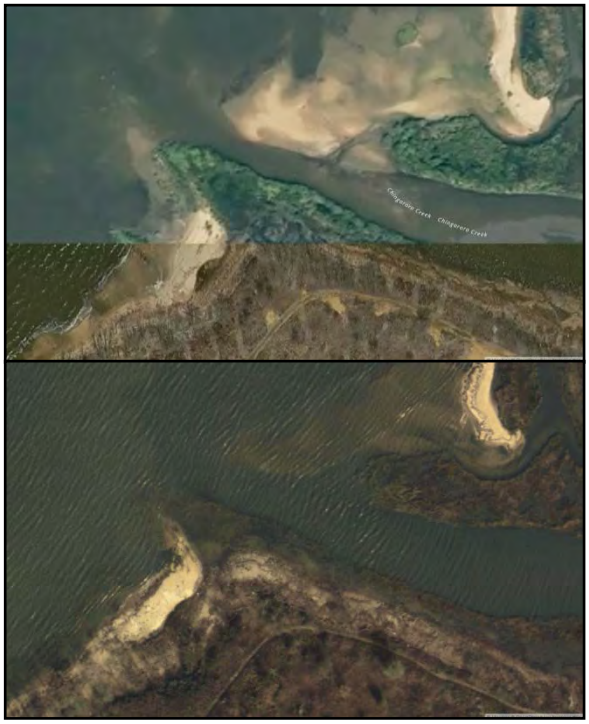
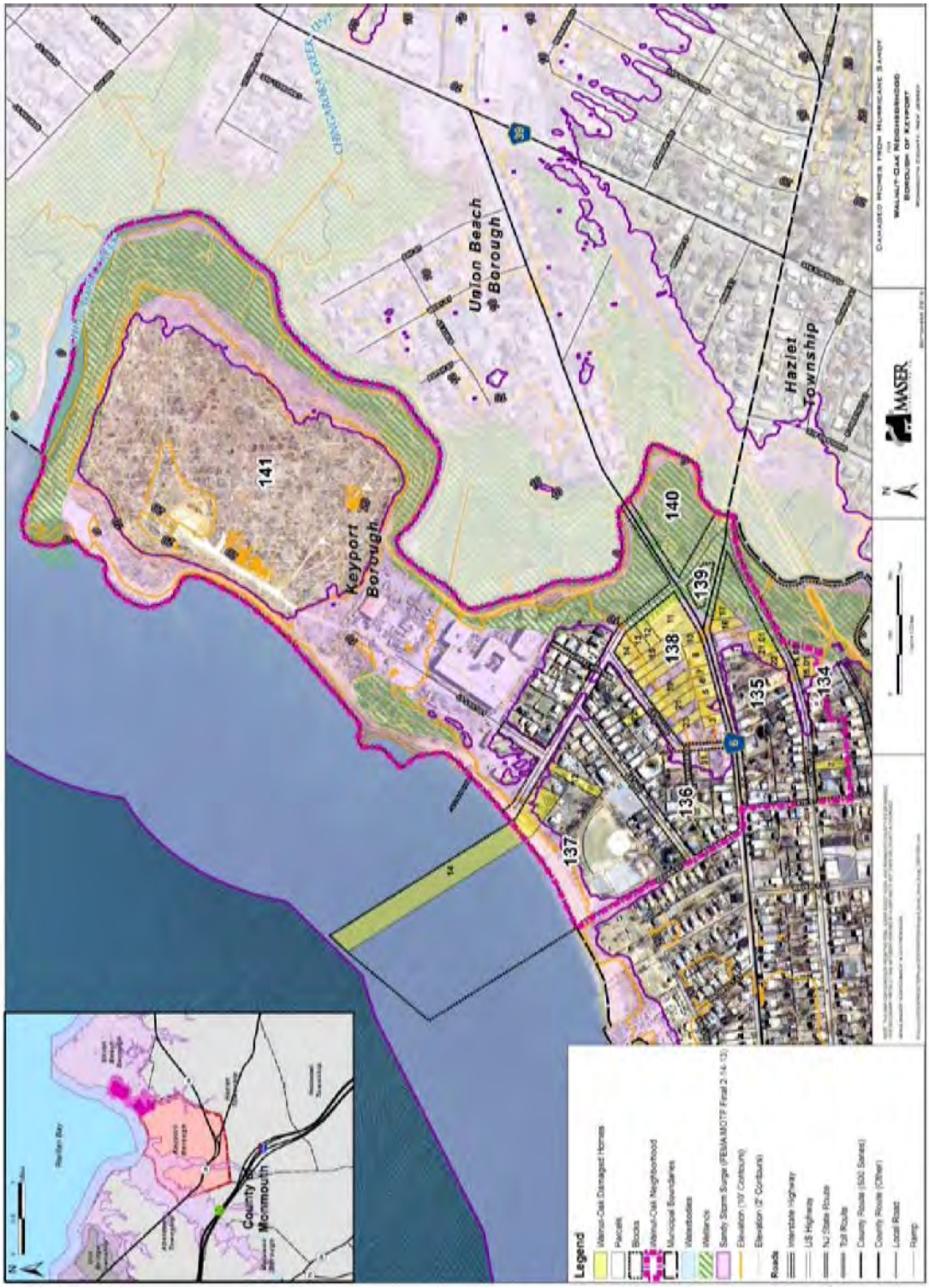


Figure 24: Mouth of Chingarora Creek before (top) and post-Sandy (bottom)

Map 23: Damaged Homes from Hurricane Sandy with Storm Surge in Walnut-Oak Neighborhood[30]



[30] Reported flood insurance claims through the Borough of Keyport. Strategic Recovery Planning Report. Borough of Keyport. Table 1. 2014. (Appendix III)

Table 1: Residential properties in Walnut-Oak Neighborhood damaged by Hurricane Sandy

Block	Lot	Shape Area	Property Class	Property Location	Land Value	Improvement Value	Net Value	Building Description	Land Description	Damage Assessment
134	7	5680.007555	2	186 SECOND	98000	169600	267600	2SF2G10B-2U	40X142	Porch supports
134	15.01	7212.05957	2	224 SECOND	98500	45000	143500	2SF-1U	93 AVG X 85 AVG	water
134	15.02	1217.63169	2	236 SECOND	85100	124200	209300	1SF-1U	63X106 IRR	water
135	16	6609.941959	2	334 FIRST	102000	104600	206600	2SF-2U	55X129 AVG	East side foundation wall
135	17	5214.523423	2	336 FIRST	95600	88600	184200	1SF-1U	102X109 TRI	Structural damage- rear wall
135	21.01	10316.55418	2	233 SECOND STREET	280300	342000	622300	3 UNITS	110X90	water
135	22	5167.980654	2	227 SECOND STREET	109400	157300	266700	2SF4G10B-1U	80X70 AVG	water
136	22	4047.632942	2	40 OAK	95000	86800	181800	2SF2G-1U	40X100	water
136	31	3599.942514	2	2 SPRING ST	94200	121500	215700	2SF-1U	40X90	5' water, boiler, hwh, wiring
137	12	9615.260243	2	46 WALNUT	154100	79900	234000	1SF-1U	37X213 IRR	bulkhead damage, erosion
137	14	110503.916	2	60 WALNUT	537300	134300	671600	2SF2G-1U	170 AVG X 110 AVG	bulkhead damage
138	3	3980.608522	2	299 FIRST	96600	69100	165700	2SF1G-1U	45X91	water, foundation damage, boiler
138	4	6157.155699	2	305 FIRST	108600	129200	237800	2SF1G-1U	70X91	basement flooded hwh, furnace
138	5	5374.592573	2	309 FIRST	103700	244500	348200	2SF1G-2U	61X89	water, boilers, hwh, siding
138	6	3478.113864	2	313 FIRST	93800	83400	177200	2SF2G-1U	40X88	water
138	7	3464.236159	2	319 FIRST	93800	93500	187300	2SF-1U	40X87	5' water, boiler, hwh, wiring
138	8	8608.26858	2	325 FIRST	122000	196600	318600	2SF-2U	100X86	water
138	10	3862.407012	2	329 FIRST ST	96600	169500	266100	1 UNIT	45X92 AVG	water
138	11	24563.37793	4C	333 FIRST & WALNUT	330000	382400	712400	1SB&1SB-10U	194X169 IRR	4' water (10 units)
138	12	6060.962547	2	10 WALNUT	102000	90600	192600	1 UNIT	50X121	5' water- foundation
138	13	5878.049474	2	12 WALNUT	101500	94900	196400	2SF-1U	50X119 AVG	4' water- basement, 1st fl
138	14	8373.340369	4C	14-16 WALNUT ST	115700	366400	482100	2SF1SF-6U	83 AVG X 99 AVG	water
138	15	10162.2057	2	47 OAK	100400	84800	185200	1SF-1U	40X242 AVG	water
138	16	9974.104652	2	45 OAK ST	100400	81100	181500	2SF-1U	40X242 AVG	water- vacant
138	17	9354.311038	2	43 OAK	100400	107500	207900	2SF-1U	40X232 AVG	water
138	19	8261.888665	2	39 OAK	100400	127700	228100	2SF1G-1U	40X205 AVG	water
138	20	7624.5808	2	37 OAK STREET	99800	139100	238900	2SF1G-1U	40X188 AVG	water
138	21	7247.400477	2	35 OAK	99200	158500	257700	2SF1G-1U	40X171 AVG	water
138	23	5668.722422	2	25 OAK	97800	152800	240600	2SF-1U	40X136 AVG	water

ECONOMIC IMPACT OF HURRICANE SANDY

The damage that Hurricane Sandy caused to infrastructure, homes, transportation, and the environment, and interruptions to the workforce and tourism had a catastrophic impact on the economy overall. Not adjusted for inflation, population, and wealth normalization, preliminary U.S. damage estimates from the storm were near $50 billion.[31] That would make Hurricane Sandy the second-costliest cyclone to hit the United States since 1900, when the records of costliest cyclones began.

In a September 2013 report, "Economic Impact of Hurricane Sandy: Potential Economic Activity Lost and Gained in New Jersey and New York," the U.S. Department of Commerce analyzed and estimated the ultimate change in economic activities, including industry production and employment, which were resultant from the massive one-time losses in tourism spending in the State and the potential gains in construction spending.

[31] Eric S. Blake, Todd B. Kimberlain, Robert J. Berg, John P. Cangialosi and John L. Beven II. National Hurricane Center. "Tropical Cyclone Report Hurricane Sandy (AL182012) 22 – 29 October 2012." 12 February 2013. Page 1. http://www.nhc.noaa.gov/data/tcr/AL182012_Sandy.pdf

"The economic impact story of Sandy is immediate, devastating damage primarily to residences, but also to structures and equipment that support industrial production of both goods and services."[32]

The U.S. Department of Commerce concluded the following in their 2013 study of the impact of Hurricane Sandy in New Jersey:

- An estimated loss of $950 million in tourism spending in New Jersey in 2013 will reduce total output in New Jersey by $1.2 billion this year and reduce employment by over 11,000 workers primarily in the Accommodations, Food Services, Retail, Amusements and Performing Arts and the Transportation Services sectors. These losses are expected to occur in the third quarter of 2013 and would be concentrated in two counties— Ocean and Monmouth.
- The New Jersey state government estimated construction costs of $29.5 billion to repair and replace the damage caused by the storm. If all of this money is spent on rebuilding, the influx of new spending will result in $44 billion in total output and about 281,000 new jobs (full-time and part-time2). Thus, the net gain in jobs in New Jersey over the four year period would be 270,000 (281,000 construction-related jobs less 11,000 Travel and Tourism-related jobs). Of the 281,000 construction-related jobs, about 218,000 will be direct construction jobs.
    - If all of the projected new construction spending in New Jersey is spread over four (4) years, the average annual number of jobs supported by this spending would be about 70,000.
- As of July 2013, however, approximately $5.5 billion in Federal aid had been authorized for projects in New Jersey. 3 In addition to Federal aid, insurance claim payments will reach the state. Private insurers are expected to issue $6.3 billion in settled claims in New Jersey.

CHANGES SINCE HURRICANE SANDY

FLOOD MAPS

According to the 1992 National Flood Insurance Program (NFIP) Effective Flood Insurance Rate Map (FIRM), Block 138 was mostly located within the Zone A11, with a Base Flood Elevation of eleven (11') feet; whereas, most of the rest of the Neighborhood was located in Zone B or Zone C. According to the 2009 NFIP Effective FIRM, much of the southern and southeastern portion of Block 138 is located in the Zone AE with a Base Flood Elevation of eleven (11') feet.

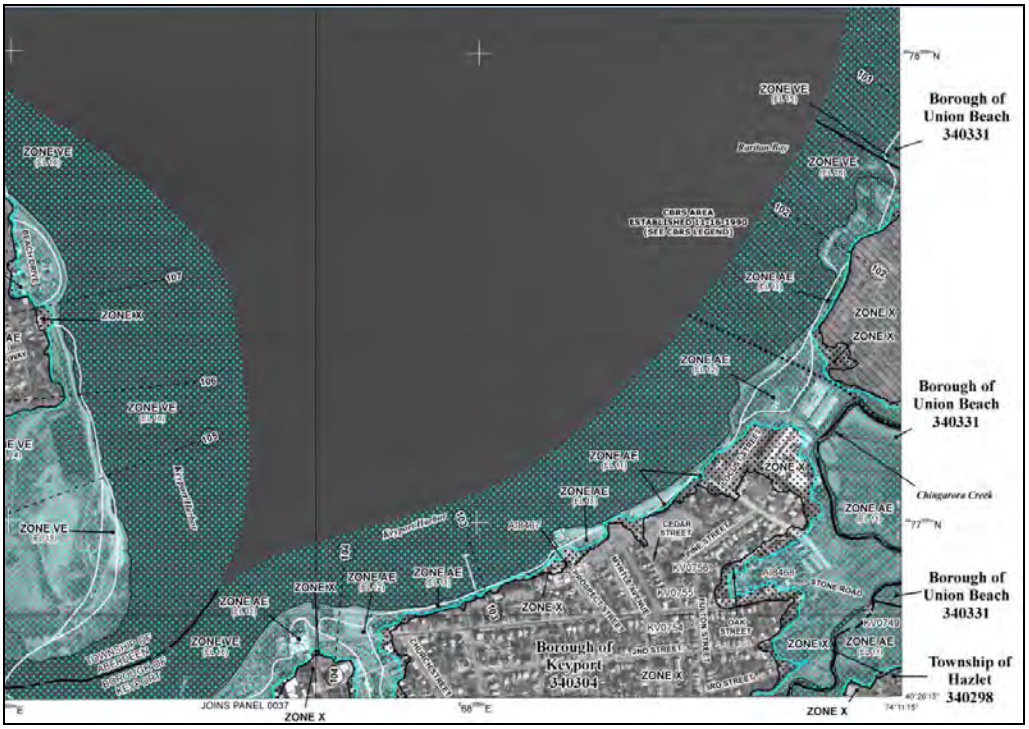
Zone X is an "Area determined to be outside the 0.2% annual chance floodplain" located outside of Zone AE. In 2009, Zone X was shown in the area with black dots, located just outside of the perimeter of Zone AE and, at that time, included most of Locust Street, including the Aeromarine industrial building, small areas of Oak Street and First Street up to Spring Street, and Cedar Street along the waterfront. The 2015 Revised Preliminary FIRM shows an expanded Zone X, which covers most of the area from Aeromarine to Cedar Street and Waverly Street to the west that is not already in Zone AE.

A Floodway Area in Zone AE has Base Flood Elevations determined and is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights. Zone AE is generally similar between the 2009 and

[32] Henry, David K. et al. "Economic Impact of Hurricane Sandy: Potential Economic Activity Lost and Gained in New Jersey and New York." U.S. Department of Commerce. Economics and Statistics Administration, Office of the Chief Economist. September 2013. Pp. vi-vii. http://www.esa.doc.gov/sites/default/files/sandyfinal101713.pdf

2015 maps, although slightly increased. Part of Walnut Street and the Aeromarine industrial building were changed from Zone X to Zone AE.

Map 24: Excerpt from Effective Flood Insurance Rate Map (FIRM), September 25, 2009[33]

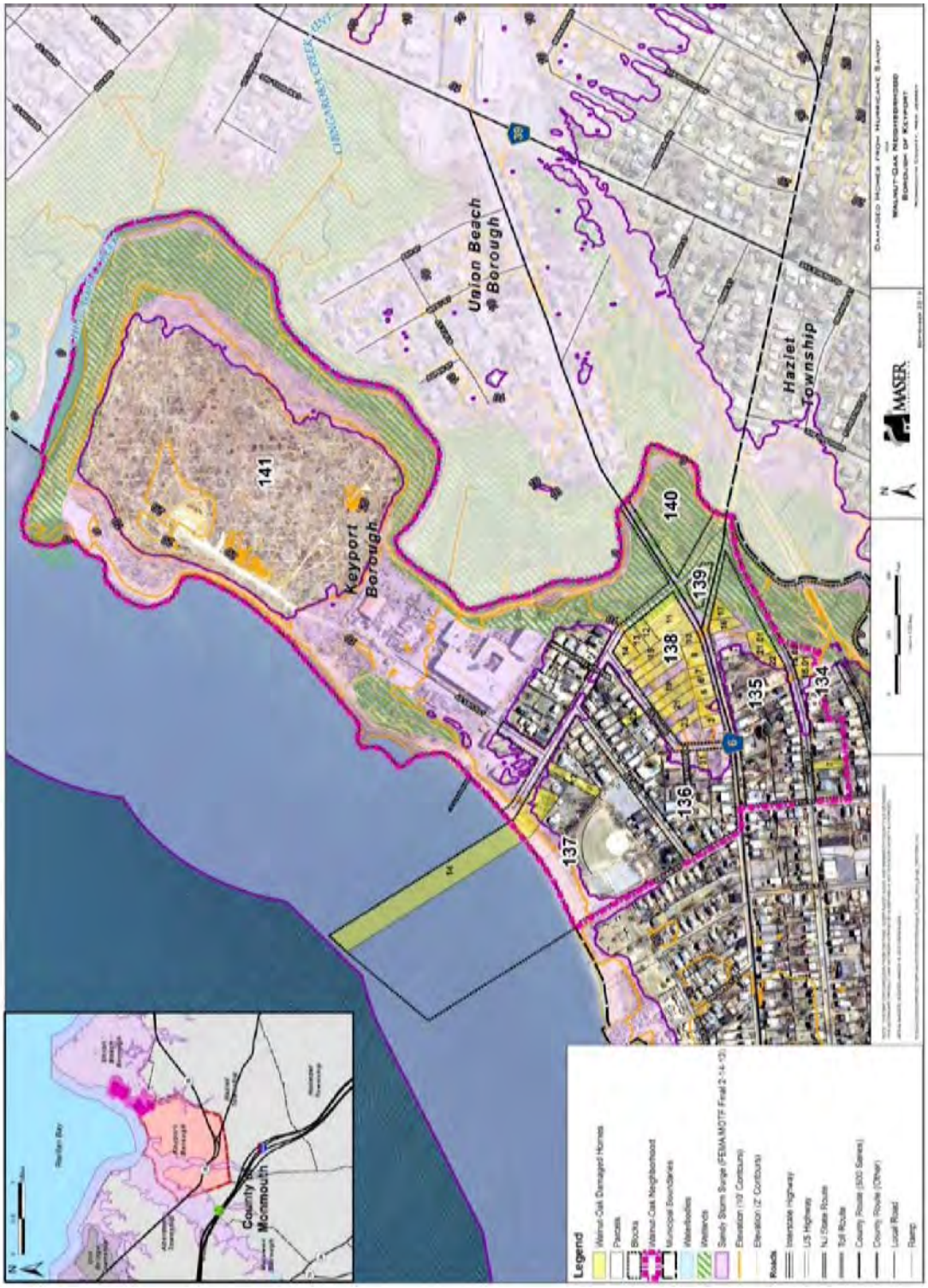


Map 25: Excerpt from Revised Preliminary Flood Insurance Rate Map (FIRM), January 30, 2015[34]

[33] Flood Insurance Rate Map for Monmouth County, New Jersey. Federal Emergency Management Agency. Map Number 34025C0029G. Panel 29 of 457. Effective September 25, 2009.

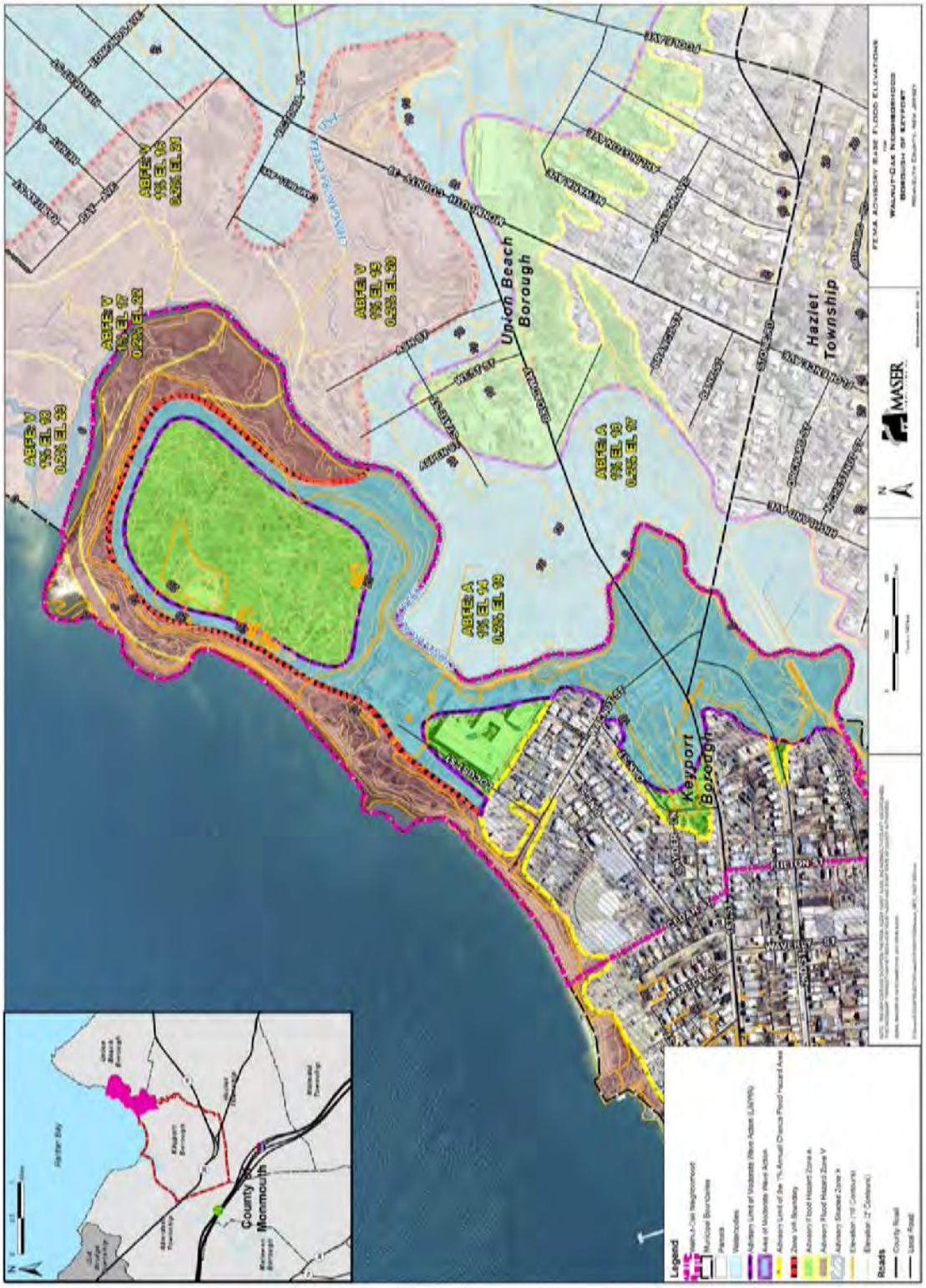
[34] Flood Insurance Rate Map for Monmouth County, New Jersey. Federal Emergency Management Agency. Map Number 34025C0029G. Panel 29 of 457. Revised Preliminary January 30, 2015.

Map 26: Damaged Homes from Hurricane Sandy with Storm Surge in Walnut-Oak Neighborhood[35]



[35] Reported flood insurance claims through the Borough of Keyport. Strategic Recovery Planning Report. Borough of Keyport. Table 1. 2014. (Appendix III)

Map 27: FEMA Advisory Base Flood Elevation Map of Walnut-Oak Neighborhood



UNION BEACH U.S. ARMY CORPS OF ENGINEERS PROJECT

The Borough of Union Beach, New Jersey is located to the east-northeast of the Walnut-Oak Neighborhood in the Borough of Keyport. Union Beach experienced significant storm inundation and damage from Hurricane Sandy, partly due to its exposure to Raritan Bay, whereas Keyport is slightly more protected, and partly due to its flat elevation near sea-level and development along the beachfront and creeks. There was a record 14-foot storm surge in the Borough, inundating many of the small one- and two-story homes. As development has increased and protective beaches have been lost, problems with structures "susceptible to flooding from rainfall and coastal storm surges, erosion and wave attack, combined with restrictions to channel flow in the tidal creeks," according to the U.S. Army Corps of Engineers (USACE).[36] The USACE, State of New Jersey Department of Environmental Protection (DEP), and Borough of Union Beach have undergone major studies and made proposals over the past 15 years in order to address the increasing flooding and storm damage in the Borough.

> *"The final Feasibility report and Environmental Impact Statement (EIS) were approved and released to the public in January 2004. The report recommended implementation of a storm damage reduction project consisting of a combination of levees and floodwalls, tide gates, pump stations and a dune and beach berm with terminal groins. The project would also construct wetland mitigation sites to mitigate for the loss of wetlands. The final feasibility report and EIS was approved by Corps of Engineers Headquarters on Jan 4, 2006. A Design Agreement was executed with NJDEP in July 2008. A Value Engineering Study report was completed and the results were presented to the Borough of Union Beach and NJDEP on 20 January 2011. In coordination with State and Borough representatives the Corps of Engineers began moving forward with the Preconstruction, Engineering and Design (PED) which was underway when the project area was struck by Hurricane Sandy. Serious damages to the community requires a limited re-evaluation report in order to document damages sustained and changes in conditions via the P.L. 113-2, The Disaster Relief Appropriations Act, 2013. The re-evaluation report is underway and being conducted with the non-federal partners, the NJ Department of Environmental Protection and the Borough of Union Beach, New Jersey. After report completion and approval the project may move into the Design and Construction phase."*[37]

Figure 25: Beach replenishment Army Corps project along Raritan Bay in Port Monmouth, New Jersey (Photo by James D'Ambrosio, Public Affairs, July 24, 2014. U.S. Army Corps of Engineers)

In 2002, it was estimated that an investment of $65 million would be needed for a system of levees, dikes, pumping stations and drainage improvements.[38] As of April 8, 2015, the U.S. Army Corps of Engineers, in partnership with New Jersey Governor Christie and New Jersey DEP

[36] Thalhauser, Jenifer. "Fact Sheet – Raritan Bay and Sandy Hook Bay, Union Beach, New Jersey." 2016. http://www.nan.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/487656/fact-sheet-raritan-bay-and-sandy-hook-bay-union-beach-new-jersey/

[37] Ibid.

[38] Cheslow, Jerry. "If You're Thinking of Living In/Union Beach, N.J.; Waterfront Borough Making a Comeback." May 5, 2002. http://www.nytimes.com/2002/05/05/realestate/if-you-re-thinking-living-union-beach-nj-waterfront-borough-making-comeback.html

Commissioner Martin, announced $202 million for a resiliency project to protect Union Beach from storms.[39] The federal government will fund $132 million, whereas the State of New Jersey will fund $53 million, and $17 million will come from the Borough of Union Beach. According to Commissioner Martin, he project will be part of an overall coastal flood protection system for Raritan Bay to protect Keansburg, Port Monmouth, and Union Beach.[40] The project was a re-evaluation of the project that was originally designed over a decade ago and that was worked on since 1995, and will now "incorporate advancements in construction technologies."[41] It is expected that the project will include a 3,200-foot beach and dune system, 14,320 feet of levee and 6,925 feet of floodwalls, two pump station and flood gates, and restoration of 25 acres wetlands.[42]

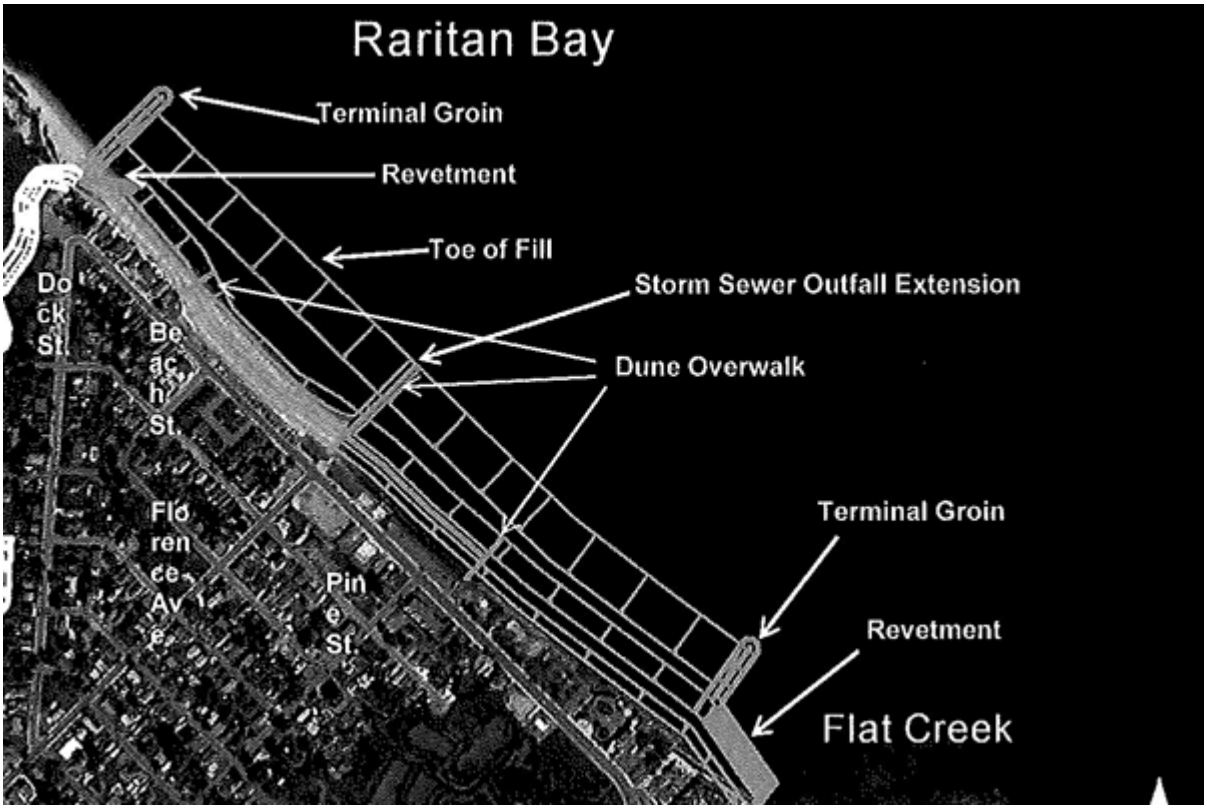


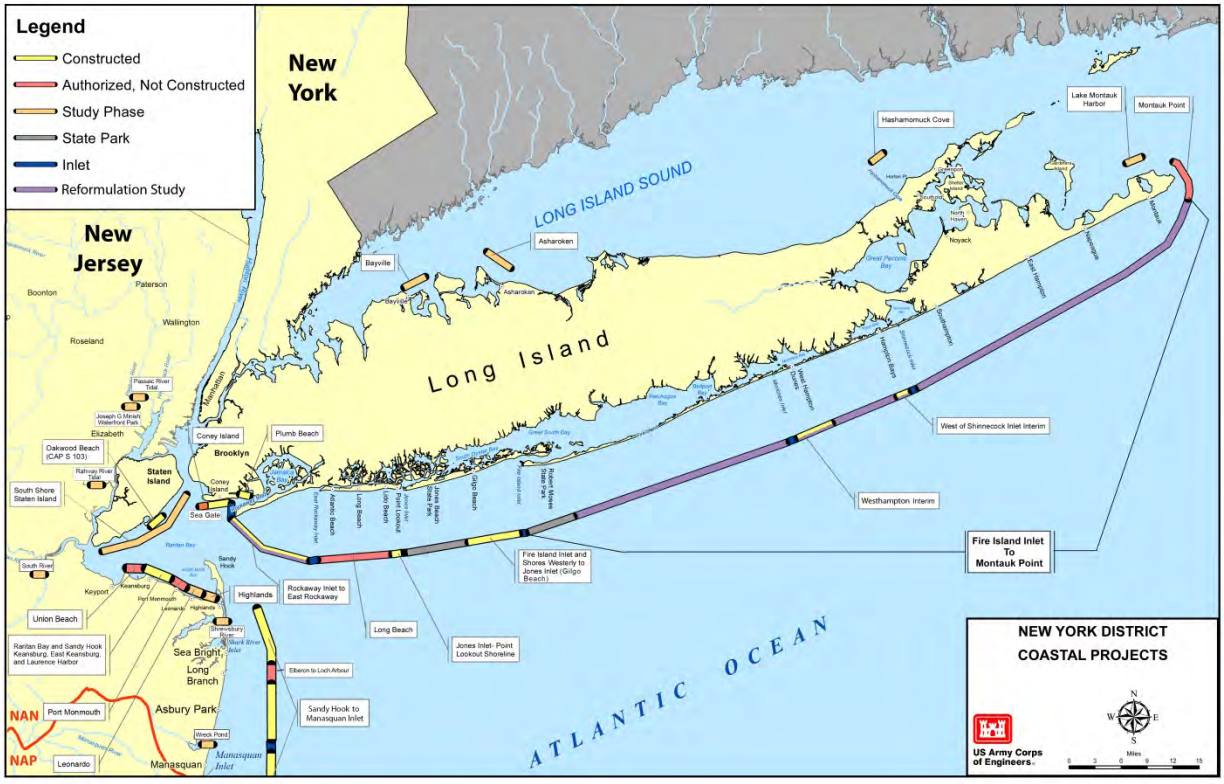
Figure 26: Army Corps of Engineers diagram of flooding control measures to be used in Union Beach[43]

Although the Army Corps project is being built to protect several Raritan Bay communities, it is concerning to many Keyport residents that Keyport is not included, but may, instead, be the recipient of unintended spillover effects that will ultimately be more detrimental to the Borough during storms. Executive Director Debbie Mans of NY/NJ Baykeeper, a regional environmental group, also responded to the project calling for a more comprehensive approach, "And so what does that mean for Keyport if you're going to push the water out of Union Beach? We understand we need flood mitigation in the area…But if you do it here and you don't do it elsewhere, what does that mean for the other communities? What's the height of the walls? And what was the

[39] "Governor Christie, Army Corps Announce $202 Million Resiliency Project to Bolster Union Beach Against Storms and Flooding." State of New Jersey, Office of the Governor. April 8, 2015.
[40] Ibid. Qtd. NJDEP Commissioner Bob Martin.
[41] Ibid.
[42] Ibid.
[43] U.S. Army Corps of Engineers diagram. Gurian, Scott. "Union Beach Flood-Control Project Offers Hope to Community Ravaged by Sandy." April 9, 2015. http://www.njspotlight.com/stories/15/04/08/union-beach-flood-control-project-offers-hope-to-community-devastated-by-sandy/

height of the storm surge? And what are we predicting? And is this accounting for seal level rise?..."[44] The levee, floodwalls, and flood gates are the most disquieting because they have the effect of displacing storm surge and floodwater elsewhere. Since Keyport is the adjacent Borough, there is concern that the redirected water will have increase erosion and inundation in low-lying areas of Keyport, particularly along the Chingarora Creek and Keyport Harbor.

Map 28: Status of New York District Coastal Storm Risk Reduction Projects and Studies Map[45]



The recommendations in this Plan address ways in which the Borough of Keyport can respond to the potential unintended adverse impacts of the Army Corps projects in Raritan Bay, to the extent that it is possible.

[44] Ibid. Qtd. Debbie Mans, NY/NJ Baykeeper.

[45] "NY District Coastal Storm Risk Reduction Projects and Studies Map." U.S. Army Corps of Engineers. http://www.nan.usace.army.mil/About/Hurricane_Sandy/Coastal-Storm-Risk-Reduction-Projects-and-Studies/

EXISTING CONDITIONS ANALYSIS

The initial assessment for the Neighborhood Plan involved several site visits of the area with local representatives, input from local residents, and an analysis of the information gathered by the Borough, through investigations of historic documents, data from the Keyport Historical Society, and U.S. Census and American Community Survey data, among other sources. From this baseline information, the following facts and observations were identified.

NEIGHBORHOOD PROFILE

A neighborhood is often best represented or understood by those who inhabit it and the structures within it. The demographics, income, and housing data below give a snapshot into the lives of residents from a quantitative perspective, although it is not a comprehensive understanding of social structure within the Neighborhood. Data is not available for all topics at the level of the Walnut-Oak Neighborhood and, therefore, the most local level was used, despite sometimes being a slightly larger area. In other cases, data was only available at the municipal level. The information gathered also includes some comparative data between the Neighborhood area, the Borough of Keyport, Monmouth County, and the State of New Jersey.

DEMOGRAPHICS

TOTAL POPULATION

The Borough of Keyport has had a general upward trend in population since its founding, increasing every decade through 1990, although it has plateaued and slightly declined in recent years. In 1900, the total population was 3,413[46] and by mid-century, post-war in 1950, the population reached 5,888.[47] Between 1990 and 2000, the population of Keyport decreased (0.2%) from its peak population of 7,586. Between 2000 and 2010, the population decreased again (4.3%) from 7,568 to 7,240 – the largest decrease yet. By 2014, the population of Keyport was estimated to be 7,213 in 2014[48] – another slight decrease of (0.4%) from the 2010 population.

[46] United States. Bureau of the Census. U.S. Government Printing Office, 1912. "Thirteenth Census of the United States, 1910: Population by Counties and Minor Civil Divisions, 1910, 1900, 1890." Statistics of Population – New Jersey. Table 1. P. 337. https://books.google.com/books?id=T9HrAAAAMAAJ&pg=PA337#v=onepage&q&f=false

[47] New Jersey Department of Labor. Table 6. New Jersey Resident Population by Municipality: 1930-1990. http://lwd.dol.state.nj.us/labor/lpa/census/1990/poptrd6.htm

[48] United States Census Bureau. American Community Survey 5-Year Estimates, 2010-2014. Last updated May 30, 2016.

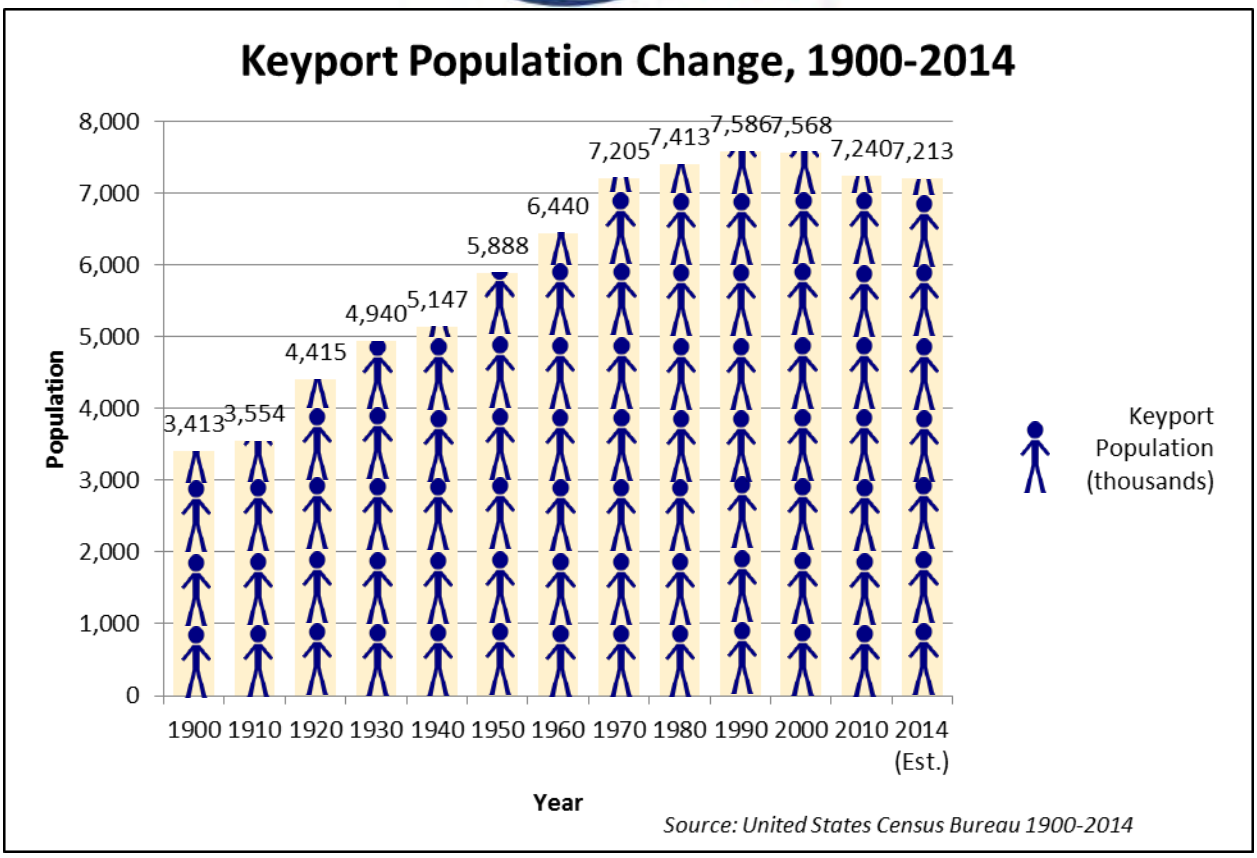


Figure 27: Change in Population, Borough of Keyport, 1900-2014

The trends in Keyport followed the trends for the State of New Jersey and Monmouth County for a long period of time as far more people began moving beyond the major cities and into the suburbs. Keyport started off as an important regional hub, but as a formerly industrial, fully built-out town, population growth slowed more quickly and began to decline sooner than other parts of the County. Growth in Monmouth County has begun to slow since 2010, for various reasons, while the State of New Jersey as a whole continues to grow, albeit much more slowly.

Table 2: Population Change in Borough of Keyport, Monmouth County, & State of New Jersey (1970-2014)

	Keyport[49]		Monmouth County[50]		New Jersey[51]	
Year	Population	Percent Change	Population	Percent Change	Population	Percent Change
1970	7,205	-	463,977	-	7,171,112	-
1980	7,413	2.9%	503,173	8.4%	7,365,011	2.7%
1990	7,586	2.3%	554,210	10.1%	7,730,188	5.0%
2000	7,568	-0.2%	617,127	11.4%	8,414,350	8.9%
2010	7,240	-4.3%	630,649	2.2%	8,791,894	4.5%
2014 (Est.)	7,213	-0.4%	629,279	-0.2%	8,874,374	0.9%

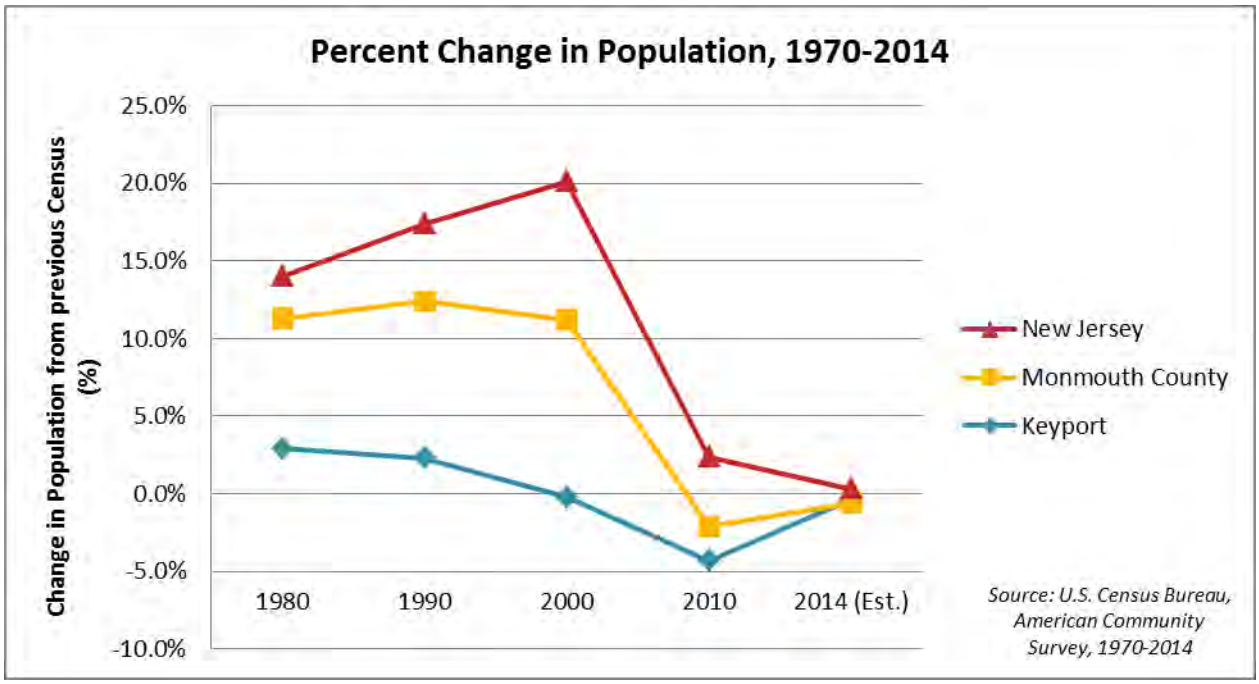


Figure 28: Percent Change in Population of Keyport, Monmouth County, and the State of New Jersey, 1970 – 2014

Within the Walnut-Oak Neighborhood, there were 526 residents in 2000.[52] By 2010, there were 543 residents – an increase of 3.2%, or 17 persons,[53] despite the decrease in the Borough. The 2014 estimates are not

[49] New Jersey Department of Labor. Table 6. New Jersey Resident Population by Municipality: 1930-1990. http://lwd.dol.state.nj.us/labor/lpa/census/1990/poptrd6.htm; U.S. Census Bureau, American Community Survey, 2000-2014.
[50] United States Census Bureau, American Community Survey, 2000-2014. Last updated May 30, 2016
[51] Wu, Sen-Yuan. "New Jersey Population: 1790 to 2010." New Jersey Economic Indicators. Pp. 19-21. Division of Labor Market & Demographic Research. New Jersey Department of Labor. December 2010. http://lwd.dol.state.nj.us/labor/lpa/dmograph/est/nj1790_2010.pdf; U.S. Census Bureau, American Community Survey, 2010-2014.

available at the Census block level to give an accurate representation of the Walnut-Oak population post-Hurricane Sandy in 2012. However, it is likely, given the extent of damage, existing vacancies in 2016, and loss of population for the Borough as a whole, that the population of Walnut-Oak has decreased slightly since 2010. The rate of population loss is also likely to be higher in this Neighborhood than the Borough as a whole as it was one of the most heavily impacted areas. The population of Walnut-Oak comprises only 7.5 percent of the total Borough population, based on the 2010 Census data.

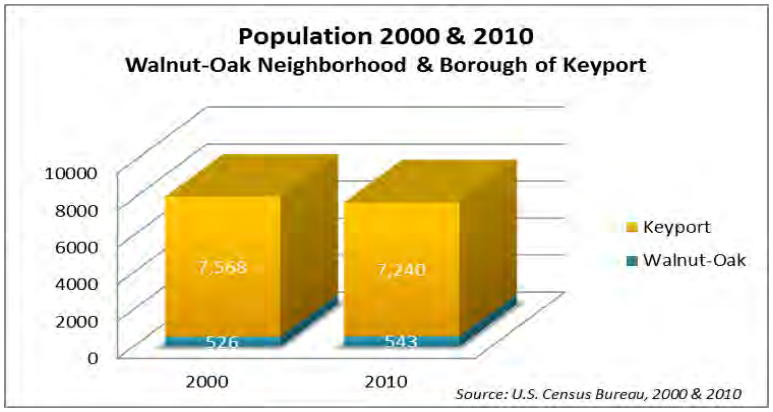
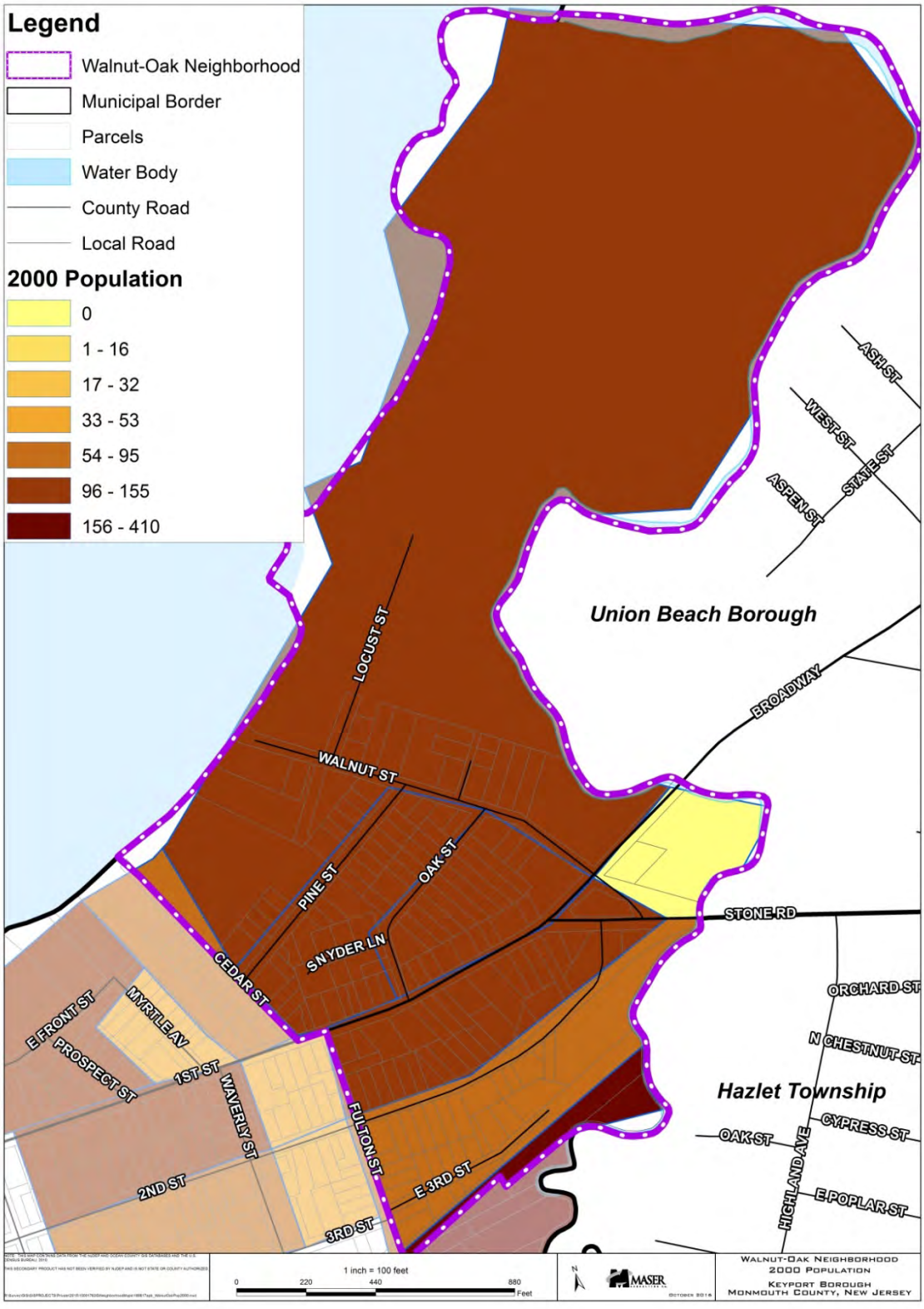


Figure 29: Population of Walnut-Oak and Keyport from 2000 to 2010

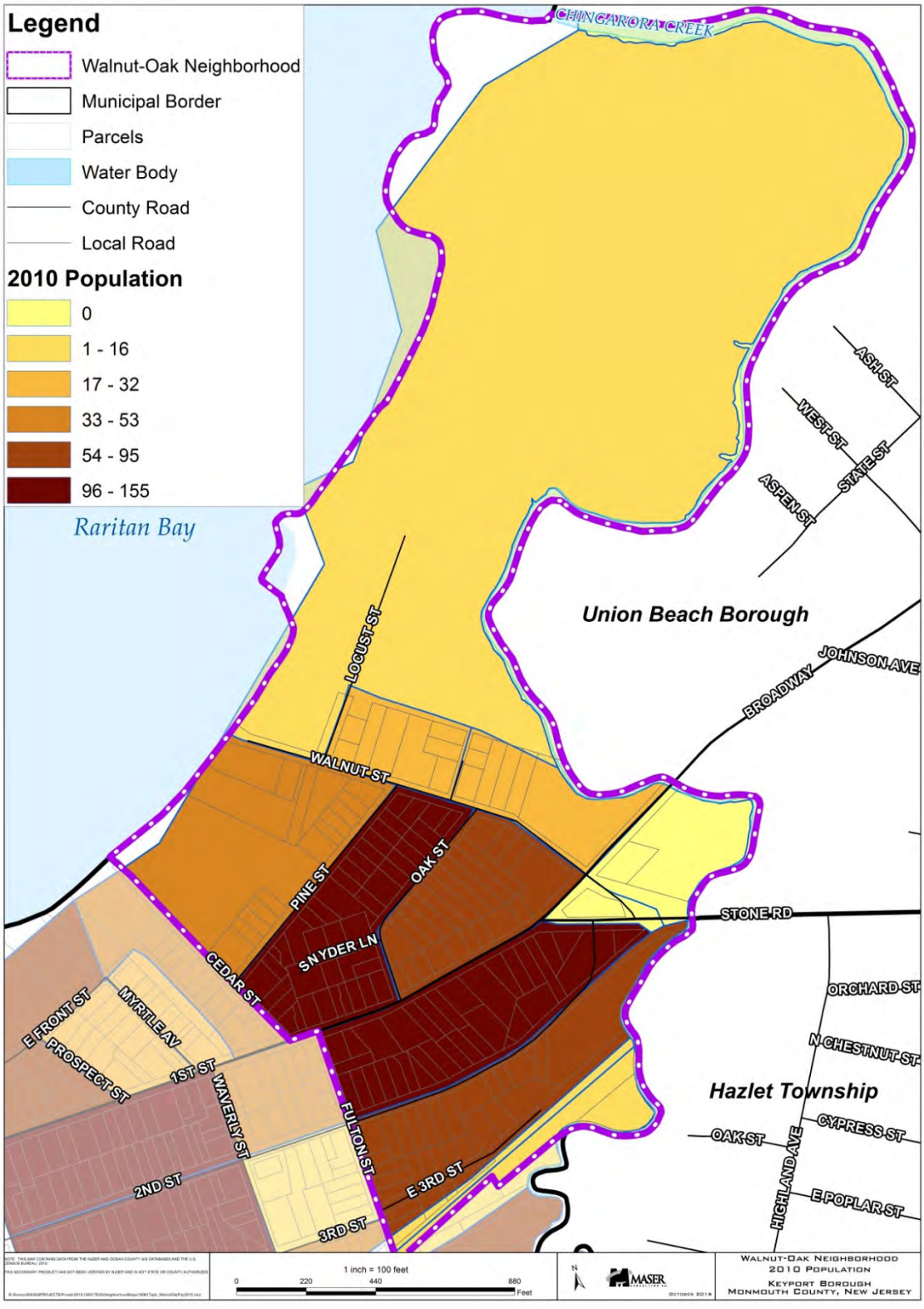
The following maps show the population of the Walnut-Oak Neighborhood of the Borough of Keyport by U.S. Census Block Groups. The Block Groups have been redrawn between 2000 and 2010, showing slight differences in the map to reflect the population more accurately. Although there are some inconsistencies, it demonstrates approximately the population density of each block within the Neighborhood. However, the Census Blocks on the map do not account for vacant land or open space. On Map 28, for example, Block 1002 (including Aeromarine and landfill property) shows a population of "1 – 16"; whereas, there is only one residential property on the entirety of the Block and the majority of it is vacant.

[52] United States Census Bureau. U.S. Census, 2000.
[53] Ibid. 2010.

Map 29: Walnut-Oak Neighborhood Population by Census Block, 2000 (U.S. Census Bureau)



Map 30: Walnut-Oak Neighborhood Population by Census Block, 2010 (U.S. Census Bureau)



POPULATION BY AGE

The median age of the population in Keyport is 40.6 years, which has increased slightly from 40.5 years in 2010 and up from 38.1 years in 2000.[54] As of the 2014 American Community Survey by the U.S. Census Bureau, the 25 to 34 cohort comprises the largest percentage of the population at 15.7%, which increased from 13.8% in 2010 and 15.2% in 2000, although the total population has decreased. The next largest group is the 45 to 54 year old cohort with 14.0% of the population in 2014, followed by 35 to 44 year olds with 12.8%, although both have experienced declines in total population since 2000.

The largest increases in population have been in the age groups of 55 to 59 and 60 to 64 year olds, with 66.1% and 66.4%, respectively.[55] However, these groups make up only 7.5% and 5.8% of the total 2014 population, respectively. The largest decreases in population by age group have been in 15 to 19 and 75 to 84 year olds, with -36.7% and -35.3%, respectively. These groups make up only 3.8% and 4.5% of the total 2014 population, respectively.

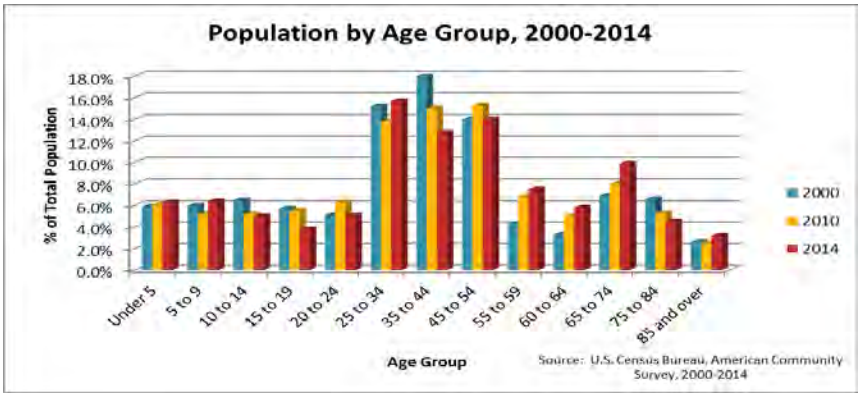


Figure 30: Borough of Keyport Population by Age Group, 2000-2014

POPULATION BY RACE

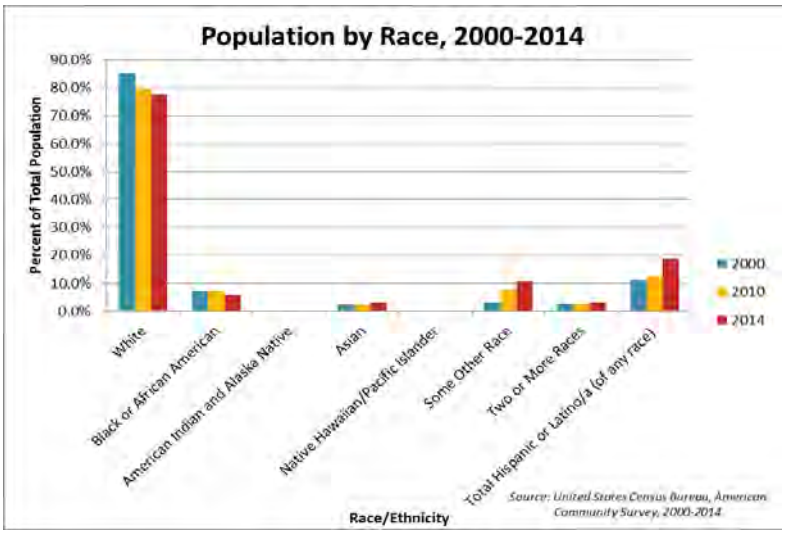


Figure 31: Change in Population by Race, 2000-2014

[54] United States Census Bureau. U.S. Census, 2000, 2010. American Community Survey, 2010-2014.
[55] Ibid.

Table 3: Borough of Keyport Population by Race

Race	2000		2010		2014	
	Number	Percent	Number	Percent	Number	Percent
White	6,447	85.2%	5,505	75.3%	5,091	70.6%
Black or African American	531	7.0%	572	7.8%	401	5.6%
American Indian and Alaska Native	9	0.1%	-	0.0%	-	0.0%
Asian	168	2.2%	206	2.8%	227	3.1%
Native Hawaiian/Pacific Islander	3	0.0%	-	0.0%	-	0.0%
Hispanic or Latino	N/A	N/A	910	12.4%	1,353	18.8%
Some Other Race Alone	224	3.0%	14	0.2%	12	0.2%
Two or More Races	186	2.5%	105	1.4%	129	1.8%
Total	**7,568**		**7,312**		**7,213**	
Hispanic or Latino/a						
One race	770	91.8%	805	88.5%	1,267	93.6%
Two or more races	69	8.2%	105	11.5%	86	6.4%
Total Hispanic or Latino/a (of any race) (% of Total Population)	839	11.1%	910	12.4%	1,353	18.8%

Source: U.S. Census Bureau, American Community Survey, 2006-2010; 2010-2014; Census 2000 Summary File 1, Matrices P3, P4, PCT4, PCT5, PCT8, and PCT11.

INCOME

Income for the neighborhood was calculated using Census Block Group 1, Census Tract 8019, which stretches slightly west of the designated study area to Atlantic Street (shown on the map below). However, any variances between the data are likely to be very minimal. The data shows that between 1999, when the first data set for that level was released, and 2013 (the subsequent data set), that the number of households increased by seventy (70) in the highlighted area. The total number of households declined by eighty-two (82) by the following year.

With the increase in number of households, there were also a far greater number of households within the earning brackets of $75,000-99,999; $100,000-125,000; $150,000-199,999; and $200,000 or more between 1999 and 2013. Collectively, households earning $75,000 or more per year increased from (91) households representing 30.3 percent in 1999 to (387) households representing 55.2 percent of total households in 2013. Simultaneously, households in income brackets earning less than $74,999 generally decreased between 1999 and 2013, or added only a few households, with the exception of those earning between $10,000 and $14,999, which increased by forty (40). The largest decrease in this range was in households earning between $40,000 and $44,999, which decreased -100% from seventy-three (73) to zero (0) households. However, households

earning between $125,000 and $149,000 per year declined the most, by eighty-two (82), from ninety (90) to eight (8). The reason for this change is unclear, although the overall trend of higher-earning households could have likely been attributed to rising property values and taxes in the area, as well as a renovated housing stock.

Between 2013 and 2014, the trends of household earnings that occurred the previous decade nearly reversed, with a large decrease in the number of higher-earning households and an increase of some low-income households. Particularly, households earning less than $10,000 per year increased just above the 1999 levels, or 61 percent greater than 2013. Meanwhile, households earning between $10,000 and $39,999 all decreased, as well as those earning $45,000-49,000; $75,000-99,999; $100,000-124,000; $150,000-199,999; and $200,000 or more.

The per capita income increased by 39.9 percent from $22,807 in 1999 to $31,908 in 2013. Along with the decrease in number of households, the per capita income for the Walnut-Oak area declined, but not as drastically, to $31,398. While the overall impact of Hurricane Sandy on household dynamics are not well-defined, it is clear that there have been significant fluctuations over the past fifteen years and even between 2013 and 2014.

Map 31: Block Group 1, Census Tract 8019, Monmouth County, New Jersey (*Source: American Factfinder*)

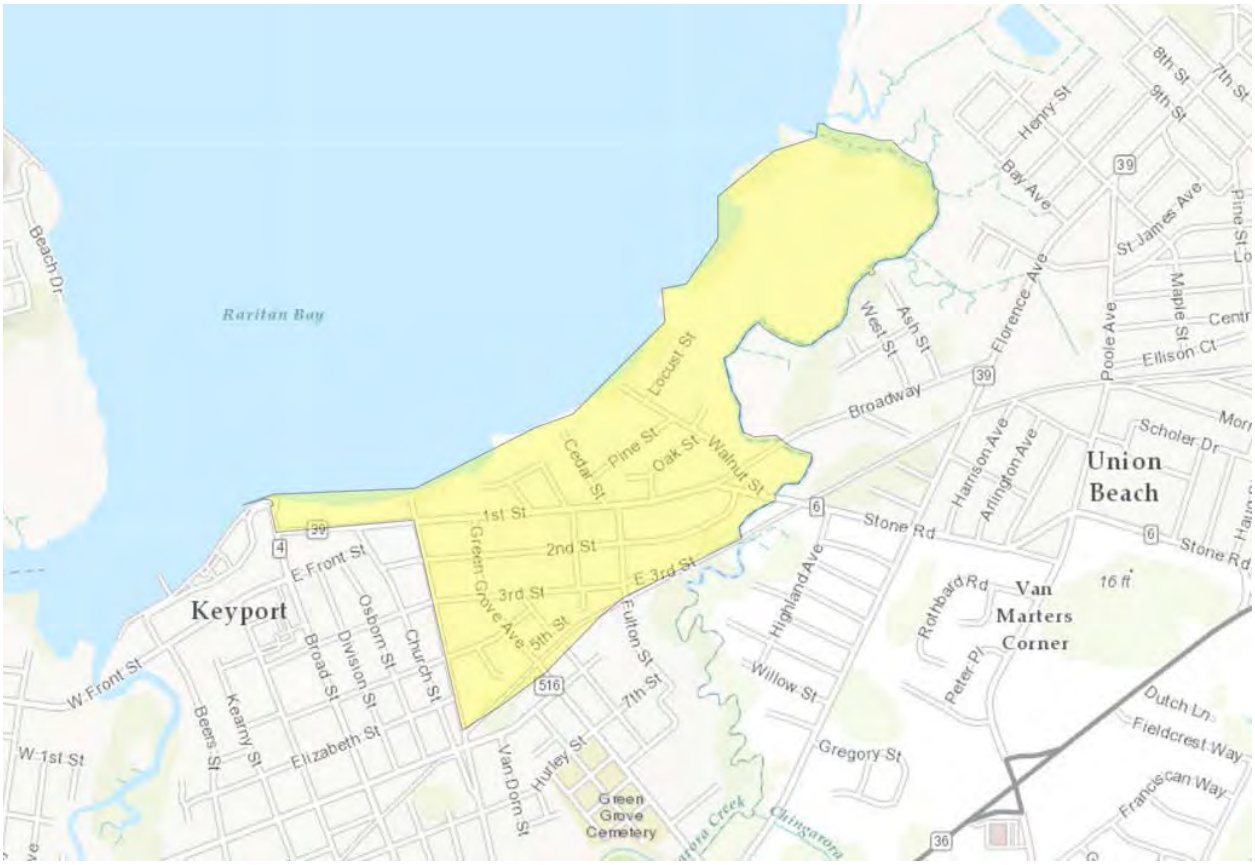


Table 4: Household Income & Per Capita Income, Block Group 1, Census Tract 8019, Monmouth County, New Jersey, 1999-2014

Household Income	1999	2013	2014
Total (households)	631	701	619
Less than $10,000	57	36	58
$10,000 to $14,999	11	51	35
$15,000 to $19,999	0	18	15
$20,000 to $24,999	34	32	30
$25,000 to $29,999	37	40	27
$30,000 to $34,999	48	29	0
$35,000 to $39,999	44	24	0
$40,000 to $44,999	73	0	27
$45,000 to $49,999	52	19	9
$50,000 to $59,999	41	26	43
$60,000 to $74,999	43	39	52
$75,000 to $99,999	64	168	151
$100,000 to $124,999	28	109	82
$125,000 to $149,999	90	8	24
$150,000 to $199,999	9	82	51
$200,000 or more	0	20	15
Per capita income in the past 12 months	22,807	31,908	31,398

Source: U.S. Census Bureau, 2009-2013, 2010-2014 American Community Survey 5-Year Estimates; Census 2000 Summary File 3 (SF3) - Sample Data (Block Group 1, Census Tract 8019, Monmouth County, New Jersey)

HOUSING

Housing in this section is measured by the Borough of Keyport as a whole. Housing by occupancy and type has remained relatively stable throughout the past decade and a half, with some very slight fluctuation. The data from 2000, 2010, and 2014 is intended to capture trends in housing, as well as changes since Hurricane Sandy.

Despite an anticipation of an increase in vacant units between 2010 and 2014 due to Hurricane Sandy in 2012, there was actually a decrease in the number of vacant units and increase in occupied units. This may reflect changes in policies to help rebuilding efforts and possibly a more favorable housing development climate since 2012, despite the changes to flood insurance premiums and potential future storms.

Table 5: Changes in Housing Occupancy Distribution, 2000-2014

Housing Occupancy (Type of Occupancy)	2000		2010		2014*	
	Number	Percent	Number	Percent	Number	Percent
Occupied Units	3,264	96.0%	3,067	93.7%	3,142	95.9%
Vacant Units	136	4.0%	205	6.3%	134	4.1%
For Rent	44	1.3%	108	52.7%	60	44.8%
Rented, not occupied	10	0.3%	7	3.4%	0	0.0%
For Sale	16	0.5%	38	18.5%	0	0.0%
Sold, not occupied	10	0.3%	7	6.5%	27	20.1%
Seasonal, recreational or occasional use	11	0.3%	4	2.0%	0	0.0%
Other	45	1.3%	41	20.0%	47	35.1%
Total	**3,400**		**3,272**		**3,276**	
Homeowner vacancy rate		1.0%		2.3%		0.0%
Rental vacancy rate		2.7%		6.8%		3.8%

Source: U.S. Census Bureau, 2000 and 2010

** American Community Survey, 5 Year Estimate, 2010-2014*

The dynamic of households by type has also been changing to some degree since the 2000 Census. As with many communities around the country, the number of households comprised of a family unit has decreased to 52.5 percent, while non-family households has increased to 47.5 percent. The percentage of male householders (male alone) has declined from 8.6 in 2000 to 2.7 in 2014, while female householders (female alone) have increased from 19.8 percent to 21.5 percent, and husband-wife families have also increased. Householders living alone, which is included in non-family households has increased and includes 40.9 percent of the Borough population. The average household size has similarly declined to 2.28 persons, although the average family size has increased to 3.19 persons.

Table 6: Changes in Household Types, 2000-2014

Households By Type	2000		2010		2014*	
	Number	Percent	Number	Percent	Number	Percent
Family Household	1,797	55.1%	1,694	55.2%	1,650	52.5%
Husband-Wife Family	1,286	71.6%	1,217	71.8%	1,210	73.3%
Male Householder	155	8.6%	139	8.2%	85	2.7%
Female Householder	356	19.8%	338	20.0%	355	21.5%
Non Family Household	1,467	44.9%	1,373	44.8%	1,492	47.5%
Householder Living Alone	1,253	38.4%	1,143	37.3%	1,285	40.9%
Total	**3,264**		**3,067**		**3,142**	
Average Household Size	2.31		2.35		2.28	
Average Family Size	3.11		3.15		3.19	

Source: U.S. Census Bureau, 2000 and 2010

** American Community Survey, 5 Year Estimate, 2010-2014*

The number of owner-occupied housing units has increased since 2000, but is slightly down from 2010; whereas, renter-occupied units declined between 2000 and 2010, but has since increased in 2014, but still below 2000 levels. They comprise 51.2 percent and 48.8 percent, respectively. The average owner-occupied household has been decreasing, from 2.72 persons in 2000 to 2.51 in 2014; whereas, the average renter-occupied household has increased, at a slower rate, from 1.89 in 2000 to 2.04 in 2014.

Table 7: Changes in Housing Tenure, 2000-2014

Housing Tenure	2000		2010		2014*	
	Number	Percent	Number	Percent	Number	Percent
Owner housing Units	1,648	50.5%	1,601	52.2%	1,608	51.2%
Renter Occupied Units	1,616	49.5%	1,466	47.8%	1,534	48.8%
Total	**3,264**		**3,067**		**3,142**	
Avg. owner occupied household size	2.72		2.64		2.51	
Avg. renter occupied household size	1.89		2.03		2.04	

Source: U.S. Census Bureau, 2000 and 2010

** American Community Survey, 5 Year Estimate, 2010-2014*

There are a few multi-family structures in the Walnut-Oak Neighborhood, or in the immediate vicinity; however, most housing structures are single-family (1 unit) detached. Throughout the Borough, the number and percentage of 1-unit detached structures has increased, from 46.5 percent in 2000 to 51.6 percent in 2014.

The number of 1-unit attached structures has decreased since 2000, as well as 3 or 4 units, and 20 or more units; while 2 units, 5 to 9 units, and 10 to 19 units have increased.

Table 8: Changes in Number of Units in Structures, 2000-2014

Units in Structure (# of units)	2000		2010*		2014*	
	Number	Percent	Number	Percent	Number	Percent
1-unit detached	1,581	46.5%	1,599	46.7%	1,691	51.6%
1-unit attached	211	6.2%	90	2.6%	157	4.8%
2 units	272	8.0%	359	10.5%	300	9.2%
3 or 4 units	217	6.4%	112	3.3%	116	3.5%
5 to 9 units	122	3.6%	181	5.3%	167	5.1%
10 to 19 units	92	2.7%	358	10.5%	201	6.1%
20 or more units	875	25.74%	722	21.1%	644	19.7%
Mobile Home, Boat, RV, etc.	30	0.88%	0	0.0%	0	0.0%
Total	**3,400**		**3,421**		**3,276**	

Source: U.S. Census Bureau, 2000

** American Community Survey, 5 Year Estimate, 2008-2010 and 2010-2014*

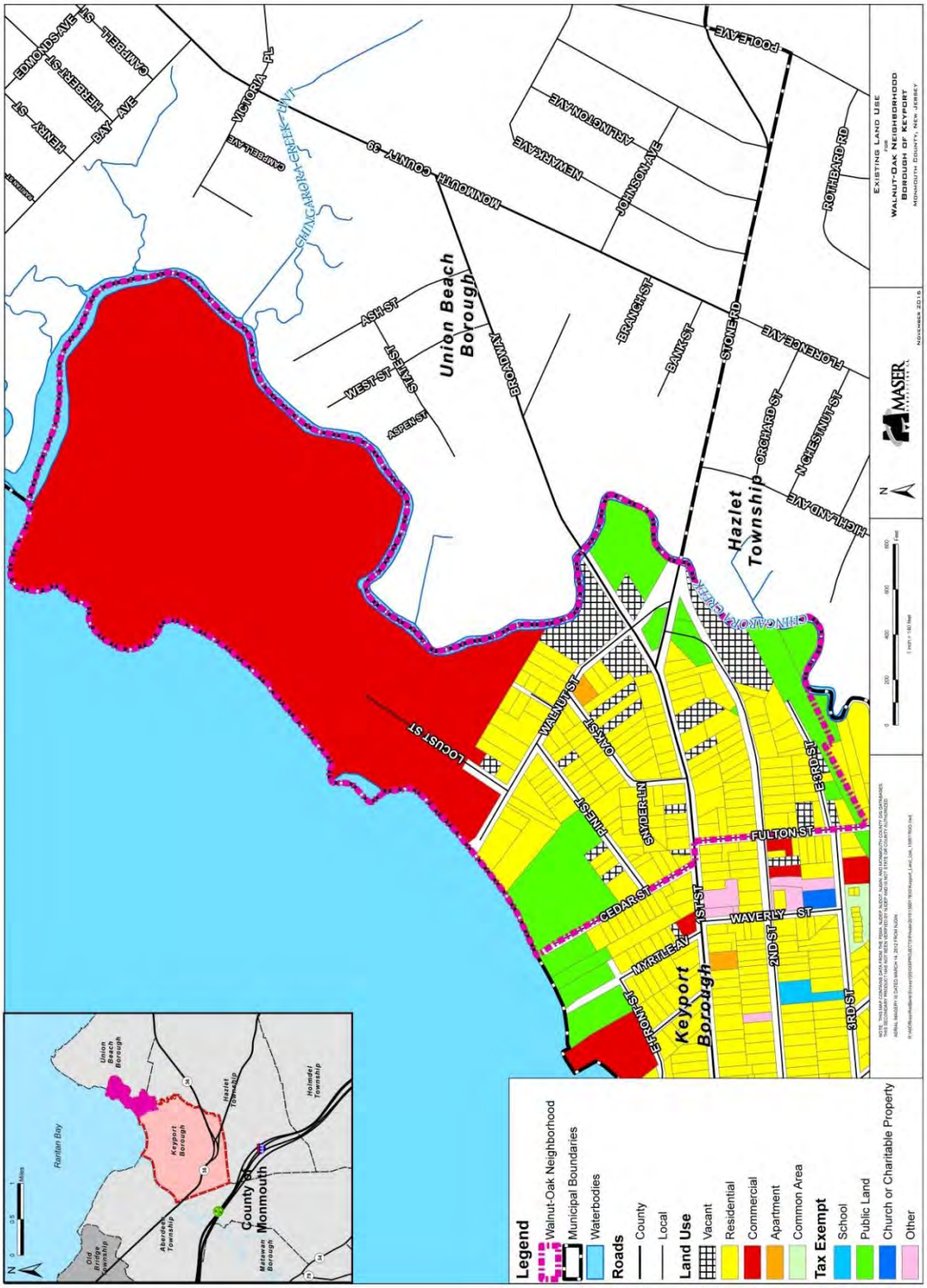
DEVELOPMENT PATTERNS AND EXISTING LAND USE

The Walnut-Oak neighborhood of the Borough of Keyport is primarily a residential area, as described in the Neighborhood Character section of this Neighborhood Plan and in the existing Land Use Map provided below. However, as demonstrated in the Neighborhood History section of the Plan, the neighborhood evolved partly around waterfront and rail industrial uses, including the Aeromarine Industrial Park.

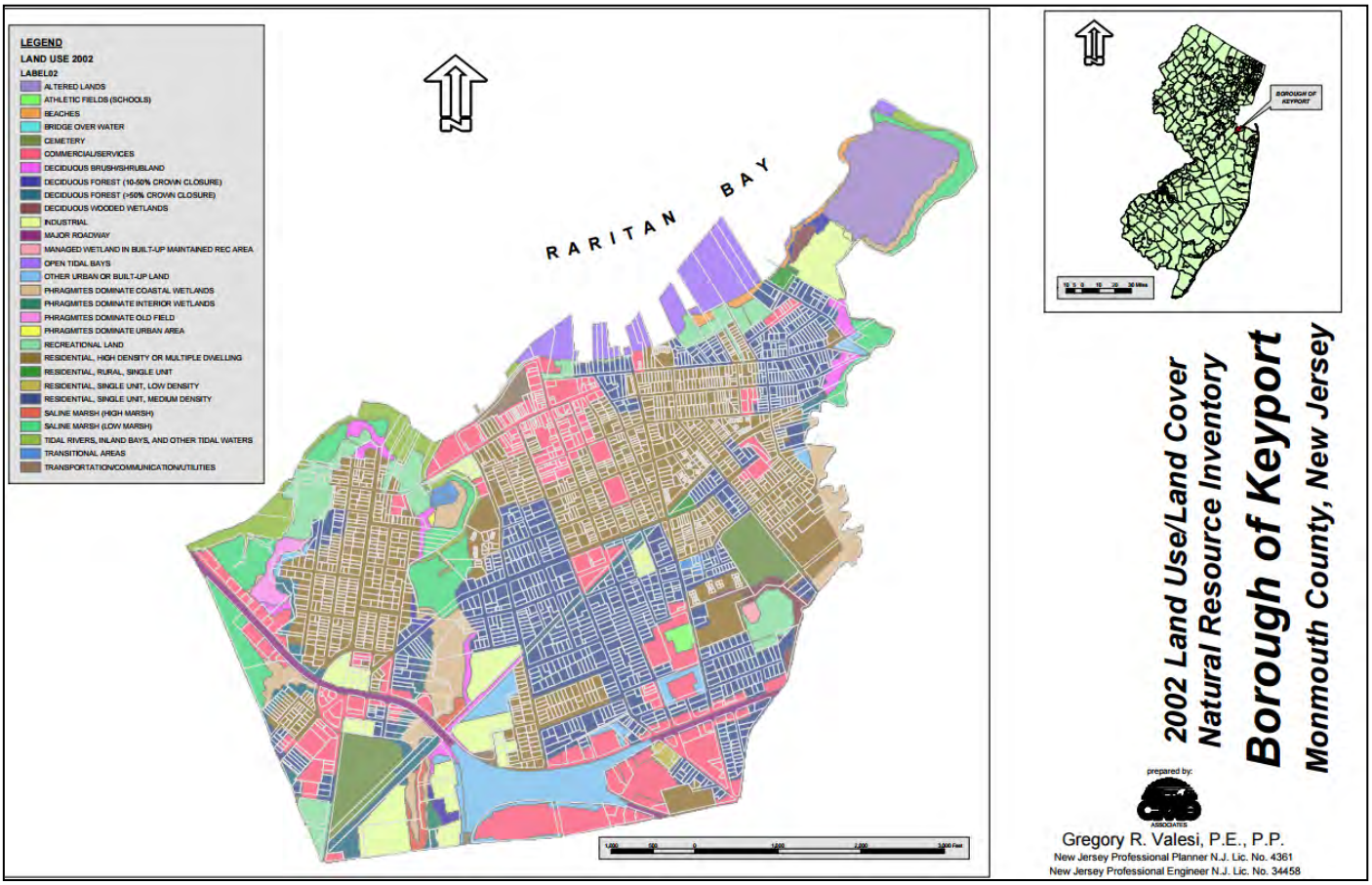
The existing Land Use Map was developed according to data from Monmouth County MODIV and www.etaxmaps.com. Vacant parcels were added based upon observations from site visits during 2016, MODIV data, and information provided by the Borough of Keyport. The Land Use Map shows the uses that are there as of August of 2016, but may not necessarily be permitted uses as per the Zoning Map and Schedule.

A Land Use/Land Cover Map from 2002 delineates the uses in more detail, not by parcels. This map was used in the 2007 Borough of Keyport Natural Resource Inventory.

Map 32: Existing Land Use Map for Walnut-Oak Neighborhood



Map 33: 2002 Land Use/Land Cover Map – Borough of Keyport Natural Resource Inventory[56]



RESIDENTIAL

The Walnut-Oak neighborhood consists primarily of residential uses that are single-family, although there are also some multi-family houses (not shown) and two parcels classified as apartments within the boundaries of the neighborhood. However, one apartment building, located on Block 138, Lot 11, has been vacant since Hurricane Sandy and is shown as vacant on the existing Land Use Map.

Below are a few examples of residential areas in Walnut-Oak.

[56] Valesi, Gregory R. P.E., P.P. "2002 Land Use/Land Cover". Natural Resource Inventory. Borough of Keyport, Monmouth County, New Jersey. Consulting & Municipal Engineers. August 2007.

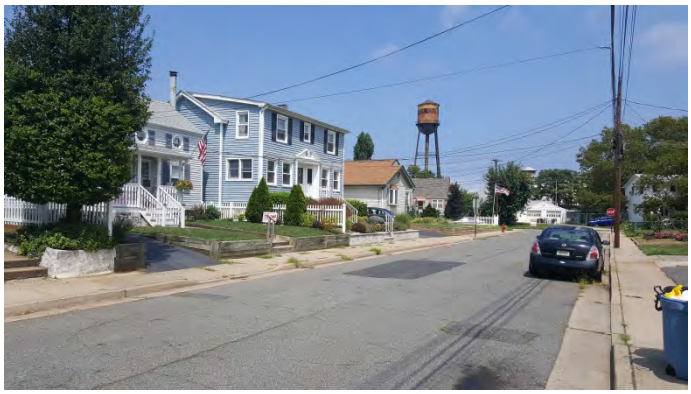


Figure 32: Pine Street residential (August 18, 2016)

Figure 33: Walnut Terrace residential (August 18, 2016)

Figure 34: Fulton Street residential (August 18, 2016)

INDUSTRIAL/COMMERCIAL

Block 141, Lot 15, also known as "Aeromarine Industrial Park" is the only commercial property within the neighborhood boundaries, although there are others nearby. Aeromarine is located off of Locust Street in the northeastern section of the Borough. The site was originally used by the Aeromarine Plane and Motor Company until 1930 to build and test engines and planes, among other machinery.

The northern end of the site was used for a landfill in the 1960s and 1970s and closed in 1979. The former industrial complex is now occupied by a variety of commercial businesses, including auto body, construction, storage, and retailers.

The Borough's Tax Map (Map 13) still shows the Aeromarine commercial buildings, the landfill, and the residential property on the north side of Locust Street as the same Lot 15 on Block 141, despite being different land uses. Although there are a variety of uses, the property is considered commercial by the County MODIV data and zoned as Residential District A – Planned Industrial District (RA – P.I.D.).

Figure 35: Main Aeromarine industrial building (August 18, 2016)

Figure 36: Building used for auto body shop on Aeromarine site (August 18, 2016)

LANDFILL

During the 1960's and 1970's, the northern area of Block 141 Lot 15 was used a landfill. Tons of waste was dumped here creating an abnormally high elevation. The NJDEP "Historic Fill" GIS data layer provides the area of large historic fill exist. The DEP defines historic fill as any non-indigenous material places on a site in order to raise the topographic elevation of the site. It is estimated that the historic fill covers 29.03 acres of the 59.95 acre property or 48.4% as of the most recent update in January 2016.

Figure 37: Entrance to landfill site from Aeromarine Industrial Park (August 18, 2016)

Figure 39: Shoreline of landfill property at Aeromarine along Keyport Harbor/Raritan Bay (August 18, 2016)

Figure 38: Gravel path through landfill site and vegetation (August 18, 2016)

OPEN SPACE AND RECREATION

The Borough of Keyport has met 41.4% of its target for open space acreage, with a 15.43 acre deficit. There are 10.88 acres of existing open space, equating to 1.2% of the total land area; whereas, the target is 26.31 acres of open space.[57] Within the Walnut-Oak Neighborhood, there are approximately 5.78 acres of designated open space, or 8.68 acres if including the Henry Hudson Trail on Monmouth County land. Including the wetlands of the Chingarora Creek and other Monmouth County lands, there are a total of 8.37 acres of open space in the Neighborhood. When including the landfill property and other associated properties (62.98 acres), which are under private ownership, there are then 71.35 acres of open or recreational space. Some of these open spaces are also part of the New Jersey Department of Environmental Protection (NJDEP) Green Acres Program on the Recreation and Open Space Inventory (ROSI).

CEDAR STREET PARK

This park is known as Block 137 Lots 6, 16 and 16.01 on page 12 of the Borough of Keyport's tax map. The tax map describes the Block 137 Lot 6 as containing 0.426 acres; Lot 16 containing 2.95 acres; and Lot 16.01 containing 16.75 acres; totaling 20.126 acres. However, Lot 16.01 is not included in the total because it is mostly underwater and part of a riparian grant; therefore, bringing the total to 3.376 acres. The park is registered under the NJDEP's Green Acres Program.

The park is located behind homes on Pine Street and is accessible from Cedar Street and Pine Street. The Pine Street entrance (Lot 6) has a parking lot with 22 spaces including two (2) handicap spaces. Street parking is available along Cedar Street on the southbound side only. The park contains a full size basketball court, two (2) tennis courts, a little league baseball field and a playground. Walking paths wind through the park connecting the Pine Street entrance to Cedar Street. Additionally, the Park has waterfront access via a sandy path to the beach area.

Figure 40: Ballfield in Cedar Street Park (August 18, 2016)


Figure 41: Walkway and playground in Cedar Street Park (August 18, 2016)

[57] Table 3d.6. "Existing Municipal Open Space and Targets by Jurisdiction, 2005." Monmouth County Park System, 2005. Multi-Jurisdictional Natural Hazard Mitigation Plan – Monmouth County, New Jersey. Draft – 2014 Plan Update. p. 3.d-14.

Figure 42: Tennis courts in Cedar Street Park

Figure 43: Basketball court in Cedar Street Park (August 18, 2016)

Figure 44: Beach at Cedar Street Park (August 18, 2016)

THERESA AVENUE PARK (TERRY PARK)

Theresa Avenue Park, also known locally as Terry Park, is a Borough-owned park located on Block 127 Lot 12, 13, 25 and 25.01 on page 12 of the Borough of Keyport's tax map. The park is located between the end of Cedar Street and the intersection of East Front Street and Myrtle Avenue.

The tax map describes Block 127, Lot 12 as containing 0.448 acres; Lot 13 containing 0.385 acres; Lot 25 containing 0.31 acres; and Lot 25.01 containing 13.35 acres, for a total of 14.493 acres. Some of Lot 25.01 is covered by a landscaped bulkhead and a narrow beach; however much of the Lot is underwater, although it has riparian grants. Not including Lot 25.01, the park totals 1.143 acres. Lot 13 is registered under the NJDEP's Green Acres Program.

A small parking area is located on the north side of East Front Street and street parking is available on the southbound side of Cedar Street. The park contains benches, a gazebo, a swing set, and a landscaped memorial. There is waterfront access to a beach on both sides and a bulkhead extending over the beach area offering a landscaped grassy lawn with a sidewalk and railing around the perimeter.

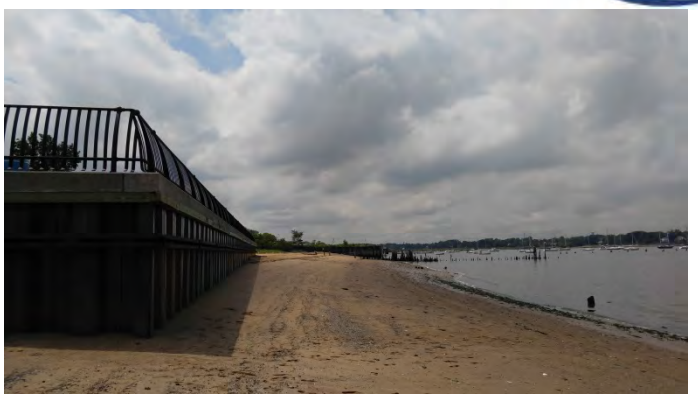


Figure 45: Beachfront and bulkhead at Terry Park on Keyport Harbor (August 18, 2016)

Figure 46: Grass lawn at Terry Park (August 18, 2016)

Figure 47: Walkway and lawn on bulkhead at Terry Park (August 18, 2016)

VETERANS PARK

This park is known as Block 94, Lots 45 and 45.01 on Page 9 of the Borough of Keyport's Tax Map. The Tax Map describes Lot 45 containing approximately 0.659 acres and Lot 45.01 containing approximately 0.602 acres for a total of 1.261 acres +/-. This park is registered under the NJDEP's Green Acres Program.

The park is located north of East Front Street, just west of the East Front Street and Myrtle Avenue intersection. A small parking area is located on the north side of East Front Street. The park contains some picnic tables, waterfront access and a Veterans Memorial.

Figure 48: Lawn and anchor centerpiece at Veterans Park (August 18, 2016)

Figure 49: Grass field at Veterans Park (August 18, 2016)

Figure 50: Picnic area and gazebo at Veterans Park with view of Keyport Harbor (August 18, 2016)

Figure 51: Swing set at Veterans Park (August 18, 2016)

HENRY HUDSON BIKE TRAIL

The Henry Hudson Bike Trail is a former railroad right of way that was turned into a recreational "rail trail" in the 1990s. The path is designated for pedestrian and bicycle use and does not permit vehicles.

The trail is paved and is ten feet in width, extending 24 miles long throughout Monmouth County. The trail's northern section is 12 miles long and runs parallel to Rt. 36. The trail runs along the southern border of the Walnut-Oak neighborhood and extends west into the Borough of Keyport and east into the Borough of Union Beach. The trail can be accessed from Fulton Street, just south of Third Street, as well as from the eastern end of East Third Street, and from Stone Road in Hazlet Township just to the south of the Neighborhood. There is no on- or off-street parking designated for trail use in these locations, but on-street parking is available on East 3rd Street and Fulton Street.

Figure 52: Henry Hudson Trail at Stone Road (August 18, 2016)

Figure 53: Cyclists on Henry Hudson Trail (August 18, 2016)

OTHER OPEN SPACE

Much of the Walnut-Oak Neighborhood is developed with the exception of Wetlands, the old Aeromarine property and the parks mentioned above. Additionally, there is a fairly large portion of undeveloped land in the south east corner of the Neighborhood. The property, Block 139 Lot 1, is bounded by Stone Road to the south, Walnut Street to the northeast and 1st Street to the northwest. The property is approximately 9,200 square feet, or 0.211 acres, according to the 2014 MODIV tax data.

Figure 54: Open space on Block 139, Lot 1, facing south on First Street (August 18,2016)

WETLANDS

Due to the proximity to the Chingarora Creek, there is a large presence of wetlands in the Walnut-Oak Neighborhood. The Creek makes up most of the eastern boarder of the Neighborhood and as a result, much of the land adjacent to it is within the wetlands boundary. According to the NJDEP 2012 Land Use/Land Cover GIS data, the wetlands surrounding the Creek are classified as saline marshes. There is another small area of wetlands that is located in the west on the shore in the Aeromarine site. This wetland is labeled as a Deciduous Scrub/Shrub Wetland. The Creek wetland is 19.5 acres and the Aeromarine wetland is 1.348 acres, totaling 21.03 acres or 21.7% of the total area of the Walnut-Oak neighborhood.

Figure 55: Chingarora Creek wetlands near Henry Hudson Trail bridge (August 18, 2016)

Figure 56: Chingarora Creek wetlands near Stone Road (August 18, 2016)

Figure 57: Chingarora Creek wetlands near First Street (August 18, 2016)

VACANCIES

According to the data used in the Monmouth County Multi-Jurisdictional Natural Hazard Mitigation Plan, the Borough of Keyport had an estimated 151 vacant parcels. Ninety (90) of those vacant parcels are located in delineable hazard areas. Whereas eleven (11) of the ninety (90) parcels located in delineable hazard areas are protected as open space; the other seventy-nine (79) parcels are potentially developable. Seventy-six percent (76%), or sixty (60), of the seventy-nine (79) potentially developable vacant parcels in delineable hazard areas are also identified for growth; whereas twenty-four percent (24%), or nineteen (19), are identified for limited growth/conservation.[58]

Based on observations from a site visit on August 18, 2016, there were eight (8) identified vacant parcels marked by the Borough of Keyport Fire Department in the Walnut-Oak neighborhood. Of these, three (3) were also damaged during Hurricane Sandy, which includes Block 138, Lots 11, 15, and 17. According to a separate list provided by the Borough of Keyport[59], there are eleven (11) abandoned properties in the neighborhood, five (5) of which were also observed and six (6) which were not. Those that overlap are shown in yellow on Map 34.

In addition, there are four (4) vacant, but undeveloped properties in the neighborhood that are included in the Monmouth County MODIV data, which are not classified in the properties identified above. These properties are shown in red on Map 34 and include Block 134, Lot 15 and Lot 27.02; Block 140, Lot 1 (with additional Lots 2 and 3); and Block 141, Lot 14. These lots are primarily wetlands or wooded.

Block	Lot
134	2 3 15 25
135	8 10
136	14 34 38
137	2
138	11 16 18
140	1
141	1.01 14

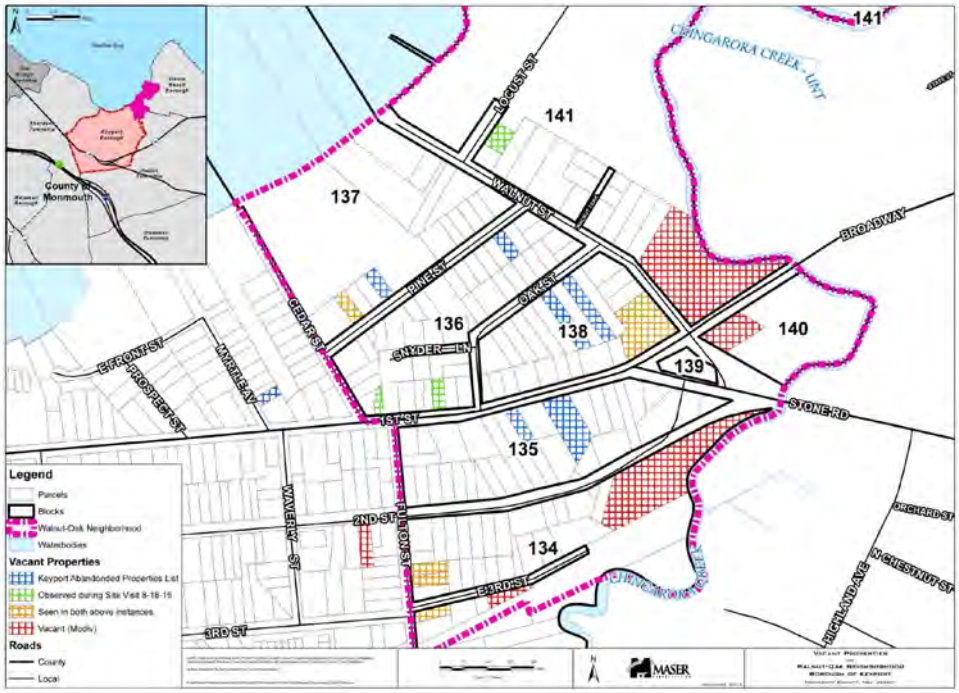
Table 9: Vacant Properties in Walnut-Oak Neighborhood

[58] Table 3d.9. "Potentially Developable Vacant Land in Identified Hazard Areas, by Jurisdiction." Monmouth County Park System, 2005. Multi-Jurisdictional Natural Hazard Mitigation Plan – Monmouth County, New Jersey. Draft – 2014 Plan Update. p. 3.d-40.
[59] Abandoned Properties List. http://www.keyportonline.com/filestorage/4135/4921/Copy_of_2016_vacant_list_jessi.1.pdf. Accessed: September 2016.

Figure 58: Vacant property on First Street (August 18, 2016)

Figure 59: Vacant property on Second Street (west of neighborhood boundary) (August 18, 2016)

Figure 60: Vacant properties on Fulton Street (August 18, 2016)



Map 34: Vacancies in Walnut-Oak Neighborhood

LAND USES AND DEVELOPMENT TRENDS IN HAZARD AREAS

According to the Monmouth County Multi-Jurisdictional Natural Hazard Mitigation Plan, it was reported that development patterns in Keyport include the continuation of residential development fifty (50) yards from the waterfront. There have been ten (10) new homes built within last five years. Future projects include a multi-condominium project along a creek bed. Since the last version of the Plan, recent additional approvals include twenty-six (26) condominium units along a creek bed. Inquiry by developers continues, requesting approvals for waterfront multi-family units.[60]

The property at 331 First Street, the site of the vacant ten-unit multi-family apartment building on Block 138, Lot 11, is currently approved for a twelve-unit townhome project.[61] This would allow two- and three-bedroom units with two car garages, equating to 1,685 square feet each. A new water line would need to be run to the site, as the current water line is only four (4") inches and the buyer would need to remove the existing buildings. Below is an architectural rendering of what the townhomes could look based upon the given approvals.

Figure 61: Rendering of possible townhome design for 331 First Street, Keyport (RE/MAX of New Jersey, September 15, 2016)

REGULATIONS AND ORDINANCES TO PROTECT NEW DEVELOPMENT FROM NATURAL HAZARDS

According to the Monmouth County Natural Hazard Mitigation Plan, "The jurisdiction [of the Borough of Keyport] continues to enforce or regulate development by enforcement of CAFRA regulations and floodplain management best practices along Raritan Bay and along our two creeks."[62] Additionally, the Borough has High Wind Criteria for new development along Raritan Bay/Keyport Harbor bayfront.

NEW JERSEY STATE DEVELOPMENT AND REDEVELOPMENT PLAN

[60] Multi-Jurisdictional Natural Hazard Mitigation Plan – Monmouth County, New Jersey. Draft – 2014 Plan Update. Table 3d.8. "Municipal Development Patterns." p. 3.d-30.

[61] 331 First Street. Listing provided by Susan Montanti, Re/Max Imperial, Source: RE/MAX of New Jersey. Accessed September 15, 2016. http://www.zillow.com/homes/for_sale/Keyport-NJ/pmf,pf_pt/2107619782_zpid/5416_rid/40.444934,-74.187203,40.437798,-74.198737_rect/16_zm/?3col=true

[62] Multi-Jurisdictional Natural Hazard Mitigation Plan – Monmouth County, New Jersey. Ibid.

The New Jersey State Development and Redevelopment Plan designates a number of "planning areas" on the Policy Map. An excerpt of the map for the Walnut-Oak Neighborhood area of the Borough of Keyport is shown below.

The New Jersey State Plan lays out various Planning Areas with differing priorities for development, redevelopment, and conservation. These Planning Areas are to be coordinated with the local Master Plan documents and other planning or development studies. This Neighborhood Plan seeks, in part, to rectify the existing development with the objectives of the State Plan.

> *"The State Plan promotes the strategic application of investment and regulatory policy to repair and maintain infrastructure in developed areas, to reestablish adequate levels of service in over-burdened communities and to protect the agricultural, natural and cultural resources of the state. The State Plan's Statewide Policies are applied to the natural and built resources of the state through the designation of five Planning Areas. These Planning Areas reflect distinct geographic and economic units within the state and serve as an organizing frame work for application of the Statewide Policies of the State Plan.[63]"*

Most of Walnut-Oak is located within the "Metropolitan Planning Area", or Planning Area 1 (PA1), of the New Jersey State Plan Policy Map. The objectives for PA1 are to "provide for much of the State's future redevelopment; revitalize cities and towns; promote growth in compact forms; stabilize older suburbs; redesign areas of sprawl; and protect the character of existing stable communities.[64]" Although the Borough of Keyport has managed sprawl and kept its dense character, many of the objectives and concerns of the Planning Area 1 apply to the Neighborhood. Many other urban centers and mature communities, which are often connected by rail and/or influenced by major metropolitan centers, such as New York City/Newark/Jersey City, are also included in the PA1 designation. These communities share common motifs including a lack of or diminishing vacant land; expiring infrastructure; increasing need for redevelopment; regionalization of services; need to rehabilitate housing; and shifting demographics.

The State outlines delineation criteria for the Metropolitan Planning Area (PA1) and suggests that local conditions may require flexible application of the criteria to achieve the Policy Objectives.[65] These include:

1. Density of more than 1,000 people per square mile
2. Existing public water and sewer systems, or physical accessibility to those systems, and access to public transit systems.
3. Land area greater than one square mile.
4. A population of not less than 25,000 people.
5. Areas that are totally surrounded by land areas that meet the criteria of a Metropolitan Planning Area, are geographically interrelated with the Metropolitan Planning Area and meet the intent of this Planning Area.

"To achieve consistency with State Plan Goals, municipal, county, regional and state agencies should implement Statewide Policies by undertaking the following activities, where appropriate:

- Strengthen or establish regional planning consortiums.

[63] State of New Jersey Department of State. New Jersey State Development and Redevelopment Plan: State Plan Policy Map. P.181. http://www.nj.gov/state/planning/docs/stateplan030101d.pdf
[64] Ibid. P.186.
[65] Ibid. P.190.

- Perform a community build-out analysis to determine opportunities for and impacts of future development under existing zoning.
- Identify regional focal points for public and private investment.
- Inventory the condition and capacity of infrastructure components such as roads, wastewater treatment facilities, water supply, and public buildings and parks, and prioritize maintenance and rehabilitation projects.
- Develop strategic capital plans and budgets to reduce infrastructure backlogs and adequately address ongoing maintenance and modernization.
- Integrate planning and implementation at all appropriate scales—the neighborhood, municipality, county, corridor and region (including interstate linkages).
- Coordinate permitting and land use approval requirements that recognize the regional and statewide interest in encouraging private investment in the Metropolitan Planning Area.
- Identify strategies for linking the region internally and externally.
- Identify opportunities and prepare guidelines for retrofitting concentrations of commercial, industrial and institutional land uses.
- Support needed improvements for downtown business communities by establishing programs such as "Special Improvement Districts" in Centers."[66]

Within the Walnut-Oak Neighborhood, there are also areas designated as "Environmental Sensitive Planning Areas", or Planning Area 5 (PA5). The Aeromarine site, landfill, wetlands along the Chingarora Creek, and Keyport Harbor waterfront, including some developed areas, are included in PA5.

In PA5, the objectives are to "protect environmental resources through the protection of large contiguous areas of land; accommodate growth in Centers; protect the character of existing stable communities; confine programmed sewers and public water services to Centers; and revitalize cities and towns.[67]"

> *"The State Plan Policy Map uses the Environmentally Sensitive Planning Area as the primary means of protecting and managing the larger areas of natural resources of New Jersey. Because it recognizes that there are important natural resources found in other Planning Areas, the State Plan recommends the designation of particular resources as Critical Environmental Sites or Historic and Cultural Sites through the Cross-acceptance and municipal and county master planning processes. Designation as a Critical Environmental Site, in addition to appropriate Statewide Policies, applies the Intent and applicable Policy Objectives of the Environmentally Sensitive Planning Area to these resources. Designation as a Historic and Cultural Site applies appropriate applicable Statewide Policies to these resources.[68]"*

"To achieve consistency with State Plan Goals, municipal, county, regional and state agencies should implement Statewide Policies by undertaking the following activities:

- Prepare and maintain Environmental Resource Inventories (ERIs) and incorporate ERI information into master plans.
- Perform a community build-out analysis to determine opportunities for and impacts of future development under existing zoning.
- Map and protect Critical Environmental Sites and Historic and Cultural Sites.

[66] Ibid. Pp.199-200.
[67] Ibid. P.217.
[68] Ibid. P.181.

- Identify strategies for linking Centers with the region and accommodating seasonal travel and tourism demands.
- Coordinate permitting and land-use approval requirements that encourage development and investment in Centers.
- Identify strategies to protect natural systems and their functions.
- Identify strategies to enhance tourism and recreation-based activities.
- Identify opportunities to assemble and connect open space networks and large contiguous areas of undisturbed habitat.
- Ensure that areas critical to water supply and quality are protected.
- Identify opportunities to accommodate growth and development in Centers through provision of infrastructure, particularly wastewater systems in Centers.
- Recognize and facilitate the participation of the private sector in achieving the objectives of the State Plan in the Environmentally Sensitive Planning Area.
- Support needed improvements for downtown business communities by establishing programs such as Special Improvement Districts in Centers.
- Capitalize on the opportunities for redevelopment in Centers afforded by redevelopment laws and brownfields redevelopment programs. Establish and maintain a publicly accessible inventory of sites recommended for redevelopment.
- Identify areas of active agriculture and develop strategies to enhance the viability and preservation of these farms." [69]

Additionally, the entire Neighborhood is located in a Coastal Area Facility Review Act (CAFRA) area, as per N.J.A.C. 7:7-2.2 in the Coastal Zone Management Rules and defined by N.J.S.A. 13:19-1 et seq.

Planning Area 1 (PA1) of the State Plan is not as restrictive for CAFRA requirements as other planning areas. A maximum of 80% impervious surface is permitted in developments in PA1 and CAFRA permits are only triggered by high development intensity.

According to N.J.A.C. 7:7-13.15 Coastal Planning Areas in the CAFRA Area, the descriptions and policy objectives for the Coastal Metropolitan Planning Area (b) and the Coastal Environmentally Sensitive Planning Area (f) are:

"(b)The Coastal Metropolitan Planning Area includes a variety of communities on the New Jersey coast. This Coastal Planning Area generally has a high population density and existing public water and sewer systems. The policy objectives for the Coastal Metropolitan Planning Area are as follows:

1. *Guide development and redevelopment to ensure efficient use of scarce land while capitalizing on the inherent public facility and service efficiencies of concentrated development patterns;*
2. *Accommodate a variety of housing choices through development and redevelopment;*
3. *Promote economic development by encouraging redevelopment efforts such as infill, consolidation of property, and infrastructure improvements, and by supporting tourism and related activities;*
4. *Promote high-density development patterns in coastal urbanized areas to encourage the design and use of public transit and alternative modes of transportation to improve air quality, to improve travel among population and employment centers and transportation terminals, and to promote transportation systems that address the special seasonal demands of travel and tourism along the coast;*

[69] Ibid. Pp.220-221.

5. *Encourage the reclamation of environmentally damaged sites and mitigate future negative impacts, particularly to waterfronts, beaches, scenic vistas, and habitats;*
6. *Promote public recreation opportunities in development and redevelopment projects, and ensure meaningful public access to coastal waterfront areas; and*
7. *Encourage the repair or replacement of existing infrastructure systems where necessary to ensure that existing and future development will cause minimal negative environmental impacts."*[70]

(f) The Coastal Environmentally Sensitive Planning Area generally has large contiguous land and water areas with critical coastal ecosystems, wildlife habitats, geological features, and other valuable coastal resources. Some of these lands have remained rural and relatively undeveloped, while others have been dominated by development for many years, such as the coastal barrier islands and spits. The barrier islands represent a major public investment in infrastructure systems that should be maintained while protecting the economic and ecological value of adjacent coastal resources. Centers on the barrier islands are almost all served by public wastewater facilities whereas centers in other environmentally sensitive areas are not often. Centers are usually linked by rural roads and separated by open spaces, or linked to the mainland by State highways crossing coastal wetlands and waterways. Areas outside of centers in the Coastal Environmentally Sensitive Planning Area are by definition more vulnerable to disturbance from new development. Damage may include fragmentation of landscapes, degradation of aquifers and potable water supplies, habitat destruction, extinction of plant and animal species, and destruction of other irreplaceable resources that are vital to the preservation of the ecological integrity of the coastal area. The Coastal Environmentally Sensitive Planning Area also supports recreation and tourism industries, and resource based industries such as mining and forestry. The policy objectives for the Coastal Environmentally Sensitive Planning Area are as follows:

1. *Protect environmentally sensitive features by guiding development into centers and maintaining low intensity development patterns elsewhere, carefully link the location, character and magnitude of development to the capacity of natural and built environments to support new growth, accommodate development at higher intensities in the Coastal Environmentally Sensitive Planning Area barrier island centers, compatible with development patterns in existing centers, and discourage the development of public infrastructure facilities outside of centers;*
2. *Encourage transportation systems that link centers and support the travel and tourism industry, recreational and natural resource-based activities, and address the special seasonal demands of travel and tourism to barrier islands;*
3. *Locate economic development opportunities in centers that serve the surrounding region and the travel and tourism industry and accommodate in other areas appropriate seasonal, recreational, and natural resource based-activities that have a minimal impact on environmental resources; and*
4. *Protect sensitive natural resources critical to the maintenance of coastal ecosystems by maintaining large contiguous areas of undisturbed habitat, open space and undeveloped land, maintain the balance of ecological systems and growth, and protect the areas outside of centers from the effects of development by maintaining it as open space."*[71]

[70] New Jersey Administrative Code. N.J.A.C. 7:7-13.15(b). Coastal Zone Management Rules. October 17, 2016. P. 227
[71] Ibid. P.229.

Figure 62: Walnut-Oak area (outlined in red dashes) of Borough of Keyport in "Policy Map of the New Jersey State Development and Redevelopment Plan and Monmouth County"[72]

ZONING

The zoning regulations for the Borough of Keyport may be found in the Revised Land Use Ordinance of the Borough of Keyport (Ord. #13-90, §25-1). As defined by this Chapter, there are four residential districts, RA, RB, and RC, as well as the Planned Industrial District RA (P.I.D.). Except for the Aeromarine site on Block 141, Lot 15, the entirety of the Walnut-Oak neighborhood is zoned as Residential Zone A (RA). The Aeromarine site is zoned as RA (P.I.D.). However, as per §25:1-5, both zones RA and RA (P.I.D.) have the same permitted uses, conditional uses, and other development standards and requirements, although the Planned Industrial District has a separate development option.

See Appendix VI for the full Existing "Borough of Keyport Code Section 25:1-16 Zoning Schedule". Below is an excerpt of the RA and LI zones, which are relevant to the Study Area.

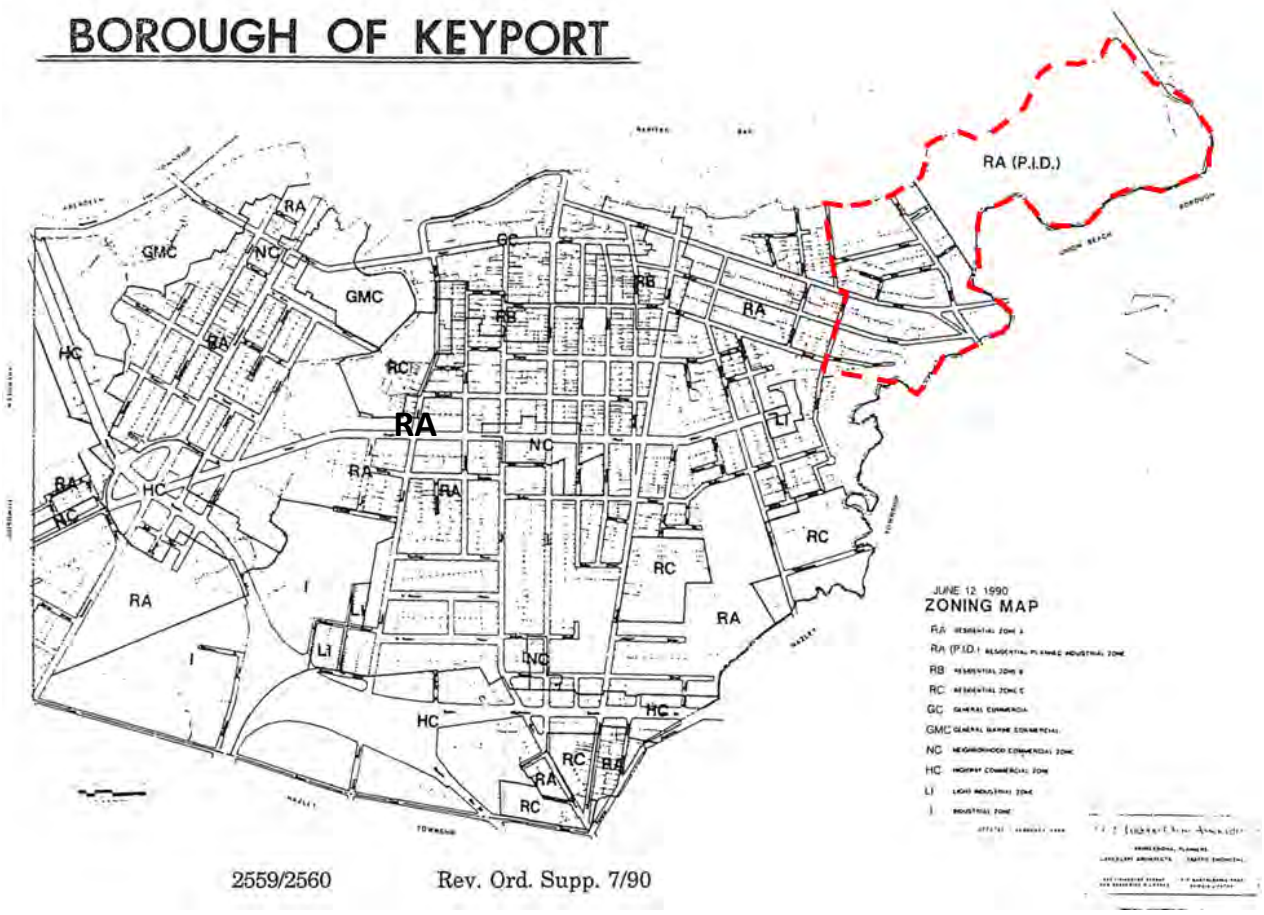
[72] Source: S. Karp, Cartographer. N.J. Office for Planning Advocacy. October 18, 2012.

District	Minimum Lot Requirements		Minimum Required Yard Depth						Maximum Percent of Lot Coverage by Buildings Inclusive of Accessory Buildings	Maximum Height		Maximum Percent Coverage		Maximum Percent of Lot Coverage by all Buildings and Impervious Surfaces
			Principal Building				Accessory Building							
	Area (square feet)	Lot Width (feet)	Front Yard (feet)	Minimum One Side Yard (feet)	Both Side Yards (feet)	Rear Yard (feet)	Side Yard (feet)	Rear Yard (feet)		Stories	Feet	Principal Building	Accessory Building	
RA	7,500	75(3)	20	6	16	15	3	3	40	2.5	30	30	10	60
and RA (PRD)	For Single Family, same as RA; For Planned Residential Development - see section													
LI	12,500	100	15	6	16	25	6	16	50	3	40	50	10	90

A note in the Schedule (Note 3) for Lot Width in the RA District states that "This shall not apply to lots containing a 50' lot width and a minimum lot requirement of 5,000 square feet, as some were conforming prior to the adoption of Ordinance Nos. 22-03 and 1-07. This shall also be deemed to apply to any such lot that may have been rendered nonconforming exclusively by the adoption of Ordinance No. 22-03."

However, many lots in this Neighborhood are still undersized by lot width and minimum lot area. There are approximately ninety-six (96) lots that have a lot width of forty (40') feet or less, according to the most recent Borough of Keyport Tax Maps.

Map 35: Borough of Keyport Zoning Map (Rev. Ord. Supp. 7/90) (Walnut-Oak Neighborhood outlined in red)



25:1-5 RESIDENTIAL DISTRICT A (RA) AND PLANNED INDUSTRIAL DISTRICT RA (P.I.D.)

25:1-5.1 PERMITTED PRINCIPAL USES.

a. Single-family detached dwelling.
b. Church, Sunday school, and other places of worship subject to Section 25:1-15.
c. Eleemosynary and philanthropic institutions.
d. Public school, park, playground, fire house, library, municipal building.
(Ord. #13-90, §25-5)

25:1-5.2 PERMITTED ACCESSORY USES.

a. Uses customary and incidental to principal use.
b. Home gardening but not the raising of livestock, poultry, or similar objectionable activities.
c. Signs subject to standards of Section 25:1-17.
d. Private garages and private parking areas.
e. Other accessory uses and structures customarily appurtenant and incidental to a principal permitted use, including radio and television antenna subject to subsection 25:1-15.14.
(Ord. # 13-90, §25:1-5.2)

25:1-5.3 CONDITIONAL USES.

a. Private school or college subject to standards of Section 25:1-15.
b. Licensed nursing homes and nursery schools subject to standards of Section 25:1-15.
c. Home occupation and professional home office subject to subsection 25:1-5.6.
(Ord. #13-90, §25:1-5.3)

25:1-5.4 DEVELOPMENT STANDARDS.

As set forth in Schedule Section 25:1-16, unless specific standard is set forth hereinafter or within Section 25:1-14 (General Regulations) and 25:1-15 (Supplemental Regulations).

25:1-5.5 MINIMUM OFF-STREET PARKING REQUIREMENTS.

Two and one-half (2.5) spaces of one hundred eighty (180) square feet, ten by eighteen (10' x 18') feet or nine by twenty (9' x 20') per dwelling unit. (Ord. #13-90, §25:1-5.5)

25:1-5.6 OTHER REQUIREMENTS.

a. *Nonresidential Uses in the RA Zone*. Nonresidential uses in the RA zone shall be provided with a minimum lot area of fifteen thousand (15,000) square feet and a minimum lot width of one hundred fifty (150') feet. Structure(s) erected or altered to be used on a lot for any other purpose other than a residence shall not exceed forty (40%) percent of the total area in lot coverage.
b. *Incidental Home Occupations*. Incidental homes occupations shall be permitted providing that no more than one person other than the owner of the premises is employed thereby, that is be confined to not more than fifty (50%) of the habitable floor area of the principal structure or six hundred fifty (650) square feet, whichever the lesser. No retail sales shall be permitted.

c. *Office of a Resident Professional Person*. The office of a resident professional person shall be permitted when carried on in the residence of an occupant and not in an accessory building, provided it does not include retail business of any sort.
(Ord. #13-90, §25-5.7)

25:1-5.7 DEVELOPMENT OPTION: PLANNED INDUSTRIAL DEVELOPMENT.

In order to preserve open space and environmentally sensitive areas, promote the economic development, as well as to establish flexibility of design and a variety of employment opportunities, a planned industrial development option is permitted only in the RA (P.I.D.) District.

a. Minimum tract size: Fifty (50) acres.
b. Permitted Uses: Same as Limited Industrial Zone Section 25:1-11.
(Ord. #13-90, §25-5.7)

25:1-11 LIMITED INDUSTRIAL DISTRICT (LI)

25-1:11.1 PERMITTED PRINCIPAL USES.

a. Wholesale storage and warehouse facilities.
b. Lumber, building materials, and other storage yards, but not salvage or junk yards.
c. Processing or assembly of materials for products sold on the premises such as a baking plant, dry cleaning plant, etc.
d. Laboratory or research facilities.
e. Boat yards and boat building facilities.
f. Light industrial use provided same shall not create toxic or corrosive fumes, gas, smoke, odors, obnoxious dust or vapor, offensive noise or vibration, glare, flashes, or objectionable effluent, the effects of which would be noticeable outside the Limited Industrial District.
(Ord. #13-90, §25-11.1)

REDEVELOPMENT AREAS

The Aeromarine property, tax lots 14 and 15 in Block 141, as well as a shore public street right-of-way known as Locust Street, is located in a Redevelopment Plan Area and includes 62 acres. One Redevelopment Plan was adopted in 2005 for the site and included residential development with open space and a restaurant. Although the Redevelopment Plan has not been followed through, the site is still eligible to be redeveloped per the uses provided in the Plan. Below are some of the site maps and land use maps for the previously proposed redevelopment.

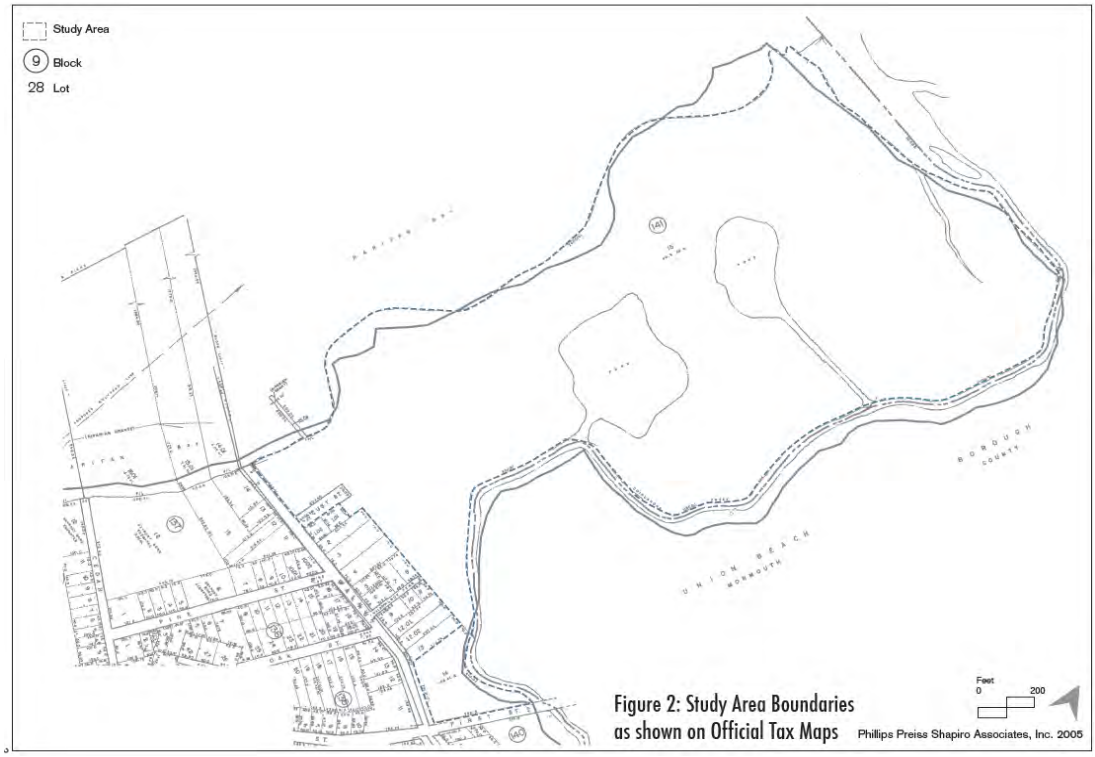


Figure 63: Study Area Boundaries of Aeromarine Redevelopment Plan Area[73]

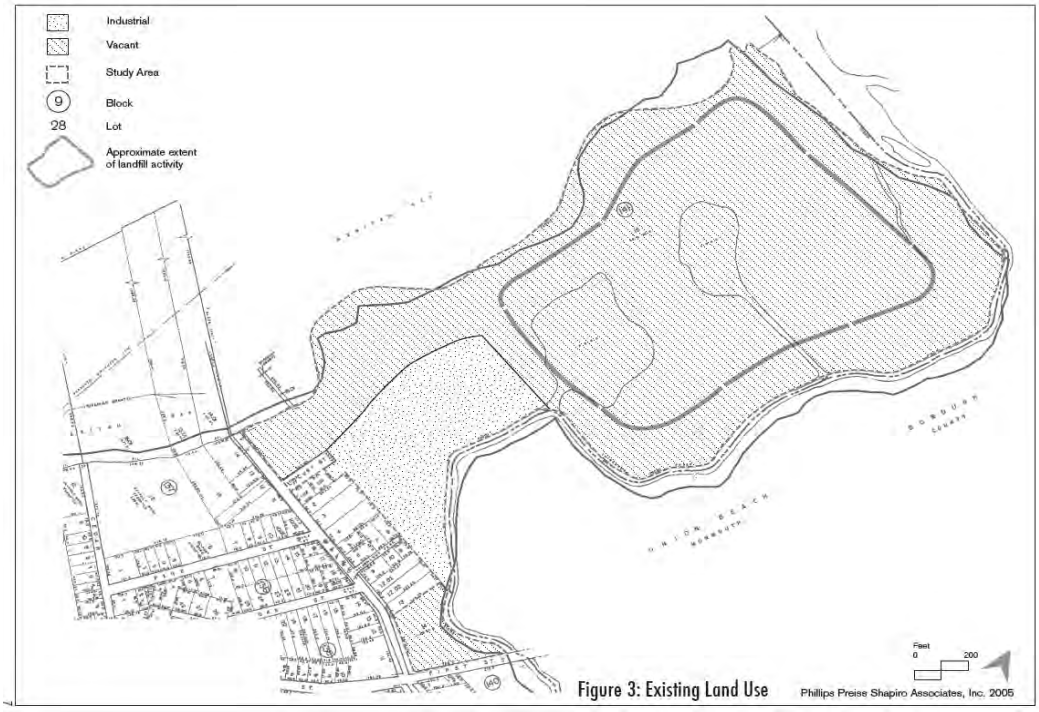


Figure 64: Existing Land Use of Aeromarine Redevelopment Plan Area[74]

[73] Aeromarine Area Redevelopment Plan. Borough of Keyport, New Jersey. Prepared by Phillips Preiss Shapiro Associates, Inc. Planning and Real Estate Consultants. June 2005. Revised September 2005. P.3.
[74] Ibid. P.7.

Figure 65: Illustrative Conceptual Plan of Aeromarine Redevelopment Plan Area[75]

In addition to the Conceptual Plan, the 2005 Aeromarine Area Redevelopment Plan allows the following uses for the site, which may still apply[76]:

A. Permitted Principal Uses:

1) Dwellings, subject to the requirements of Section 3.6 below and the following:
    a) At least 10 percent but no more than 50 percent of the dwelling units shall be age-restricted to those 55 and older.
    b) No more than 60 percent of the dwelling units shall be located in residential buildings of three or more units that are not townhouses.
    c) Dwelling units with more than two bedrooms are not permitted.
2) Live-work units, subject to the following:
    a) The redeveloper shall be permitted to substitute one live-work unit for each dwelling unit, up to a maximum of 5 percent of the total proposed dwelling units within the redevelopment area.
    b) No portion of the live-work unit shall be sublet or rented out for any other purpose.
    c) In addition to the occupant of the live-work unit, no more than one full-time employee, or the equivalent thereof, shall be employed in the live-work unit.

[75] Ibid. P.10.
[76] Ibid. Pp.11-13.

d) The live-work unit shall have proper sound insulation and ventilation to insure the safety and quiet enjoyment of the residential portions of the building.
e) Residential and nonresidential activities shall be separated so as to prevent fumes, noise, dust or other noxious byproducts from reaching the residential portions of the building.

3) Outdoor active recreation facilities, including ball fields, tennis and basketball courts, track-and-field facilities, bocce courts, swimming pools and similar facilities. However, facilities which are likely to monopolize large portions of the site for a single recreation use, such as golf courses and driving ranges, are not permitted. See Section 3.4 below for further discussion of the active recreation facilities.
4) Passive recreation facilities, including walking trails and lawns.
5) Beaches.
6) Conservation areas, including wetlands and forested areas.
7) Restaurants, bars, marinas and other water-dependent uses, convenience stores, tackle/bait shops and offices, subject to the following:
   a) Such uses shall be subject to all restrictions on such establishments in the Borough's ordinances.
   b) Such uses may occupy the first floor of residential buildings or may be located in standalone buildings, subject to the requirements in Section 3.6 of this Plan.
   c) Such uses together with the uses permitted in A(8) below shall not occupy more than 50,000 square feet of floor area within the redevelopment area.
8) Light fabrication and craft-oriented uses, including artisan studios, craft shops, cabinet and furniture making, woodworking, and pottery, subject to the following:
   a) Such uses together with the uses permitted in A(7) above shall not occupy more than 50,000 square feet of floor area within the redevelopment area.
   b) Such uses shall be separated from all residential and live-work units by a suitably landscaped buffer at least 100 feet in width.
   c) Such uses shall not be located in buildings which also have residential or commercial uses.
   d) Outdoor uses shall be screened in accordance with the requirements of subsection 25:1-14.6 of the zoning ordinance.
9) Civic and community uses including a community center, museum, or other use reflective of the history of the site.

B. Permitted accessory uses:

1) Clubhouses, swimming pools and other recreation facilities and areas for exclusive use by residents, provided that such facilities and grounds are not counted toward the minimum area requirements for open space.
2) Accessory buildings such as gazebos and pavilions.

In addition, the 2005 Redevelopment Plan envisions two types of open space, which include (i) linear open space providing continuous access to the waterfront of the Raritan Bay and the Chingarora Creek; and (ii) large areas dedicated to active and passive recreation.

In 2010, an amendment to the 2005 Redevelopment Plan was adopted, known as the Aeromarine Area Redevelopment Plan Solar Overlay Amendment. The amendment allows for a ground-based solar panel facility to be located on the landfill area of the site. Approval to develop on the property has been difficult to

obtain because of the landfill and its unknown pollution, which has influenced the idea that the "highest and best use" for the brownfield is a solar farm. So far, there has not been a solar panel facility approved either.

As called out in the 2014 Strategic Recovery Planning Report, it is important to note that the landfill site essentially became an island during the storm surge of Hurricane Sandy with the surrounding area under water. Along with the challenges presented by the landfill itself, the potential disconnect of the property from the rest of the Borough during a future storm poses a threat.

NEIGHBORHOOD CHARACTER

The Walnut-Oak Neighborhood of Keyport has a rich history which is embodied in the physical character of the place. While the Neighborhood is a distinguishable place as a whole, each street has its own character in and of itself, as described in-depth below. In contrast, some other areas, whether inflicted by storm damage and flooding; foreclosures and vacancies; overgrowth and lack of maintenance; or general neglect for design standards, seem to have lost or never fully developed their sense of place.

The goal of this analysis is to determine unifying threads of architectural and streetscape styles, as well as zoning and land use regulations, that make the street and Neighborhood unique and ultimately use those to improve upon.

WALNUT STREET

Walnut Street is one of the primary connecting roads within the Walnut-Oak Neighborhood, which runs, generally, northwest-southeast between First Street and Keyport Harbor/Raritan Bay, perpendicular to Oak Street, Pine Street, and First Street and parallel to Cedar Street.

Map 36: Location of Walnut Street in Walnut-Oak Neighborhood (circled in red)

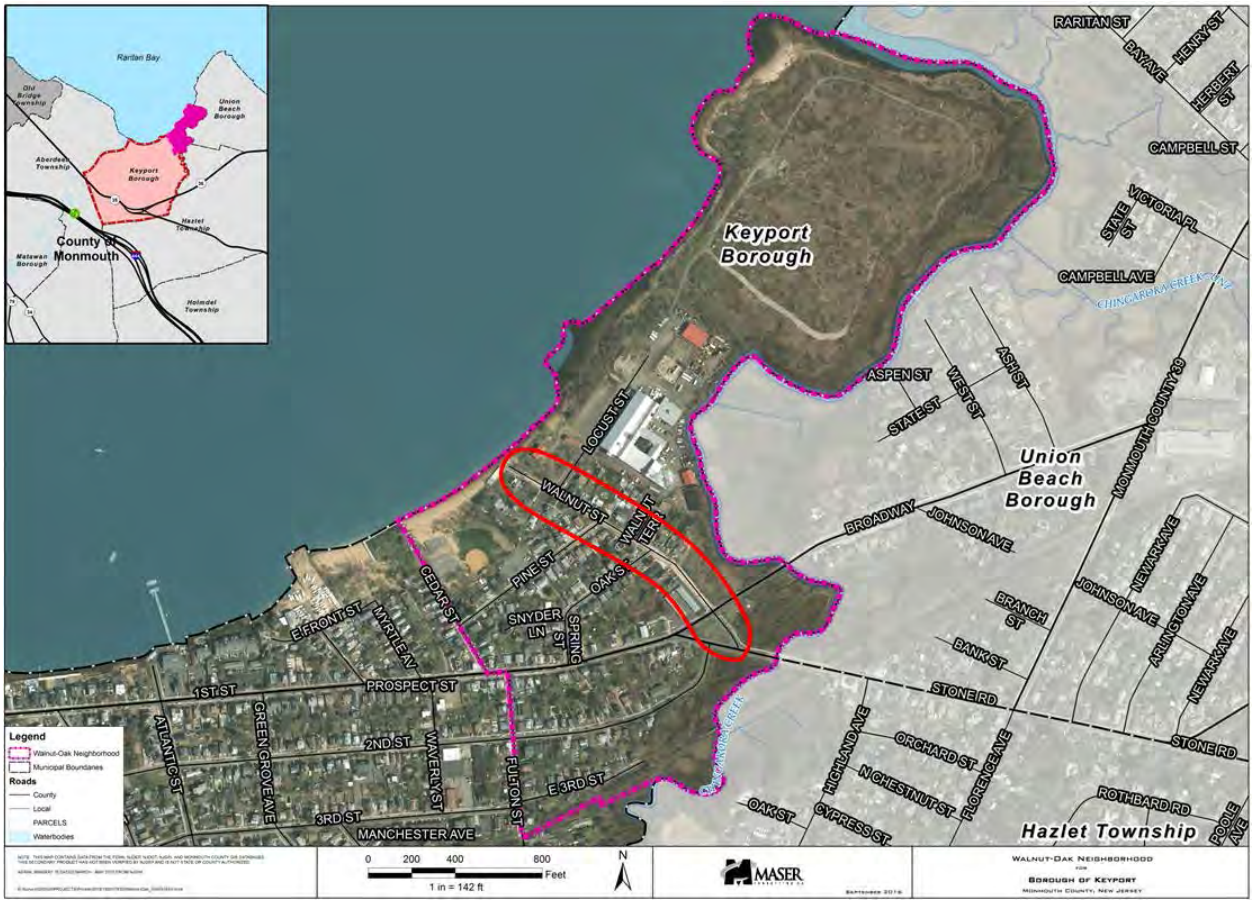


Figure 66: Walnut Street at First Street (August 18, 2016)

The qualities found at the southern end of Walnut Street at First Street are vastly different than those found at the northern end or even the central portion. The entrance to Walnut Street from First Street and Stone Road

is largely uninspiring, with a one-story ten-unit multi-family building on a 194x169 square foot lot on the northwest corner, damaged from flooding during Hurricane Sandy and now vacant. On the opposite side to the northeast, a chain-link fence guards the overgrown forested wetlands, part of the Aeromarine property, and from which hang small commercial signs. The condition of the road and sidewalks is poor, with major fissures in the road and the sidewalks heavily overgrown. The sidewalk on the easterly side of the road is essentially non-existent as it has been covered in sand, grass, and weeds, while the left side contains telephone poles and light fixtures in the middle.

Beyond First Street and the first two properties, the sidewalk and road conditions appear like patchwork and the conditions vary. There are sidewalks along both sides of the street, as far as there are developed properties. Some newer sidewalks appear to meet the width and ADA requirements and are maintained, while other segments are overgrown with weeds, paved over with asphalt, too narrow, or have large segments of driveway cutouts. The sidewalks and road at the end of Walnut Street near the bulkhead at Keyport Harbor are in poor condition with upheaval and overgrowth of weeds.

The entirety of the street is residential in land use – most of which is single-family. The ten-unit structure at First Street and a six-unit structure at Oak Street are the only two multi-family buildings on Walnut Street, although Block 141, Lots 2 and 4 each have two structures with one unit per structure.

Figure 67: Walnut Street (August 18, 2016)

With the exception of the kneewalls protecting the lawns and a few stately homes, the north end of Walnut Street does not have any significant defining streetscape features. However, a short portion of Walnut Street in the center between Walnut Terrace and Pine Street is shaded under trees lining the street and sidewalk. The trees provide a cool respite from the hot sun and asphalt, add more dimension to the street by blending the private and public realm and framing the line-of-sight, and improve the overall aesthetic of the neighborhood.

The properties at the northern end of Walnut Street near Keyport Harbor are slightly more elevated than the properties at the southern end. Many of the north end properties also have larger front yards, or larger setbacks, and are held up by small brick or concrete retaining walls ("kneewalls") above the sidewalk level, further protecting them from flooding. On the other hand, there are also several large homes with very small front yards, close to the street. One flag lot property has a driveway out to Walnut Street, but does not have a

front yard, as the rest of the property is to the rear of two others properties. The diversity of homes and front yards creates an extremely dynamic and varied streetscape, albeit lacking a unified character.

There are a variety of architectural styles on Walnut Street, ranging from the one-story red brick multi-family structures to two-and-a-half story Colonial Revival and Farmhouse-style single-family homes, and 21st Century minimal traditional bungalows and two-story modular single-family homes.

Figure 68: Walnut Street at Oak Street (August 18, 2016)

Figure 69: Walnut Street at Locust Street/Keyport Harbor (August 18, 2016)

Although various types of fences and hedges are used between properties, they are rarely used along the street side of Walnut Street. At the northerly corners of Oak Street and Pine Street at Walnut Street, property owners have used corner fences, vinyl white gothic or picket style of approximately four feet in height and eight to ten feet in length in either direction. These fences are used most likely to frame the lot and protect small corner gardens. At the easterly corners of the intersection of Walnut Terrace and Walnut Street, property owners used white aluminum fencing around the properties, as well as trees behind the fencing for privacy. The property on the west side of Walnut Street where it meets Keyport Harbor used a tall wooden picket scalloped fencing along the street behind the kneewall, whereas the property next door used a slightly shorter white picket fence with a swinging gate around the perimeter behind the stone kneewall. A chain-link fence borders the sidewalk along the Aeromarine property at the south end of Walnut Street on the northeasterly intersection with First Street.

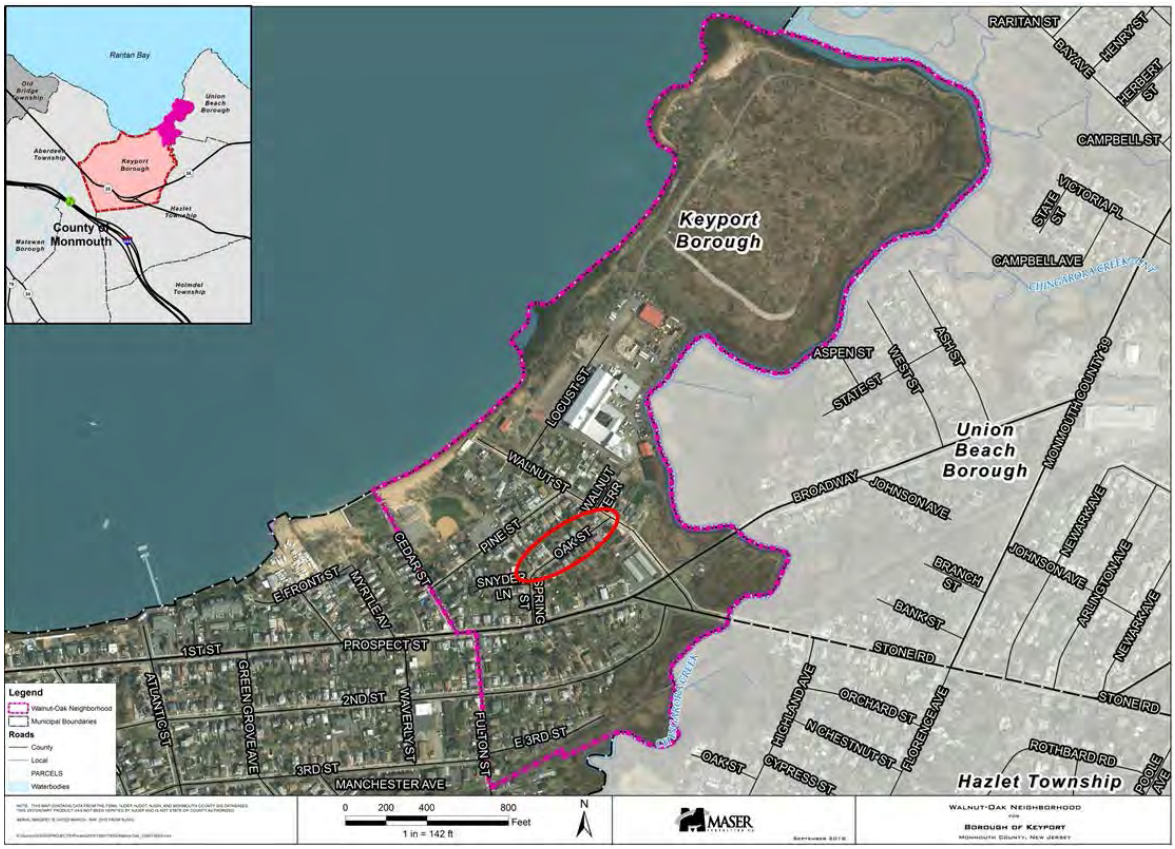
At the north end of Walnut Street, the street meets Keyport Harbor with a tall bulkhead over a sandy beach. The water and boats in the Harbor can be seen at least from Oak Street and slightly further. This view should be preserved and enhanced as much as possible.

Figure 70: Property and façade types on Walnut Street (Site visit August 18, 2016 and Google Streetview)

OAK STREET

Oak Street is a one-way street that runs perpendicular to Walnut Street and parallel to Pine Street to the north and First Street to the south. Spring Street, which extends north from First Street, becomes Oak Street as it bends to the east at the intersection with Snyder Lane. Oak Street contains primarily two-and-a-half story single-family homes, with some multi-family or duplex properties.

Map 37: Location of Oak Street in Walnut-Oak Neighborhood (circled in red)



The architectural styles of Oak Street vary between insipid Colonial Revival, Folk Victorian Farmhouse, and one-story Ranches; some with covered front porches or porticos, and others that are fully enclosed. Some of the earlier homes may have been built as affordable workers housing or renovated with cheaper materials throughout the past century.

Oak Street is higher in elevation on the north side compared to the south side by approximately three to four feet. The south side of the street was ultimately heavily impacted by storm surge during Hurricane Sandy. The elevation is noticeable in the front lawns of the north side, which are mostly bordered by two foot concrete kneewalls along the sidewalk.

Figure 71: Walnut-Oak Intersection, looking southwest (August 18, 2016)

Figure 72: Kneewalls on north side of Oak Street (August 18, 2016)

A number of homes on the south side of Oak Street are characterized by their covered front porches elevated a couple of feet. The homes on the south side of the street are also noticeably closer to the street, with generally smaller front yards than the north side. However, due to the grading, most of the homes on the north side have terraced steps that start at the sidewalk.

Figure 73: Duplex residential building on Oak Street, western end facing north (August 18, 2016)

Figure 74: Single-family homes on south side of Oak Street (August 18, 2016)

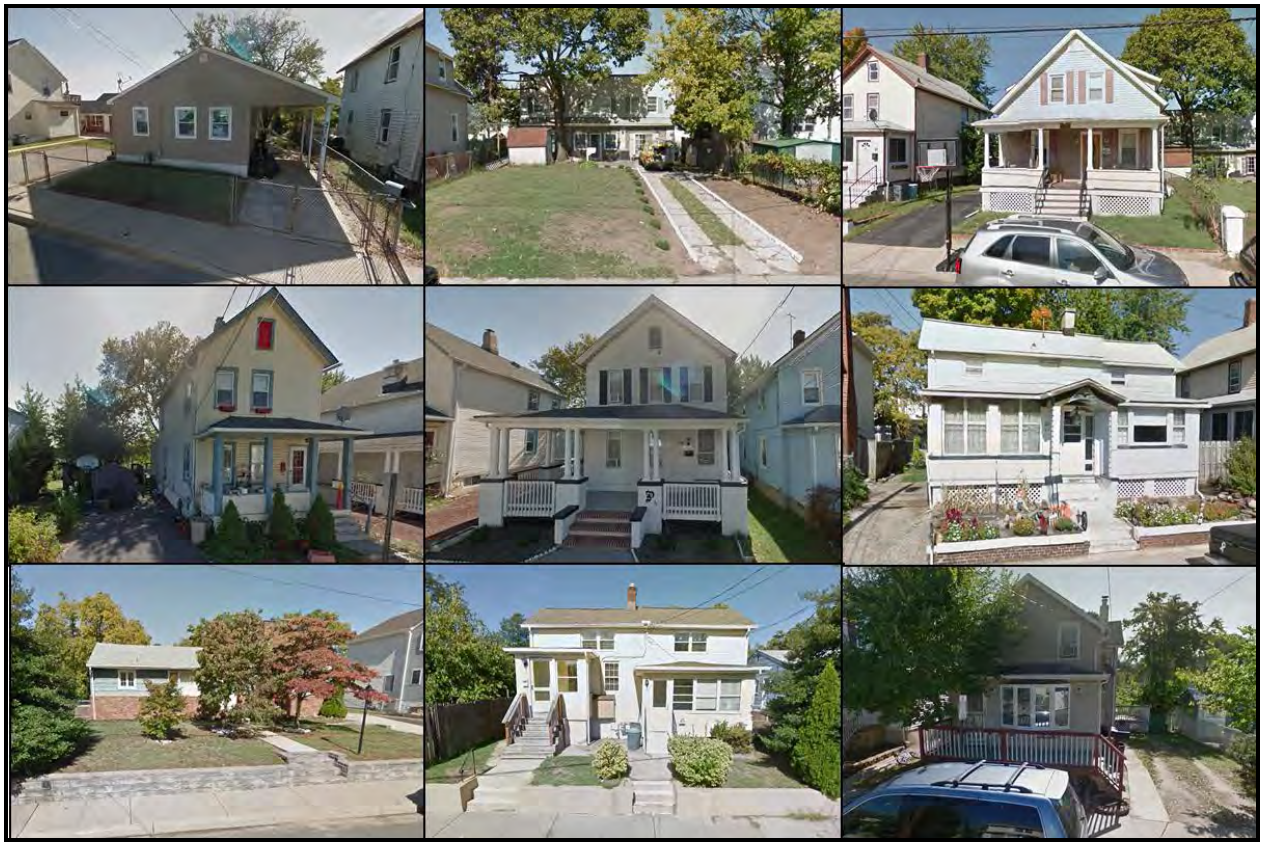
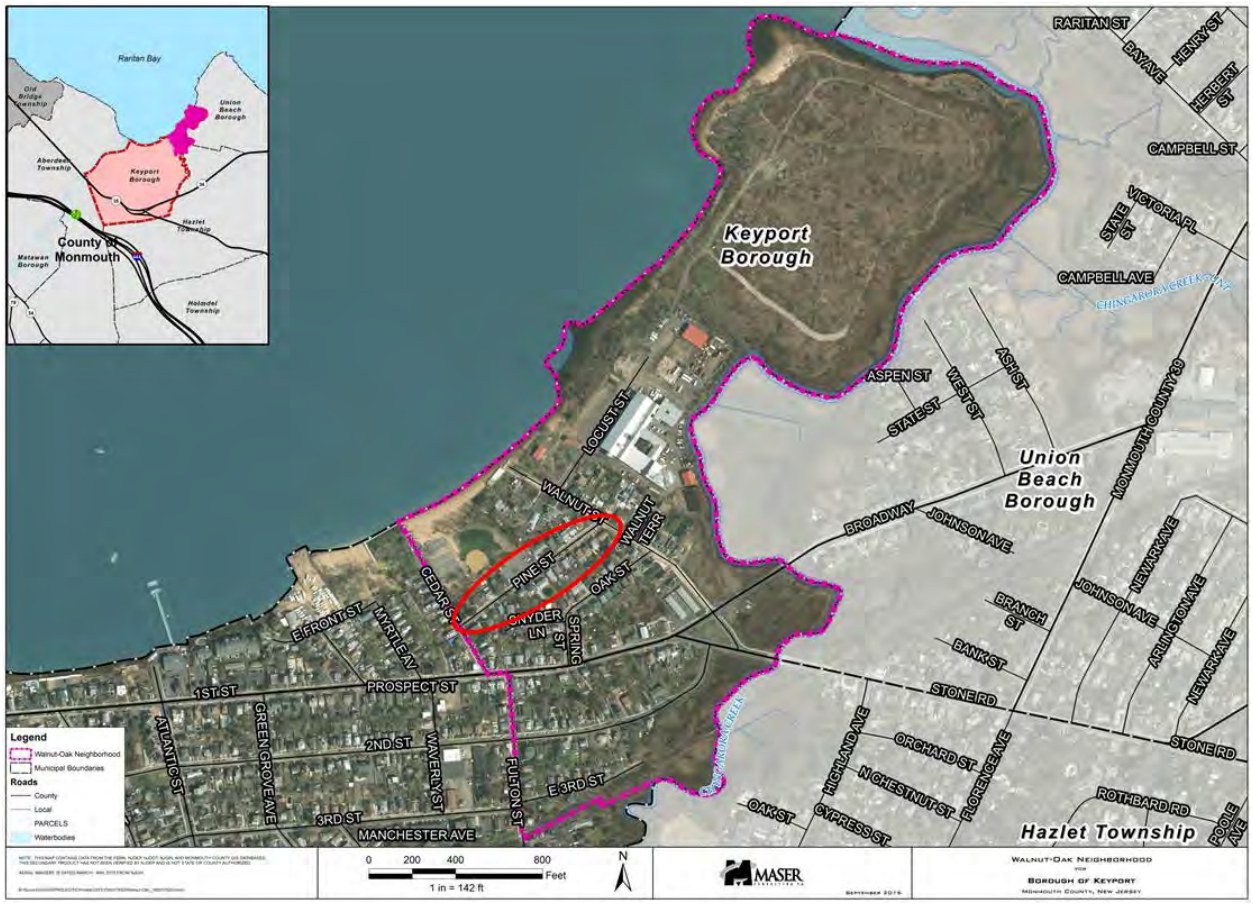


Figure 75: Property and façade types on Oak Street (Google Streetview)

PINE STREET

Pine Street runs east-west, perpendicular to and between Walnut Street and Cedar Street. Pine Street is entirely residential, with the exception of one municipal parking lot used for the adjacent Cedar Street Park, which is located on the center-north side of Pine Street. A majority of homes are single-family and are generally two to three stories on the southwest end of the street and one to two stories on the northeast end. The architectural styles range from Colonial Revival to Raised Ranch to Bungalow and Minimal Traditional.

Map 38: Location of Pine Street in Walnut-Oak Neighborhood (circled in red)



Four historic properties border Pine Street, which include: NJHPO Historic Properties on Block 137, Lots 1 and 2, built in 1871 and 1909, respectively; and Keyport Historical Society Century Homes on Block 136, Lot 1 and Block 137, Lot 3, built in 1866 and 1878, respectively. These are all located at the western end of Pine Street at the intersection with Cedar Street. Block 136, Lot 1 and Block 137, Lot 1 are also the largest private properties on Pine and Cedar Streets, with frontages along Pine Street at 100.5 feet and 121 feet, respectively. With the exception of a few odd-sized lots, most of the lots along Pine Street are 40 feet in width and 100 to 106 feet deep.

Figure 76: Municipal parking lot for Cedar Street Park, north side of Pine Street (August 18, 2016)

Figure 77: Northeast Pine Street (August 18, 2016)

The north side of Pine Street is at a slightly higher elevation than the south side. The northeast side is characterized by lawns with short kneewalls approximately two feet high and slightly taller homes; whereas the south side has shorter, bungalow-style homes and no kneewalls. A much greater area of the front yards on the south side are paved with asphalt for use as parking than the north side, with the exception of the public parking lot.

Figure 78: Homes with paved front yards, southeast Pine Street (August 18, 2016)

Fencing is used along the property lines between many properties on Pine Street, but rarely along the street itself and is varied. The property on the southeastern corner of Pine Street at Cedar Street uses a tall wrought iron fence around the entire perimeter, whereas the property on the southwestern corner of Pine Street at Walnut Street uses a chain-link fence around the side yard along Pine Street. Other types of fencing along Pine Street include a short wooden arched privacy fence, a white aluminum fence over a foot-high brick wall, and short, white scalloped picket fence. Only six properties have streetside fencing. A few properties use brick columns at the entrances of their driveways.

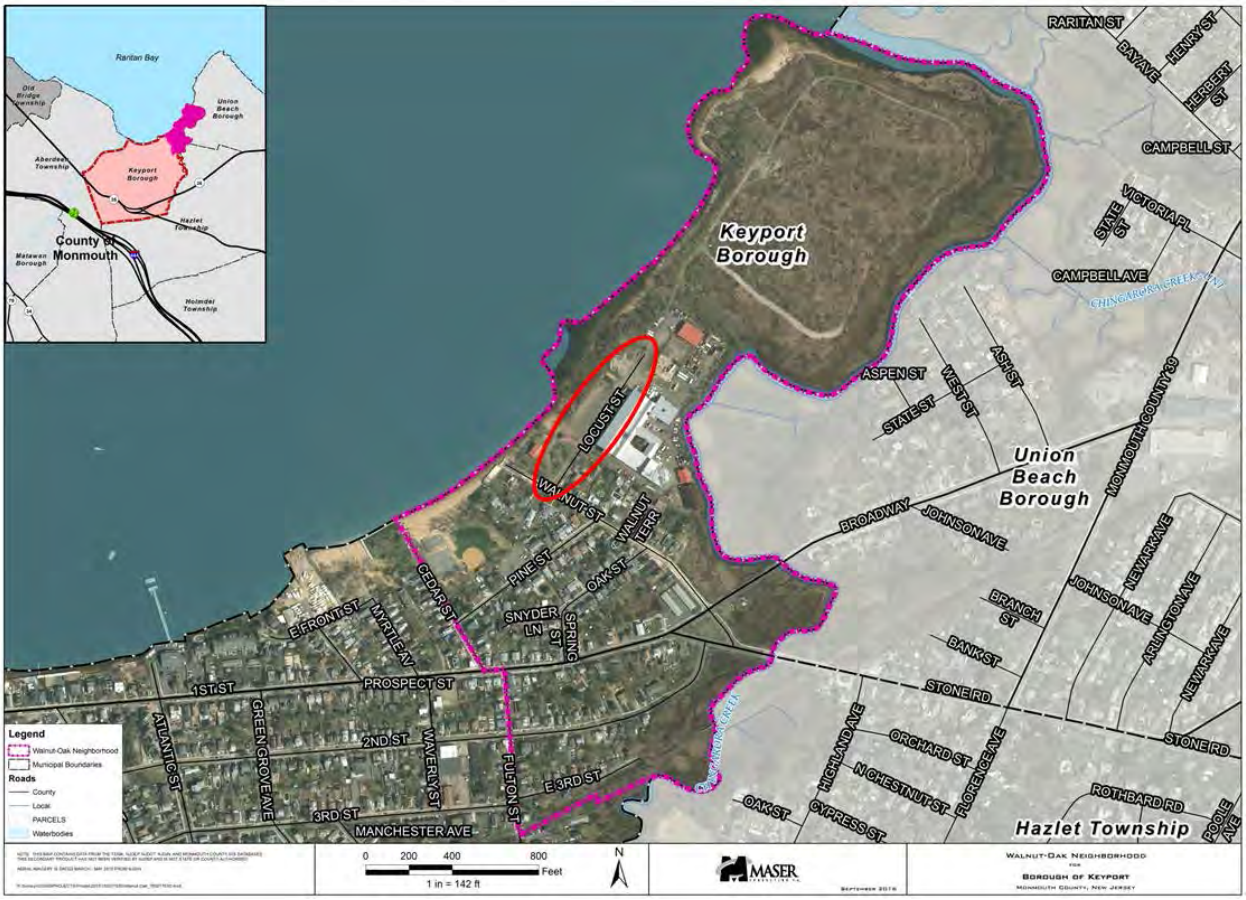
Figure 79: Fencing around properties on Pine Street (Google Streetview, September 2015)

Figure 80: Property and façade types on Pine Street (Site visit August 18, 2016 and Google Streetview)

LOCUST STREET

Locust Street is the only means of access to the Aeromarine Industrial Park and former landfill site. Aeromarine contains several commercial businesses in the industrial building and is the only commercial property within the Neighborhood boundary. In addition, Locust Street also has three residential structures fronting the street. The residential structure on the north side along Keyport Harbor was historically part of the Aeromarine Industrial Park.

Map 39: Location of Locust Street in Walnut-Oak Neighborhood (circled in red)



The two-story single-family residence on the north side, with a historic farmhouse architectural style, is still shown on the same tax lot as the rest of the Aeromarine site, but has approximately a one-hundred and thirty (130') foot yard to Locust Street with three long driveways and is 207.60 feet in width and 242.71 feet in depth. The two single-family lots on the south side of Locust Street are approximately 72x74 feet with a one-story structure and 63x81 feet with a two-story structure, respectively.

Figure 81: Locust Street at Walnut Street looking east (Google Streetview, August 2013)

The eastern end of Locust Street on the south side is part of the Aeromarine Site and gated, but clearly used as the front yard and parking for a residential structure behind it on Block 141, Lot 2, otherwise only accessible from the side yard of another residential structure on the front of Lot 2 on Walnut Street. The main Aeromarine factory building – now occupied by several small businesses – and some vacant land is located off of Locust Street, which technically ends at the front gate of the property. Aeromarine sits on an expansive 60.5 acre property, of which most is not visible from the street.

Figure 82: Looking west on Locust Street to gated lot and residential structure on Block 141, Lot 2 (August 18, 2016)

Locust Street is pockmarked with potholes and the sidewalks overgrown, with individual properties maintained to varying degrees. Only approximately twelve to thirteen feet above sea level, Locust Street was entirely submerged by storm surge during Hurricane Sandy. The residential properties on the south side and pockets of the lot on the north side remained above the storm surge; however, the Aeromarine industrial

building was in the flood area. A large portion of the landfill area at the far end of the peninsula also remained above the storm surge.

Figure 83: Aeromarine Industrial building on Locust Street (August 18, 2016)

Figure 84: Vacant lot at Aeromarine on Locust Street (August 18, 2016)

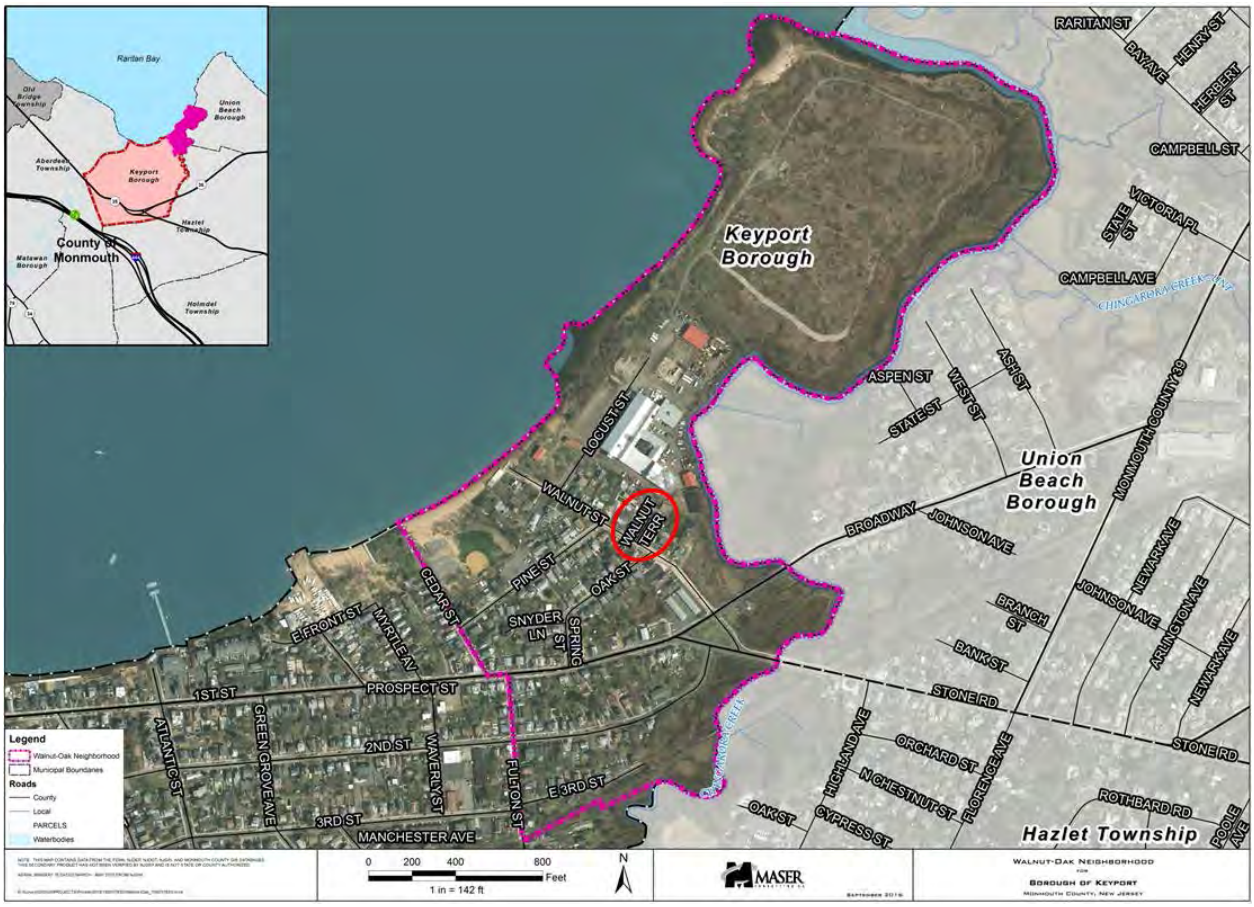
Locust Street, while vulnerable to flooding from the Chingarora Creek and Keyport Harbor, has the greatest potential for any development or redevelopment to occur, particularly on the Aeromarine property.

Figure 85: Property and façade types on Locust Street (Google Streetview)

WALNUT TERRACE

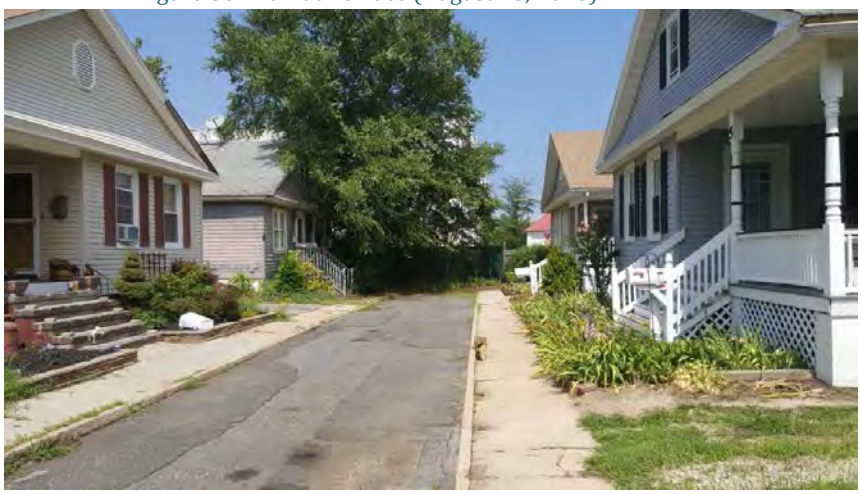
Walnut Terrace runs southwest to northeast and is accessible from Walnut Street between the intersections with Pine Street to the north and Oak Street to the south. The street is a short and narrow dead-end street, sans cul-de-sac, located adjacent to the Aeromarine Industrial Park. The end of Walnut Terrace directly abuts a fence around Aeromarine, and behind which is a private street and parking area.

Map 40: Location of Walnut Terrace in Walnut-Oak Neighborhood (circled in red)



Despite being only twenty (20') feet in width, Walnut Terrace functions as a two-way street with four single-family homes with individual driveways with frontage on Walnut Terrace and two with side yards. Vehicles are sometimes parked at the end of the street in front of the homes.

Figure 86: Walnut Terrace (August 18, 2016)



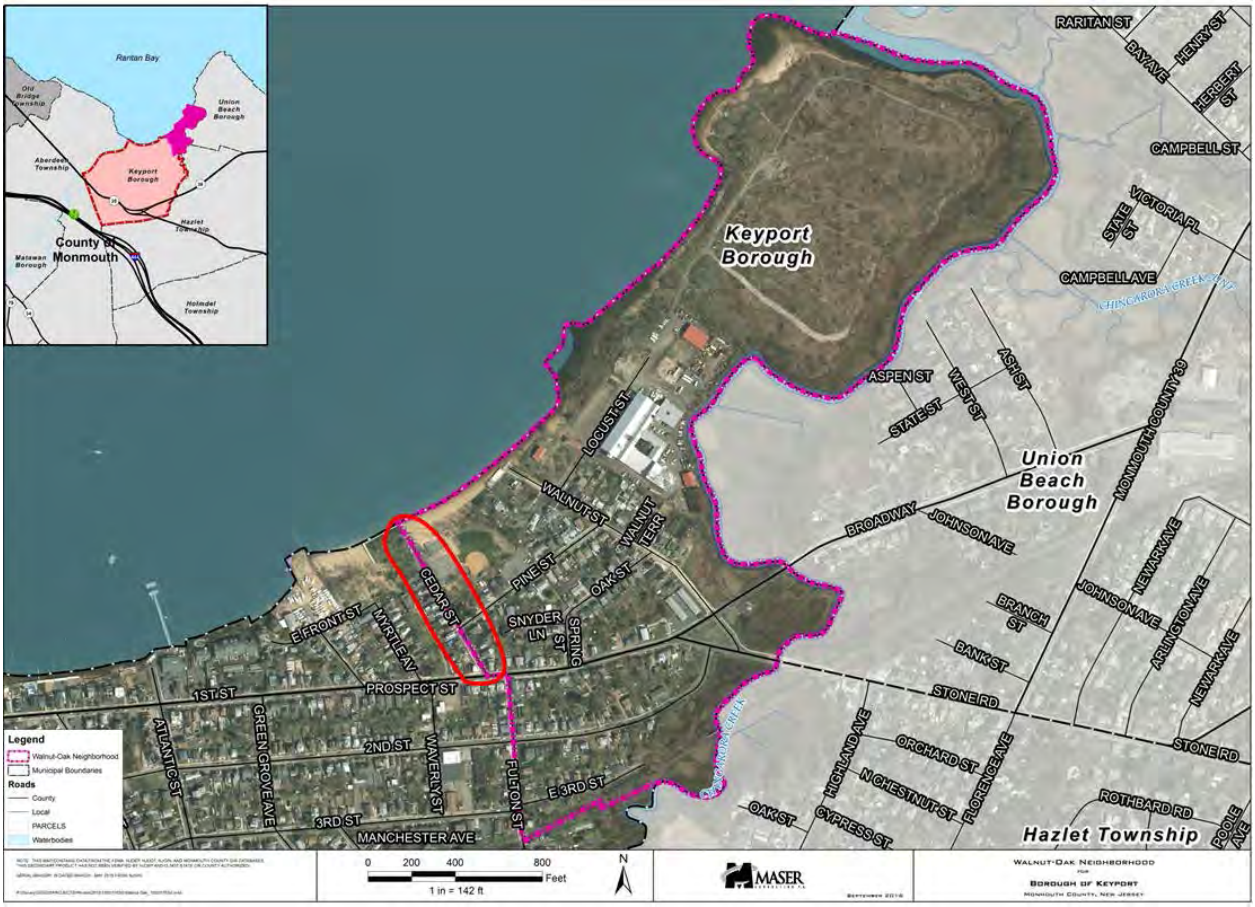
On either side of the street, the lots facing Walnut Terrace are 49.74 feet in width at the far end and 52.0 feet in width closest to Walnut Street. The lots on the north side of the street are 115.0 feet in depth and 65.0 feet in depth on the south side. The two lots at either corner of Walnut Terrace and Walnut Street are 105.5 feet in depth (along Walnut Terrace) and 65 feet in width (along Walnut Street). The four homes are all one-and-a-half stories tall, between 1000 and 1400 square feet, and are all identical in style, with only slight differences in front porch and entryway treatment and color. The shotgun bungalow-type homes were built between 1915 and 1919, likely as workers housing for Aeromarine. This style, as shown in the following images is unique to this street.

Figure 87: Property and façade types on Walnut Terrace (Google Streetview)

CEDAR STREET

Cedar Street runs parallel to Walnut Street and perpendicular to Pine Street and First Street, to which it is connected, on the northwestern edge of the Walnut-Oak Neighborhood. Cedar Street ends in a partial cul-de-sac at a bulkhead along Keyport Harbor. Although only easterly side of the street is considered part of the Walnut-Oak Neighborhood for the purpose of this planning study, the composition and relationships of the street as a whole must be considered.

Map 41: Location of Cedar Street in Walnut-Oak Neighborhood (circled in red)



Cedar Street is entirely residential, with the exception of Cedar Street Park and beach located on the east side along Keyport Harbor. The homes are mostly single-family, although the building on Block 127, Lot 1 at the northwest corner of the intersection of Cedar Street and First Street contains three units and Lot 3 contains two units.

Figure 88: Cedar Street, south end looking south
(Google Streetview, September 2015)

The architectural styles of Cedar Street include elements of Folk Victorian Farmhouse, Shotgun, Colonial Revival, American Foursquare, Neoclassical, and Italianate. The multi-family building at the northwesterly corner of Cedar Street and First Street is the only stucco building on Cedar Street, and likely within the entire Neighborhood; whereas all of the other homes on Cedar Street are wood frame. Three of the homes on Cedar Street are designated as historic properties, including two Keyport Historical Society Century Homes on Block 127, Lot 7 and Block 136, Lot 1 and one NJHPO historic property on Block 137, Lot 1. Block 127, Lots 1 (stucco building) and 2, as well as Block 136, Lot 39, at the intersection of Cedar Street with First Street, are located within the NJHPO First Street Historic District.

Figure 89: Central Cedar Street, looking north
(Google Streetview, September 2015)

Figure 90: Cedar Street, north end looking north
(Google Streetview, September 2015)

Figure 91: Cedar Street Park and beach at end of Cedar Street
(August 18, 2016)

Most of the homes are raised at least three to four feet above ground level with a set of front steps leading up to a covered front porch. Additionally, most of the lawns northwest of Pine Street toward Keyport Harbor have are also slightly elevated and have a short kneewall along the edge of the sidewalk.

Along the edge of Cedar Street Park where it meets the street, the sidewalk meanders back and forth from streetside toward the park, as shown in the images above. This design brings the park to the street, including attractive landscaping with trees, shrubs, and permeable ground. The setback of the park mirrors the setback of the houses on the opposite side of the street and on the adjacent lots; whereas the structures on the westerly side south of Pine Street are closer to the street. Cedar Street Park is a public park with a basketball court, tennis courts, baseball/softball field, and playground, with a sidewalk wrapping through from Cedar Street to the parking lot on Pine Street. There is a sandy beach area along the Harbor. Directly across from Cedar Street Park is Veteran's Park, which is an open grassy area with a walkway over a bulkhead on the Harbor.

Figure 92: Cedar Street Park looking northwest toward Cedar Street (August 18, 2016)

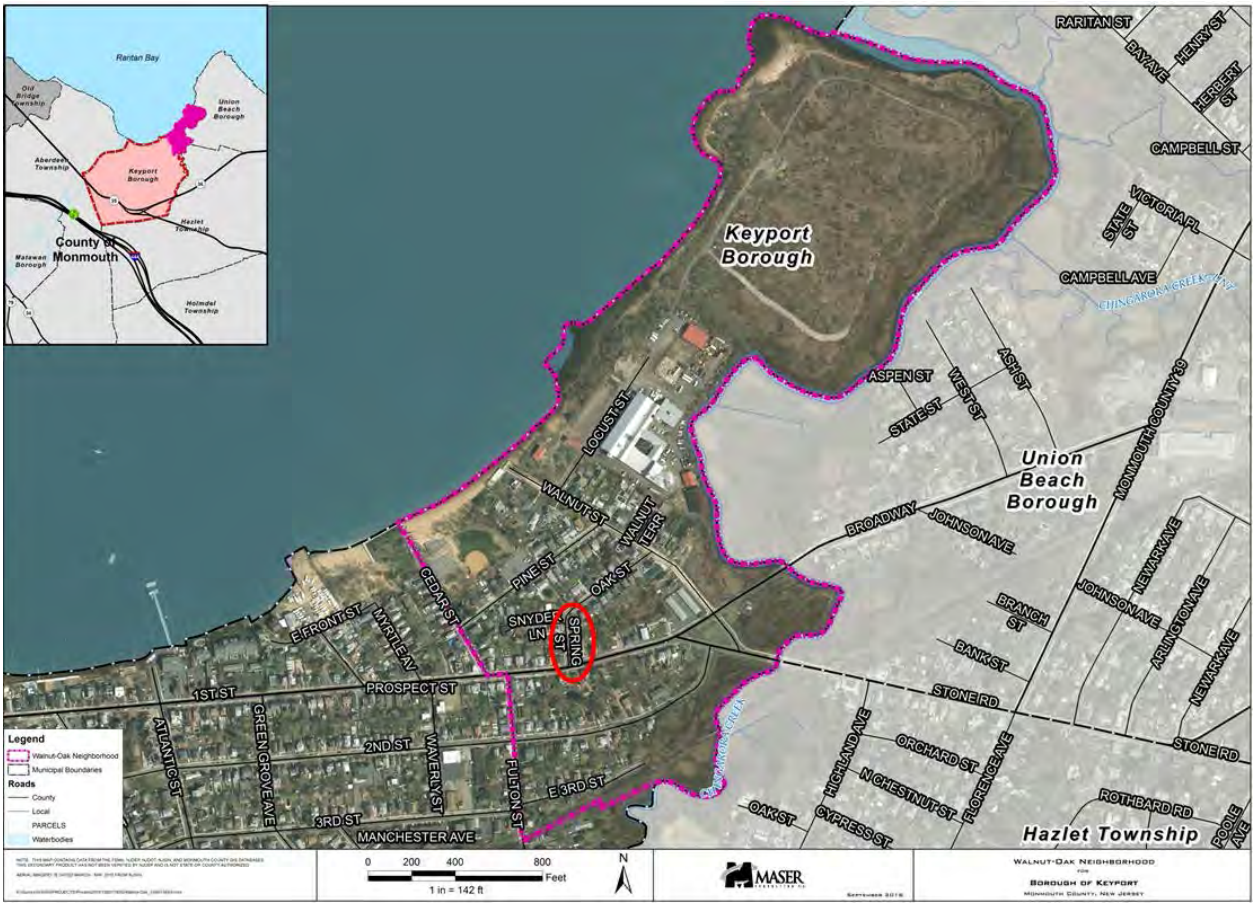
Figure 93: Veteran's Park on the west side of Cedar Street looking toward Keyport Harbor (August 18, 2016)

Figure 94: Property and façade types on Cedar Street (Site visit August 18, 2016 and Google Streetview)

SPRING STREET

Spring Street is a short and narrow, 25-foot wide, one-way street. The street runs north from and perpendicularly to First Street, and then curves to the east become Oak Street in the central portion of the Neighborhood.

Map 42: Location of Spring Street in Walnut-Oak Neighborhood (circled in red)



Although there are five single-family residential lots bordering Spring Street, only three have frontage on the street. All of the homes on these lots are historic in character and age, with the three fronting Spring Street having been built circa 1909. Block 138, Lot 1, which fronts First Street, but has a depth of 90.75 feet along Spring Street.

The architecture is similar to that of many of the homes on First and Second Street, and the neighboring homes on Snyder Lane – a mix of Folk Victorian Farmhouse and Colonial Revival. A set of a few stairs leads up to the entrance at the front of the houses under a covered porch, although one house at the corner of Spring Street and Snyder Lane has a set of stairs leading up to the main entrance on the side of the house. This same house is also slightly more elevated with a kneewall along the front of the property; whereas the surrounding properties are lower and do not have kneewalls. The properties are between eight (8') and twelve (12') feet in elevation, dipping down towards the center and east of the street.

There are sidewalks on both sides of Spring Street from First Street to Oak Street, which appear in good condition. The homes abutting Spring Street, whether front or side, are setback approximately between two (2') and fifteen (15') feet from the sidewalk. The side and/or rear yards of the corner lots along Spring Street give the street the appearance of being very open.

A white picket fence surrounds the side and rear yard of Block 136, Lot 32, which extends along half of Spring Street. Opposite, on Block 138, Lot 24, a chain-link fence surrounds the front and side yard, which extends along greater than half of Spring Street.

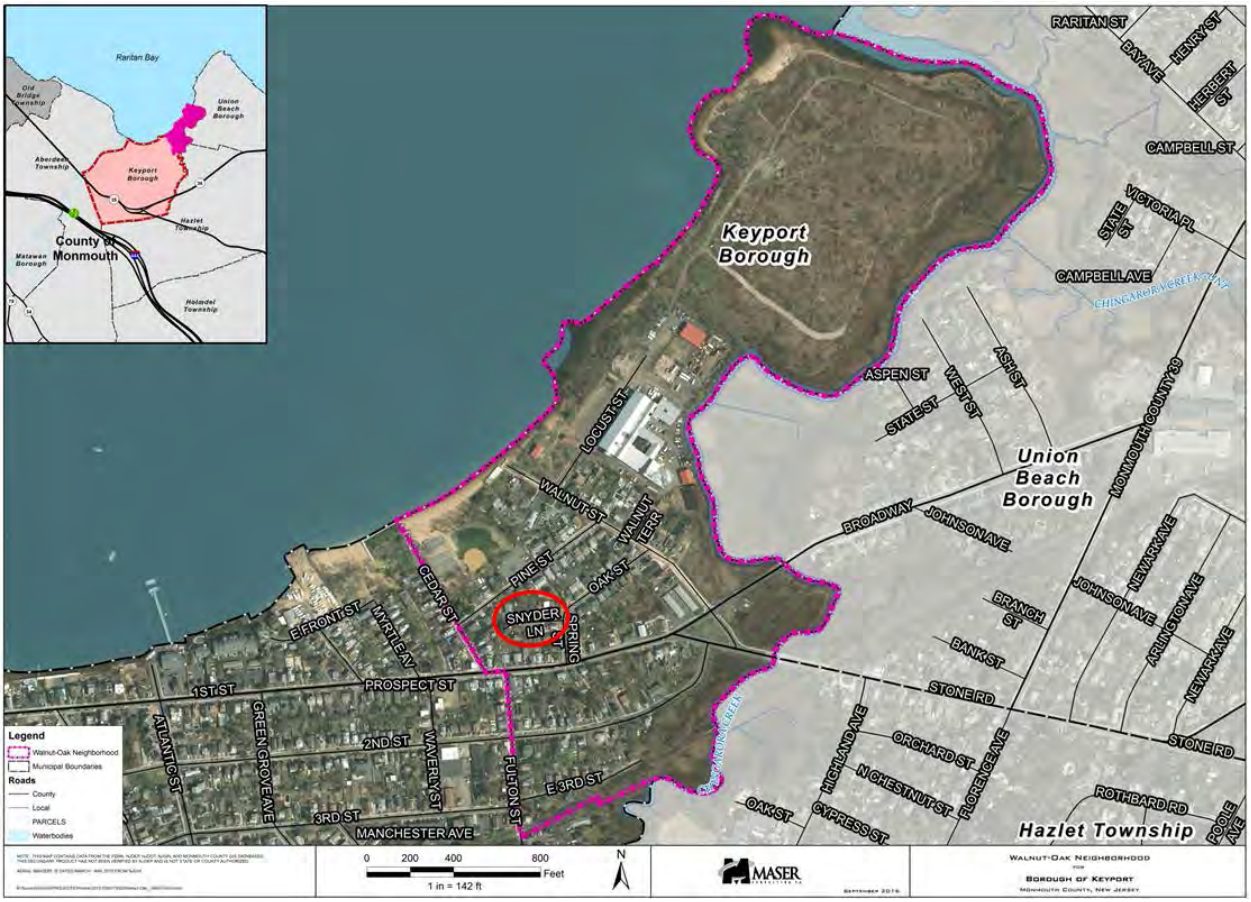
Figure 95: Spring Street (Site visit August 18, 2016)

Figure 96: Property and façade types on Spring Street (Google Streetview, October 2015)

SNYDER LANE

Snyder Lane is a narrow, dead-end street, sans cul-de-sac, that runs east to west located off the shoulder of where Spring Street meets Oak Street on Block 136. The street is entirely residential with two-and-a-half story homes, with the exception of one single-story home. The architectural styles of the homes include Folk Victorian Farmhouse, Contemporary Modular, and Ranch.

Map 43: Location of Snyder Lane in Walnut-Oak Neighborhood (circled in red)



There are seven properties facing Snyder Lane, but only six residential structures, with an additional lot along the street lengthwise at the south corner of Spring Street. Two of the six structures are multi-family and each has two units, which are on Block 136, Lot 27 and Lot 28, while the others are single-family.

The front lawns of the homes closest to Spring Street are approximately five (5') to fifteen (15') feet, while the newer homes are setback from the street approximately to twenty (20') to twenty-five (25') feet.

The first two homes on the north side from Spring Street, Block 136, Lots 26 and 27 (shown below), have a distinguished historic character somewhat unique to that street, but similar to some of the homes found on First and Second Street, which is probably best described as Folk Victorian Farmhouse. These two-and-a-half story homes, built in 1909, feature a few steps from the sidewalk up to large covered front porches, while the residential structure is stepped back under a gabled roof. However, the house on Block 136, Lot 28 is designated as a Keyport Historical Society Century Home and was built in 1925. It is similar in architectural style, but is setback slightly farther from the street and has a front and side covered portico at the entrances, rather than a front porch. The home on Lot 42 is a minimal one-story, ground-level Ranch-style home, built in 1909. The Contemporary Modular house on Lot 37.04 is the newest construction, built in 2010.

Figure 97: Snyder Lane

The interior box of the Block was once comprised of a single Lot 37 and had two twenty-five (25') foot frontages on Snyder Lane. Lot 37 was subdivided into two lots, 37.03 and 37.04, which each have twenty-five (25') feet of street frontage and dimensions of 105 feet x 80 feet and 105 feet x 105 feet, respectively. The other lots on Snyder Lane vary in width and street frontage, between forty (40') feet to eighty-three (83') feet, whereas the depths of the lots are regularly eighty-six (86') feet on the north side and eighty (80') feet on the south side.

One sidewalk in good condition borders the street along the north side of Snyder Lane, which appears to be approximately three-and-a-half (3.5') feet in width, although street signs and telephone and streetlight poles are placed in the sidewalk. A sidewalk in good condition on the south side of the road borders only Lots 28 and 29, leaving the lots on either end without sidewalk. The sidewalk area along Lot 30 at the corner of Spring Street is encroached upon by two structures on the property and, therefore, is unsuitable to build.

Snyder Lane slopes gently down toward Spring Street from approximately sixteen (16') feet to ten (10') feet. Therefore, the two lots at the intersection have kneewalls a couple of feet in height above the sidewalk and road. These two lots were the only ones impacted by the storm surge from Hurricane Sandy.

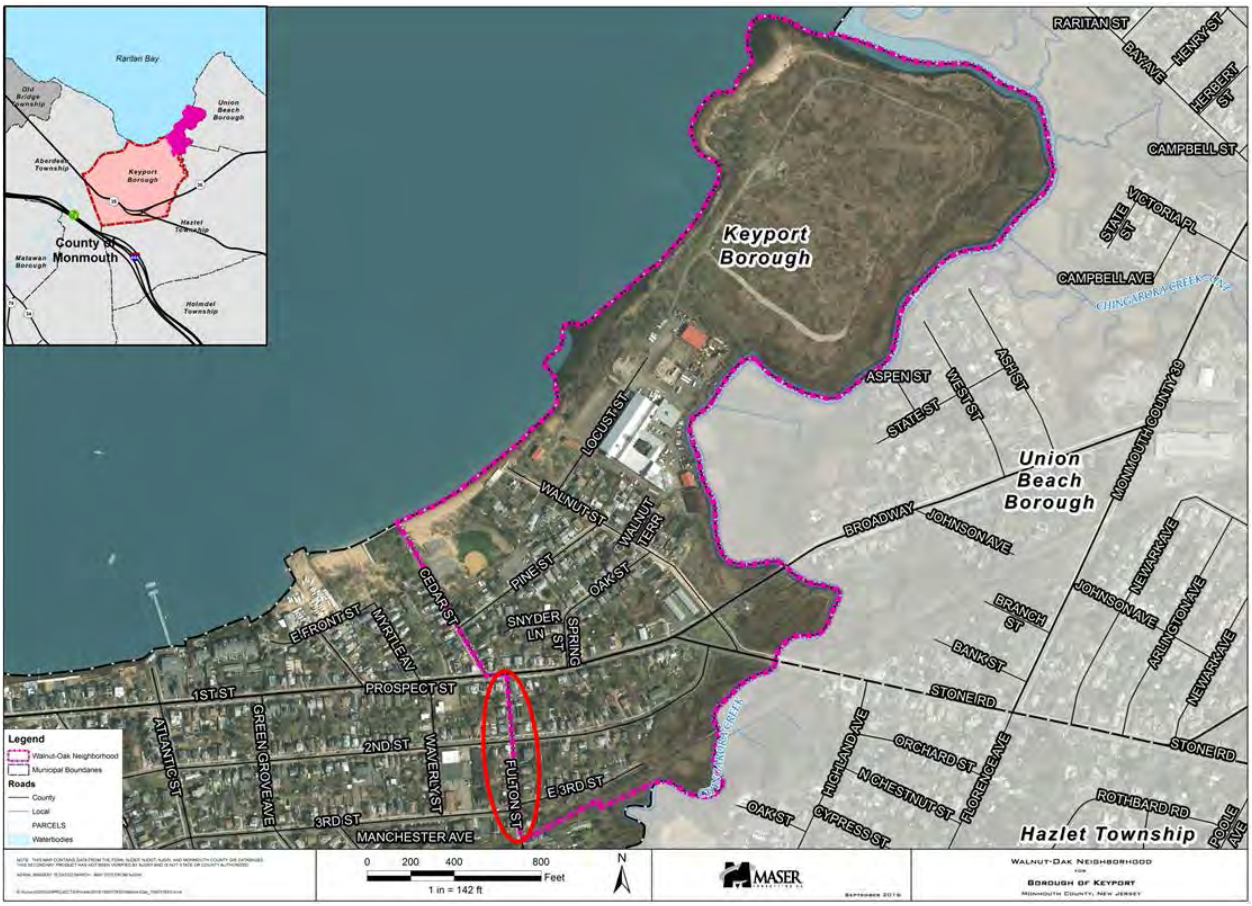
There is a variety of fences on the properties on Snyder Lane, including approximately five-foot wooden stockade fencing, four-foot chainlink fences, three-foot picket fences, and two-foot stone walls. These provide some privacy for property owners and indicate property lines; however, the styles and placement appear very mismatched.

Figure 98: Property and façade types on Snyder Lane (Google Streetview, September 2015)

FULTON STREET

Fulton Street runs from north-south along the southwestern edge of the Walnut-Oak Neighborhood from First Street to East Third Street and then continues south to Eighth Street. Fulton Street has a mix of single-family and multi-family residential structures, as well as one adjacent commercial service structure.

Map 44: Location of Fulton Street in Walnut-Oak Neighborhood (circled in red)



The street itself is thirty-five (35') feet wide and in fair condition, with some minor cracks and potholes, while the sidewalks are in good condition in most areas, but with some overgrowth of weeds. However, telephone and streetlight poles are often placed in the middle of a sidewalk, there are no ADA ramps or crosswalks, and there are wide curb cuts for driveways.

Figure 99: Fulton Street, facing south from First Street (August 18, 2016)

The north end of Fulton Street near First Street has a very different character than the south end. North of East Second Street, Fulton Street has the appearance of an alley, where the street is disregarded and treated primarily as vehicular access to the adjacent properties. Three lots, but only two structures face Fulton Street on this block. Block 135, Lot 3 has a 35.5-foot frontage and depth of 157.58 feet; whereas Lots 1 and 34 have 92-foot and 129.5-foot side yards along Fulton Street on either side. Lot 3 is a single-family residential structure; whereas Lots 1 and 34 are multi-family. On the opposite side of the street, Block 128, Lot 9.01 is undeveloped on a lot with 25-foot frontage and 80 feet in depth. Lot 10 has a 48-foot frontage with a depth of 40 feet and has a two-story single-family residential structure; whereas, the adjacent Lot 9, facing First Street, has a depth of 100 feet along Fulton Street and Lot 11, facing Second Street, has a depth of 81.5 feet along Fulton Street and a multi-family residence. Additionally, most of the structures have zero (0') to ten (10') foot setbacks from Fulton Street. Several of these properties are bounded by high wooden or vinyl privacy fencing and at least half of Lot 34 is devoted to a five-car parking garage with two large curb cuts. Fencing is uncommon south of Second Street, except for side yards, although one property has a brick gate with posts.

One commercial laundry business is located in a one-story structure attached to a two-story residence facing Second Street at the southwest corner with Fulton Street. Block 134, Lot 5 has a new Contemporary Modular single-family construction with setbacks of approximately thirty (30') feet and large, open yards. This is in stark contrast with all of the other structures on this corner, which are built within a couple of feet of the right-of-way and multi-family or commercial.

Figure 100: Intersection of Fulton Street and Second Street, facing south (Google Streetview, October 2015)

Between the Second Street and Third Street intersections with Fulton Street, there are eleven lots, nine of which front on Fulton Street. Most of these lots are 35.75 feet in width, although a couple of lots are slightly wider or narrower, and approximately 120 feet in depth. Additionally, the front setbacks are generally around ten (10') closer to Second Street and increase to approximately twenty (20') feet toward Third Street. From Second Street looking toward Third Street (with the exception of the large setbacks on Block 134, Lot 5, the street appears to open up to a more suburban, open setting, while looking from Third Street north to Second Street, the neighborhood appears to become more urban and dense, drawing the observer in.

Figure 101: Fulton Street, looking southeast at Block 134 (August 18, 2016)

The architectural styles of Fulton Street are similar to those of most other streets in the Walnut-Oak Neighborhood. The single-family homes are all two to three stories in height, built in historic early 20th Century Folk Victorian and Gothic Revival styles with minor renovations, as well as contemporary modular Colonial Revival.

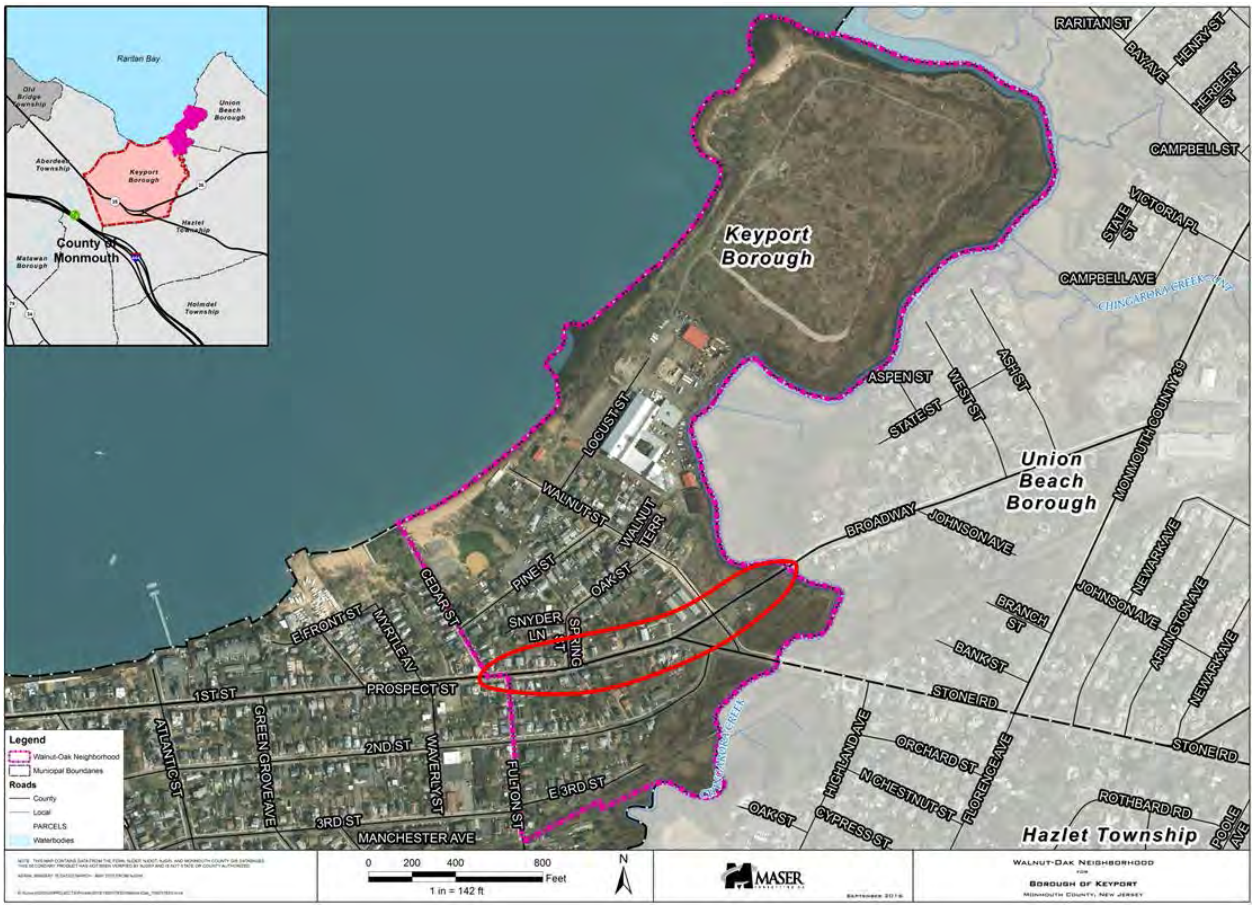
Most of the homes are raised two to three feet above sidewalk level and have a couple of steps leading up to the front entrance, which often have a covered portico or porch or an enclosed porch or vestibule. Some of the front entrance steps are raised parallel to the street with a plateau at the door and others perpendicularly.

Figure 102: Property and façade types on Fulton Street (Google Streetview, October 2015)

FIRST STREET

First Street is one of the longest streets in Keyport, which extends from the First Street Bridge at the Borough of Union Beach municipal border in the east to Broad Street in the west. First Street extends laterally through east and west through the center of the developed part of the Neighborhood and serves as the main connector road.

Map 45: Location of First Street in Walnut-Oak Neighborhood (circled in red)



First Street is, therefore, one of the more diverse streets in terms of streetscape, land uses, and architectural styles. However, much of First Street is also in a New Jersey Historic Preservation Office (NJHPO) Historic District. The "First Street Historic District" extends from Church Street in the west to Block 138, Lot 4 and Block 135, Lot 9 in the east, in the Walnut-Oak Neighborhood. Lot 1 of Block 138 (shown below) and Lot 33 of Block 136 are designated NJHPO Historic Properties and Lot 9 of Block 135 is a Keyport Historical Society Century Home. The Century Home designation is for Keyport properties over one-hundred years old and that have the original house deed.[77]

> An historic district means "a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development. A district may also comprise individual elements that although linked by association or function were separated geographically during the period of significance, as a district of discontiguous archaeological sites or a canal system where man-made segments are interconnected by natural bodies of water. The concept of a discontiguous district applies only where visual continuity is not necessary to convey the historic interrelationship of a group of related resources. Examples include, but are not limited to, college campuses; central business districts; residential areas; commercial areas; industrial complexes; civic centers; rural villages; canal systems; collections of habitation and limited activity sites; irrigation

[77] Reference from email correspondence with Cassie Milligan of Keyport Historical Society. September 15, 2016.

systems; large estates, farms, ranches, or plantations; transportation networks; and large landscaped parks."[78]

Figure 103: First Street at Spring Street, part of First Street Historic District – north side facing east (August 18, 2016)

Architectural styles on First Street are varied and include elements of Colonial Revival, Folk Victorian Farmhouse - some of which are more ornate than others – as well as Victorian Gothic, Queen Anne, Neoclassical, American Foursquare, and American Craftsman. Most of the homes are flanked by a covered, exposed front porch with pillars or a covered portico.

As with many of the streets in the Neighborhood, the condition of the street and sidewalk infrastructure varies. The street itself is 40 feet in width and both sides of the street contain sidewalks that appear to be at least three-and-a-half feet in width with all telephone and light poles located in a two foot grass buffer. However, the sidewalk on the south side of First Street, from Fulton Street eastward, is poorly maintained with major cracks and overgrowth of weeds. The street itself is approximately forty feet wide with two contra-lanes. Parking is permitted on the south, although few vehicles are regularly parked. A monolithic curb and gutter is also located on the south side of the street to route stormwater.

Street trees are uncommon along First Street, although there are a couple on the south side of First Street east of Spring Street and one on a private front yard on the north side. The trees along the street improve the aesthetic by providing a visual frame (as well as the consistent architecture), provide shade, and help to absorb stormwater in the vegetated buffer.

[78] 7:4-1.3 Definitions. New Jersey Register of Historic Places Act Rules N.J.A.C. 7:4 Effective July 2, 2015.

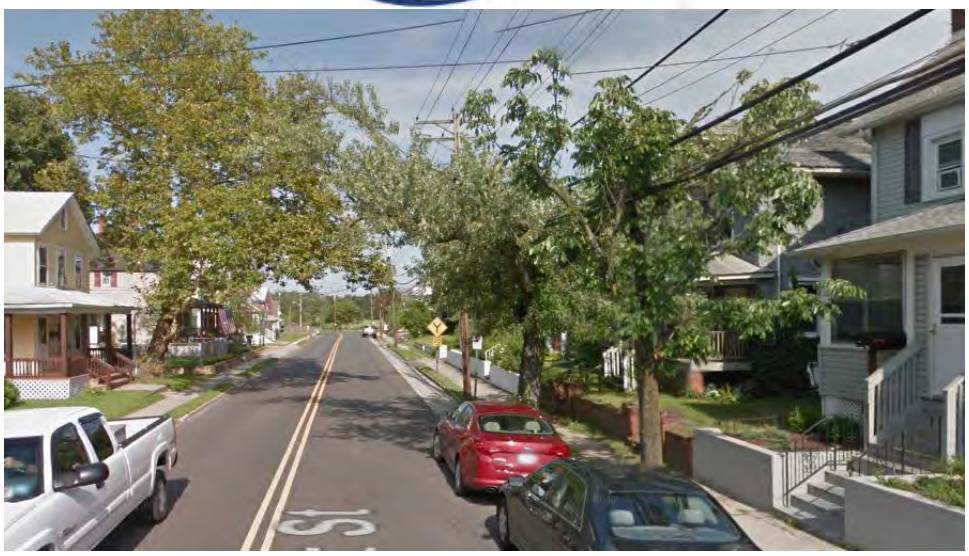


Figure 104: Street trees on First Street, east of Spring Street looking east (Google Streetview, August 2013)

Other parts of First Street, particularly the eastern end near Walnut Street, offer the same grass buffer on both sides of the street and historic homes. However, with a lack of kneewalls, street trees to frame and shade the street, monuments, reference points, or amenities, and larger setbacks with buildings further from the sidewalk, there is a feeling of emptiness.

Figure 105: First Street at Spring Street, facing southwest (August 18, 2016)

Figure 106: First Street, east end facing east toward Walnut Street (Google Streetview, August 2013)

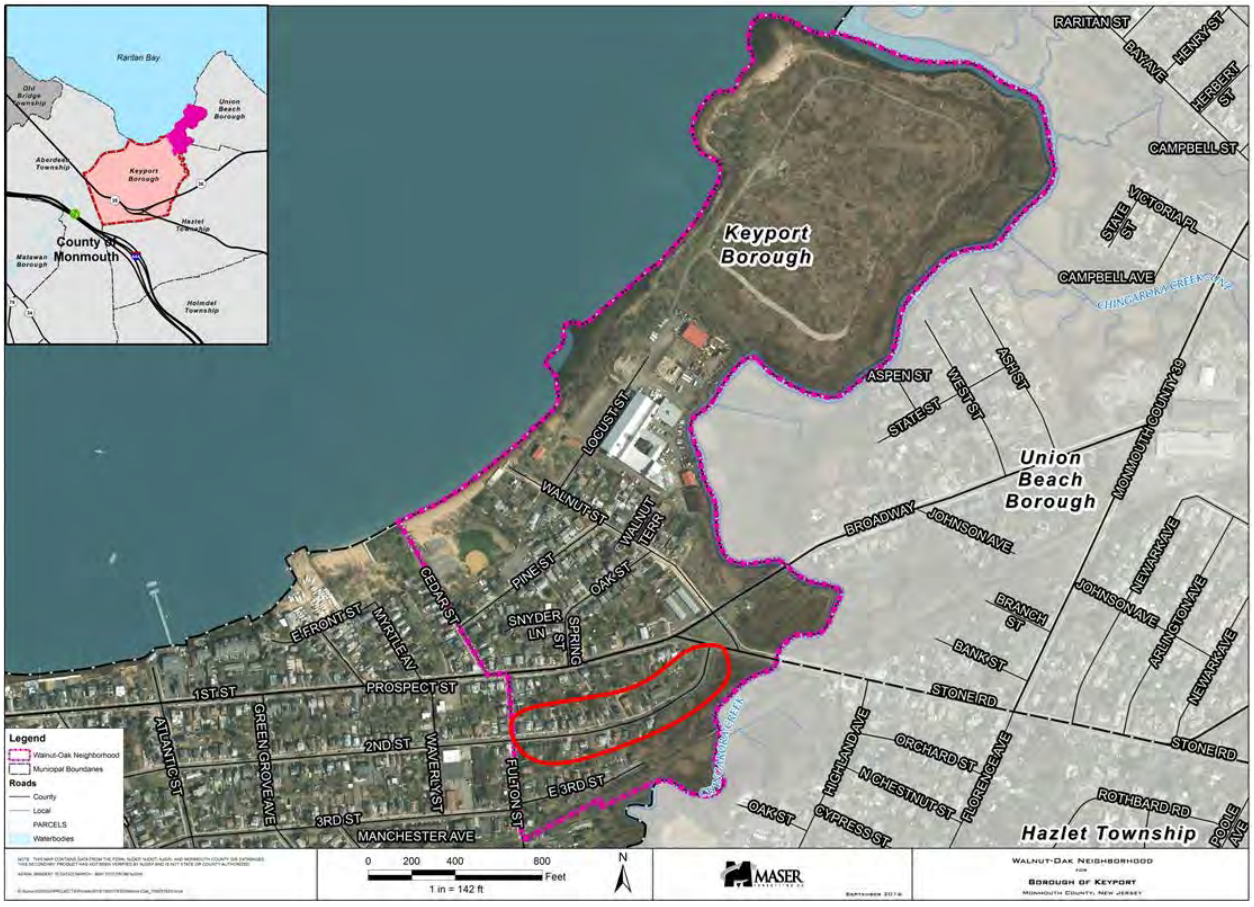
With the higher concentration of historic properties and the overall historic character of the district, as well as prime location and connectivity to other parts of the Borough and Union Beach, First Street offers a unique setting and considerable opportunity for revitalization.

Figure 107: Property and façade types on First Street (Site visit August 18, 2016 and Google Streetview)

SECOND STREET

Second Street is one of the longer roads in the Walnut-Oak Neighborhood, found on the south side of First Street and northwest of the Chingarora Creek, running perpendicular to Fulton Street to the west side and Stone Road to the east, from which it is accessible. There is a long bend in the road that prevents one from seeing either end of the street from the other or from the center. Passing along the forested wetlands of the Chingarora Creek to the southeast, the street has a feeling of remoteness, although the western portion of Second Street is as densely populated on either side by residential buildings as other parts of the Neighborhood.

Map 46: Location of East Second Street in Walnut-Oak Neighborhood (circled in red)



Second Street is forty (40') feet in width with sidewalks on both sides of the developed area, from Fulton Street to Block 134, Lot 15.03 on the south side and Block 135, Lot 21.01, but do not reach Stone Road to the east. The sidewalks generally appear in good condition and at least three-and-a-half feet in width in most areas and signs and poles located in the foot-wide grass buffer; although the central portion of the road is in poorer condition with cracks and weeds.

Figure 108: Intersection of East Second Street and Fulton Street, looking east down Second Street (Google Streetview, September 2016)

Figure 109: Second Street, looking east from Fulton Street (August 18, 2016)

East Second Street has eclectic, if not mismatched development. Many of the homes on the residential street were built in the early 20th century and there are two designated historic properties on Second Street, including an NJHPO Historic Property on Block 134, Lot 12 and a Keyport Historical Society Century Home on Block 135, Lot 31. There is a mix of architectural styles, including Folk Victorian Farmhouse, Bungalow, Minimal Traditional, and Modular – some of which are multi-family apartments, townhomes, and single-family. The eastern end of East Second Street, toward Stone Road, features a few newer constructions from late 21st Century to 2016. These properties also experienced damage during Hurricane Sandy due to lower elevation and proximity near the Chingarora Creek, impacted by storm surge. Therefore, some were torn down and/or rebuilt.

Figure 110: Mid-Second Street, looking east (August 18, 2016)

Figure 111: Sidewalks in poor condition, mid-Second Street, looking east (Google Streetview, October 2015)

Many of the yards are elevated above street level at least a few feet with a high kneewall holding them up along the edge of the sidewalk, and many of the homes are elevated a few feet higher. Often, there is a set of four steps from the sidewalk to a level area of the yard and then an additional three to five steps up to a covered front porch. Kneewalls are common on both sides of the street and are approximately three feet in height on many of the yards.

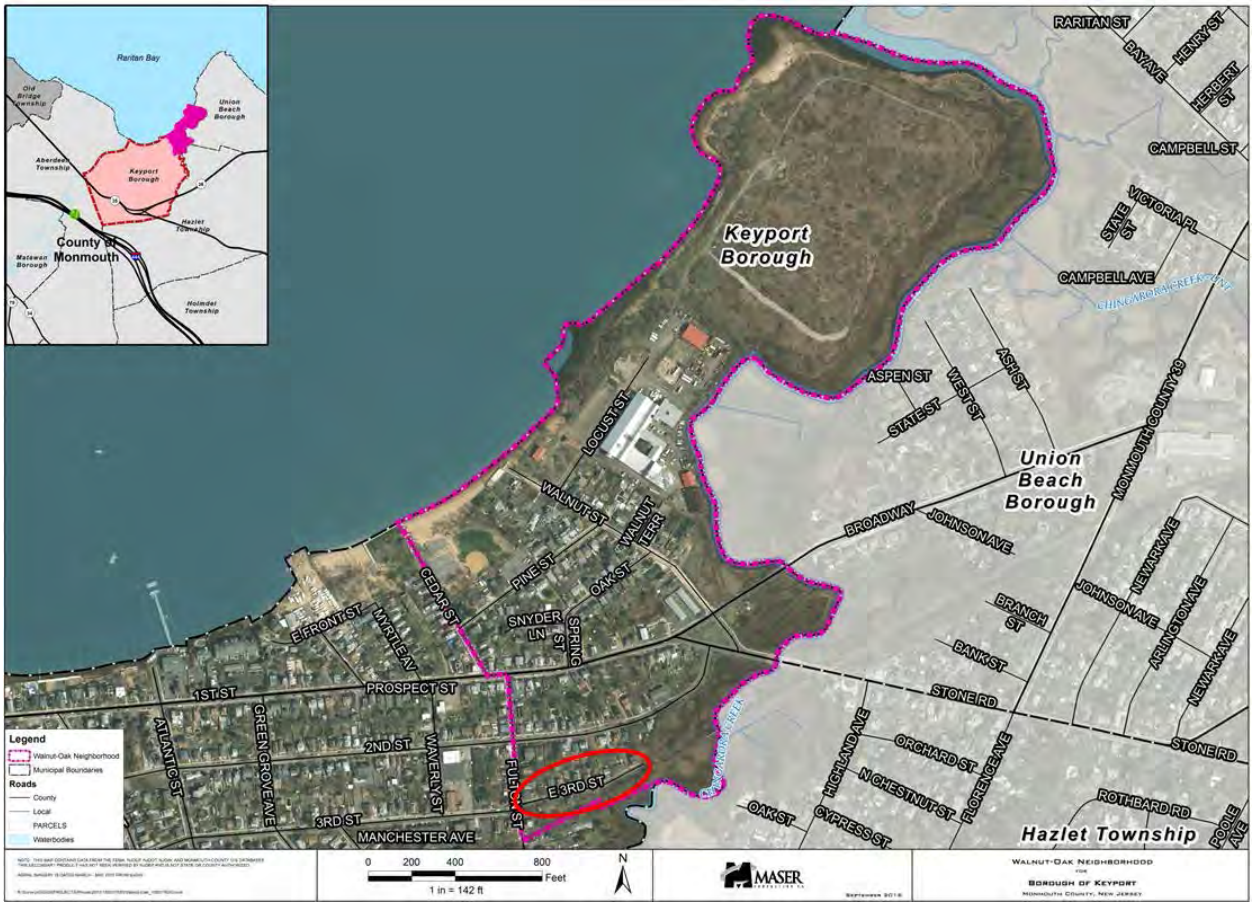
The Chingarora Creek and surrounding wetlands pass to the south of Second Street, running parallel to the street in the eastern portion, before swinging southward past East Third Street. The land to the south of Second Street is mostly undevelopable due to the wetlands, but owned by a private company.

Figure 112: Property and façade types on Second Street (Site visit August 18, 2016 and Google Streetview)

EAST THIRD STREET

East Third Street is a narrow, thirty (30') foot wide dead-end street at the southwestern-most portion of the Walnut-Oak Neighborhood, which runs parallel to First Street and Second Street, and perpendicular to Fulton Street.

Map 47: Location of East Third Street in Walnut-Oak Neighborhood (circled in red)



Lot widths vary from thirty-two (32') feet to one-hundred and eighty (180') feet and depths between thirty-seven and a half (37.5') feet to one-hundred and twenty-eight and three-quarters (128.75') feet. The front yards also vary from nearly zero (0') feet to twenty-five (25') feet and side yards approximately ten (10') feet.

Figure 113: Vacant lot owned by Borough of Keyport (Google Streetview, September 2015)

There is a mix of Raised Ranch and Folk Victorian Farmhouse-style single-family residential structures. Most of the first levels are raised at least a few feet with three or four steps leading up to the front entrance of the house. However, one structure is raised at least eight (8') feet with a set of nine (9) straight-run steps, a concrete foundation, and a half-floor below.

The north side is densely developed, while the south side is sparse. Ten single-family homes border the north side of the street and only two on the south side, with only one having frontage on East Third Street, although there are five lots. Of the five lots, one is vacant with an unknown owner, one owned by the Borough of Keyport, and one owned by the County of Monmouth (Lot 28, as well as some adjacent property). Lot 28 runs the length of East Third Street to the south of the street and then meets the street after vacant Lot 27.02. The street then opens up to the one-hundred (100')-foot wide lot, which contains the Henry Hudson Trail and forested wetlands.

Figure 114: East Third Street and adjacent Henry Hudson Trail (August 18, 2016)

A sidewalk runs along the entirety of the north side of East Third Street, as well as the developed portion of the south side to Lot 27. The sidewalks are generally in good condition, although there is some overgrowth of weeds and some compliance issues with property owners growing shrubs and trees over the public right-of-way.

Figure 115: Shrubs overgrowing public right-of-way; home surrounded by vacant and public lots (August 18, 2016)

East Third Street was minimally impacted by the storm surge from Hurricane Sandy, despite its proximity to the Chingarora Creek. According to the elevations, the road slopes down toward the east to the Creek and the road ends just above twelve (12') feet in elevation, to which the storm surge rose.

Figure 116: Property and façade types on East Third Street (Site visit August 18, 2016 and Google Streetview)

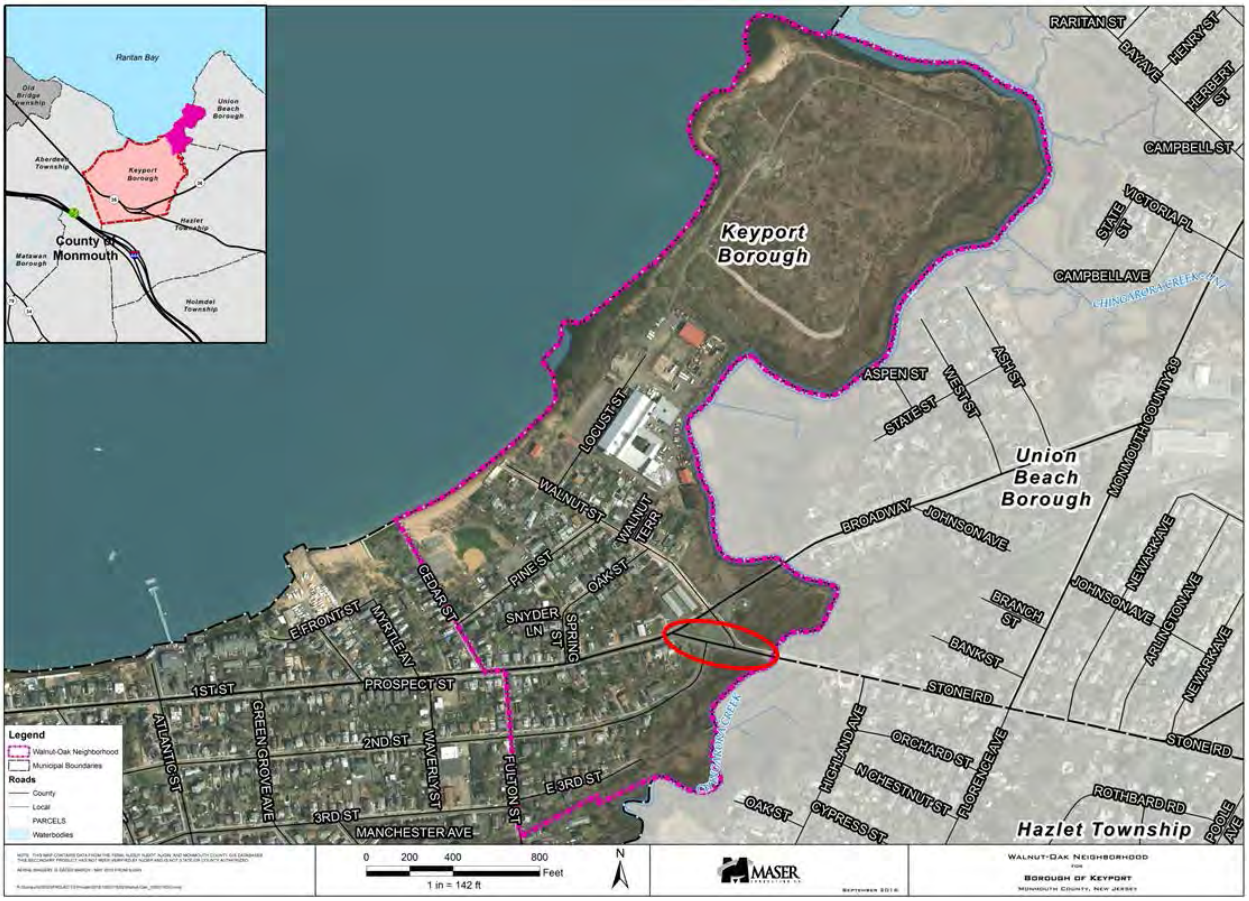
STONE ROAD

A short segment of Stone Road passes through the southeast section of the Neighborhood between the Borough of Union Beach municipal border at Chingarora Creek to First Street and intersecting with Walnut Street and East Second Street.

Figure 117: Stone Road from Union Beach border facing northwest toward First Street (August 18, 2016)

Stone Road is thirty (30') feet in width and has a sidewalk only on the easterly side from the Henry Hudson Trail on the Union Beach side to the intersection of Walnut Street, where it curves and follows Walnut Street. The bridge over Chingarora Creek is concrete with a metal guardrail and offers open views of the Creek.

Map 48: Location of Stone Road in Walnut-Oak Neighborhood (circled in red)



The Henry Hudson Trail passes over Stone Road on the Union Beach side. Stone Road is undeveloped on the Keyport side, except for one property on Block 135, Lot 17, although technically on First Street at the road bend. The rest of Stone Road is surrounded by grass fields and wetlands around the Chingarora Creek and appears expansive and remote. The entirety of the Keyport section of Stone Road is less than ten feet in elevation, including the Stone Road Bridge over the Chingarora Creek. Therefore, the entirety of the road was flooded by the storm surge during Sandy, due to the backing up of water from the Creek.

Figure 118: Stone Road intersection with Walnut Street facing north toward First Street (August 18, 2016)

VIEWSHEDS

In this study, viewsheds are considered the areas from which certain identified objects or landscapes/waterscapes are visible by the naked human eye. The purpose of determining the areas from which something can be observed is to preserve the value, whether historical, emotional, monetary, or otherwise, of those vistas into the future for those who can see them.

In particular, Aeromarine Water Tower, Chingarora Creek, and Keyport Harbor/Raritan Bay are important points of interest that have been identified. These areas are unique to the character of the Neighborhood and may be important to preserve visually throughout the Neighborhood where possible. The maps below illustrate approximately the public spaces, streets, or right-of-ways from which there is a view from ground-level. Therefore, private properties or elevated structures from which they are visible are not included. Often, there are structures, such as houses, or vegetation disrupting the view of the area in question where it may otherwise be visible, but is, therefore, not shown.

Additionally, improvements to and new public spaces and parks should emphasize these views, especially of the waterways and wetlands. Although physical access for the public to nature and to the water should be prioritized, visual access to such natural amenities also provides an enormous benefit.

AEROMARINE WATER TOWER

The Aeromarine Water Tower is the tallest structure in the Walnut-Oak Neighborhood, and most of the Borough. The water tower can, therefore, be seen from many parts of the Neighborhood, as shown below, although hidden from the street by structures, trees, and shrubs in other locations. As a historic structure, landmark for nautical navigation and symbol of the Neighborhood's industrial past, views of the water tower should be considered for preservation and enhancement.

If there is to be some type of redevelopment of the site, it may be determined at some point that the existing industrial building and associated water tower are no longer suitable or viable for the site or salvageable.

Given the long history of the Aeromarine site, the redevelopment should pay homage in some way to the use of the site and the iconic water tower, which identified the site for nearly a century.

The map below displays the viewshed areas from which the water tower can be seen, as well as "observation points". The subsequent numbered images correspond directly to the observation points, which are examples of the visualization from ground level.

Figure 119: Birdseye view of Neighborhood with Aeromarine Water Tower in center ("History of Aeromarine-Klemm Aircraft in Keyport, NJ." Jersey Bayshore Country TV)

Figure 120: Birdseye view of Aeromarine site and Water Tower ("History of Aeromarine-Klemm Aircraft in Keyport, NJ." Jersey Bayshore Country TV)

Map 49: Viewsheds of Water Tower in Walnut-Oak Neighborhood

WATER VIEWSHEDS

The map below displays viewsheds of water and wetlands, specifically Chingarora Creek and Keyport Harbor/Raritan Bay. The subsequent images relate to the identified observation points shown on the map for Keyport Harbor and then Chingarora Creek, respectively.

Map 50: Water/Wetlands Viewsheds of Chingarora Creek and Keyport Harbor

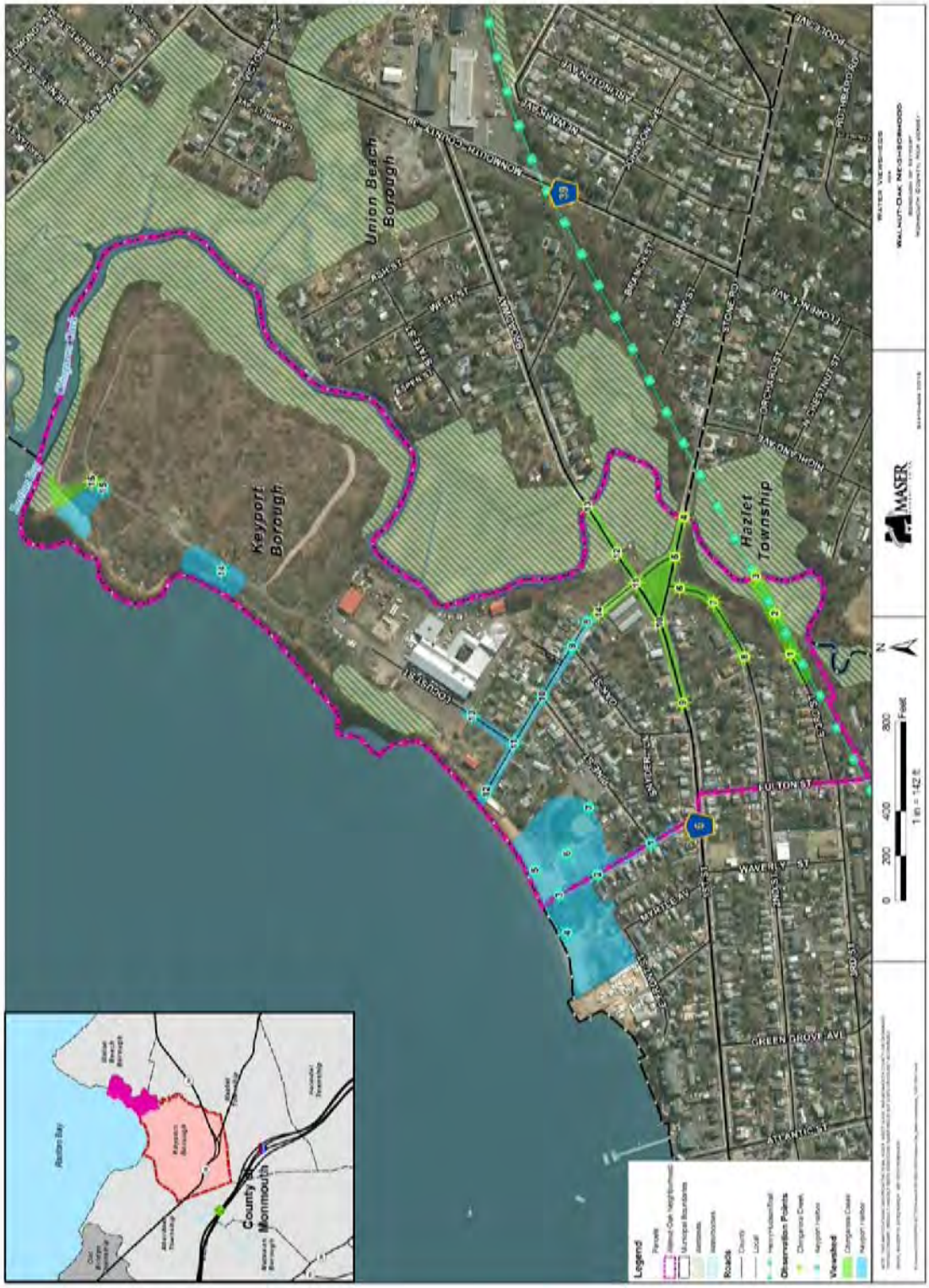


Figure 121: Images of Keyport Harbor from identified observation points, corresponding with blue points on Water/Wetlands Viewsheds Map (Images from site visit on August 18, 2016 and Google Streetview)

Figure 122: Images of Chingarora Creek wetlands from identified observation points, corresponding with green points on Water/Wetlands Viewsheds Map (Images from site visit on August 18, 2016 and Google Streetview)

MOBILITY AND CONNECTIVITY

STREETS

The Walnut-Oak Neighborhood in the northeast section of the Borough of Keyport was developed in the late 19th century. As such, it was common for streets to be placed in as much of a grid-like fashion as possible. Although the topography and existing structures play some role in the layout of the streets, it generally follows a grid previously established in the Borough to the west.

Roads are the primary means by which people move throughout a place, particularly in the Walnut-Oak Neighborhood. Streets are also commonly associated with automobiles, or cars, which often dominate the streetscape visually and by force. The Neighborhood developed slightly prior to the domination of the

automobile, which is evidenced in the form of the streets and historic, narrow lots. These features have been modified and modernized somewhat to accommodate personal automobiles, but still retain a base form that should function well for pedestrians.

The accommodation of vehicles, as well as the necessity to reach essential services in other parts of the Borough and region, has brought about a dependency on personal automobiles. According to the 2010-2014 American Community Survey 5-Year Estimates for the 8019 Census Tract, which includes Walnut-Oak and the area east of downtown Keyport, 1,447 out of 1,855 (78%) workers age 16 or older drove alone to work. Only 139 workers carpooled and 116 used public transportation.[79] 78% driving alone to work is not uncommon in many areas, and in some cases, much less than expected. The location of industries and jobs, as well as the economic status of families to be able to own a car, are major factors in this percentage. However, the connectivity of the streets and density of the Neighborhood are more conducive to walking than to driving. In this survey, 153 people are unaccounted for, meaning that they might walk or bike to work locally along these same streets.

Figure 123: Intersection of First Street and Spring Street (August 18, 2016)

First Street is the primary connecting and travel route into and through the Neighborhood, which connects downtown Keyport to the Borough of Union Beach, where the street becomes Broadway. A large number of residential units and other attractions either front on First Street or are accessible by way of First Street.

Stone Road is a secondary connector street, but directly connects the Neighborhood to Route 36 to the southeast. However, Stone Road only passes through the Borough of Keyport for a short segment where it passes over the Chingarora Creek and meets First Street to the southeast of the Walnut-Oak Neighborhood. First Street and Stone Road are both Monmouth County Department of Transportation (DOT) streets, giving the County priority over the Borough.

Second Street and Third Street also connect Walnut-Oak to downtown Keyport, east to west, but are not as direct and are primarily residential. Fulton Street connects Walnut-Oak north to south to the Green Grove neighborhood, and indirectly to Middle Road, which connects to Route 36 to the south.

Only one (1) street, Walnut Street, crosses First Street – the primary thru street in the Walnut-Oak neighborhood. There are six (6) points at which streets meet First Street, six (6) that meet Walnut Street, five (5) that meet Fulton Street, and three (3) that meet Stone Road. In total, there are fifteen (15) street intersections in the Walnut-Oak neighborhood. Although the Walnut-Oak Neighborhood does not experience

[79] U.S. Census Bureau, 2010-2014 American Community Survey 5-Year Estimates. Census Tract 8019, Monmouth County, New Jersey. Factfinder.census.gov

significant traffic, some of these intersections should be re-evaluated for their impact on traffic flow and pedestrian crossings. Intersections potentially slow down traffic and increase commute times, while also creating uncomfortable situations for pedestrians. However, in the same vein, traffic stops at intersections create a calmer and safer environment for pedestrians to cross.

The streets in Walnut-Oak are in fair condition, although Walnut Street and the southwest end of Second Street are in deteriorating condition with uneven surfaces, fissures, potholes, and crumbling curbs. Walnut Street is also constructed with concrete, rather than a typical asphalt used in the rest of the Neighborhood. Several of the streets are without outlet, or do not connect to another street, and do not have space for vehicles to turn around, other than in private drives. Additionally, streets such as Snyder Lane and Walnut Terrace, which are very narrow (25 feet in width) and which do not have an outlet, may pose a problem for parked vehicles and emergency vehicles. Spring Street and Oak Street are the only one-way streets in the Neighborhood.

Figure 124: Narrow roads are problematic for vehicles (Walnut Terrace, August 18, 2016)

A few streets, including the south end of Walnut Street, the east end of First Street, and the north end of Spring Street are also problematic in terms of flooding. During regular flooding events, and especially during storms, the First Street Bridge across the Chingarora Creek is often flooded and impassable due to its low elevation. The Stone Road Bridge is elevated slightly higher, but is still subject to closing during larger storms. The north end of Spring Street at Snyder Lane is a naturally low spot that is also subject to backed-up stormwater.

Figure 125: Conditions at low spot of intersection of Walnut Street at First Street (September 23, 2016)

PEDESTRIAN

Pedestrians must be the first consideration to ensure accessibility, safety, and autonomy for residents, workers, and visitors throughout the Neighborhood and the Borough. As a historic and dense neighborhood that was developed prior to the automobile, pedestrian mobility was likely more of a consideration at that time than it would have been in modern history. Therefore, the Neighborhood is fairly well connected by a network of sidewalks. Pedestrians also have access to the nearby Henry Hudson Trail, which connects to the Borough of Union Beach and beyond.

The existing sidewalks are located in the following areas, as shown on the map below:

Map 51: Existing Pedestrian Facilities (sidewalks, crosswalks, and trails) in and around Walnut-Oak

On the other hand, sidewalks in the Neighborhood are inconsistent and many sections are substandard. There are no consistent design standards for streetscape treatments and pedestrian sidewalks throughout the Walnut-Oak neighborhood.

Figure 126: Blocked or missing sidewalks force pedestrians into the street (left); and non-compliant ramps, uneven surfaces, and unmaintained sidewalks create difficult & hazardous situations for some pedestrians (right) (Aug. 18, 2016)

Sidewalks in many areas have crumbled, are overgrown with weeds, or have signs or electrical poles placed in the way. Additionally, many of the ramps at intersections are not ADA-compliant. Sidewalk conditions vary from those attached to the curb (5-7' wide); sidewalks with a curb strip; no sidewalk at all; no curbing at all; stone without edging; et cetera. There is a need for a standardization of sidewalk and curb treatments that can be modified to fit various applications. For example, the neighborhood could feature one sidewalk pattern with variations for the smaller and broader crossing streets.

It is unclear, based on the Census data, how many people in the area may actually walk to work, but it could be as many as 153.[80] However, based on observations from site visits, it is clear that people are using the sidewalks on a regular basis for leisure and work. Joggers, Postal workers, parents with children, and dog owners are just some of the people that can be seen on a daily basis. Maintenance and connectivity is critical for people to be able to move about freely and safely.

Figure 127: Pedestrians near intersection of Walnut Street and First Street (Google Streetview, October 2015)

[80] U.S. Census Bureau, 2010-2014 American Community Survey 5-Year Estimates. Census Tract 8019, Monmouth County, New Jersey. Factfinder.census.gov

Figure 128: Pedestrians on First Street and Second Street (Google Streetview, October 2015)

According to www.walkscore.com, which measures the walkability of any address by "analyz[ing] hundred of routes to nearby amenities", the Walnut-Oak neighborhood has a Walk Score® of 33 out of 100 points. "Points are awarded based on the distance to amenities in each category. Amenities within a 5 minute walk (.25 miles) are given maximum points. A decay function is used to give points to more distant amenities, with no points given after a 30 minute walk. Walk Score also measures pedestrian friendliness by analyzing population density. Data sources include Google, Education.com, Open Street Map, the U.S. Census, Localeze, and places added by the Walk Score user community."[81] The decay function, therefore, prioritizes closer amenities. An address at 52 Pine Street was chosen for its central location in the neighborhood, typical neighborhood design, and proximity to the Aeromarine site to calculate the Walk Score®.

Figure 129: Walk Score® for Walnut Street based on various categories (2016 Walk Score®)

Based on the calculation from this location, one can likely walk just past Edmunds Avenue to the northeast in the Borough of Union Beach; southeast to Haug Street near Route 36 off of Stone Road in Union Beach; south to Middle Road and Florence Avenue near Route 36; and west to Main Street in approximately twenty minutes.

[81] https://www.walkscore.com/methodology.shtml. Accessed October 2016.

Pedestrians can walk a relatively far distance in a short amount of time due to the accessible street grid and sidewalk network; however, nearly all amenities, such as stores and restaurants, are located at the outer boundary of this walking radius.

A Walk Score® of 33 out of 100 indicates that this location is still very car-dependent and that most errands require a car. Essentially, the only destinations that are walkable in a reasonable time or manner are a few drinking and dining establishments in the downtown and some parks. On the other hand, downtown Keyport is considered "very walkable". These destinations are still not easily accessible for all in the Neighborhood.

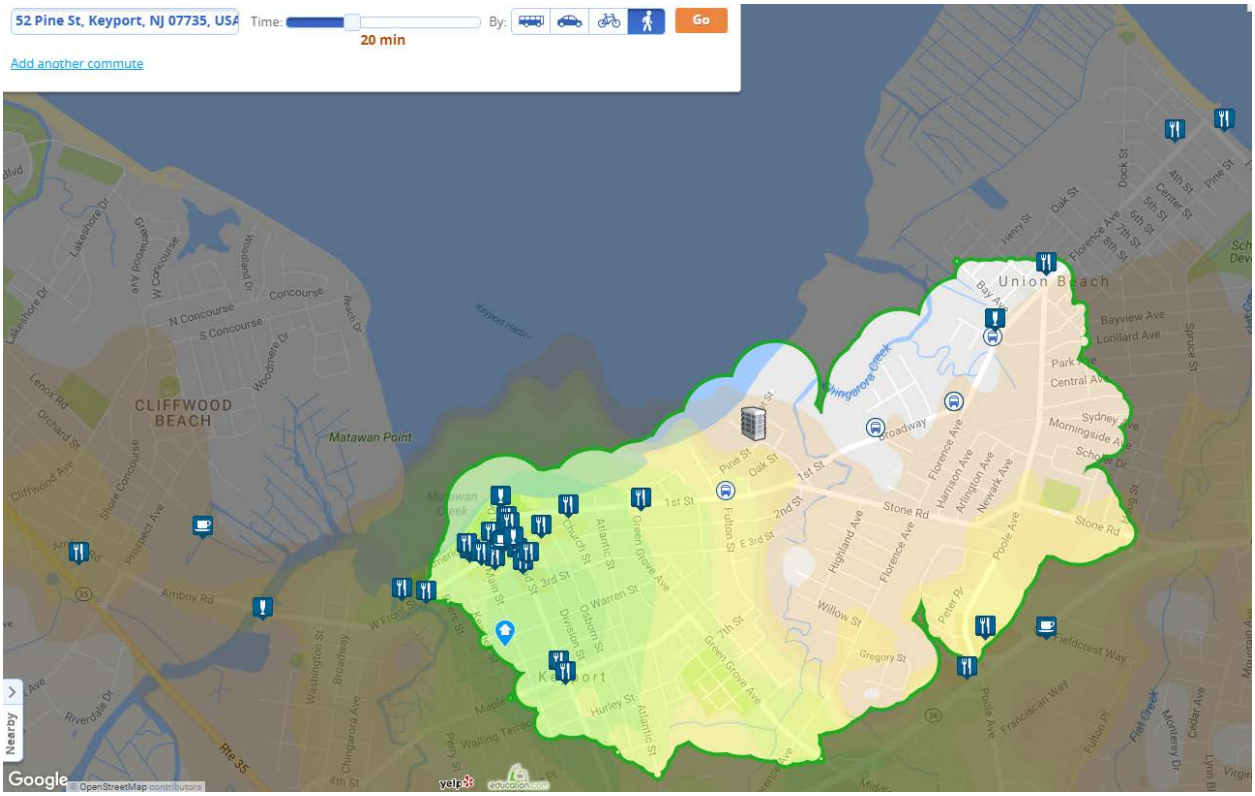


Figure 130: Radius of walkable area in 20 minutes from 52 Pine Street (2016 Walk Score®)

There are no traffic signals in the entirety of the Neighborhood Plan Area and there are only stop signs at the north-south crossings and at Pine Street, allowing traffic on the major roads, such as First, Second, and Third Streets to pass unimpeded. Similarly, there are no crosswalks around the entire Neighborhood. Although vehicular traffic is minimal, crossing streets such as First Street may be risky for pedestrians due to speeding vehicles, poor visibility, lack of lighting or reflectivity, and uneven surfaces, especially for children and handicapped or impaired people.

Figure 131: Some crossings are improved, while others are not or do not have a visible crosswalk (left); Intersections along First Street, including this one at Spring Street, do not have any crosswalks, signs, or ramps on both sides (Aug. 18, 2016)

Although there are very few crosswalks, stop or caution signs, or streetlights, there haven't been any recorded fatal accidents on highways near the Neighborhood between vehicles or vehicles and pedestrians between 2011 and 2013, according to data from the National Highway Traffic Safety Administration (NHTSA). Most neighborhood streets have slower, local traffic, but only three have posted speeds. Stone Road is 35 miles per hour (MPH); First Street is 30 MPH; and Walnut Street is 25 MPH. A study funded by the AAA Foundation found that "The average adjusted, standardized risk of death reached 10% at an impact speed of 23 mph, 25% at 32 mph, 50% at 42 mph, 75% at 50 mph, and 90% at 58 mph. Risk of death increased approximately linearly with speed for speeds between 32 mph and 50 mph, with an average increase of 2.8 percentage points (95% CI: 2.2 – 3.4) for each 1 mph increase in impact speed for speeds within this range."[82] Risk of death is higher for impact by larger vehicles, as well as for older and smaller victims.

BICYCLE

Bicyclists, oftentimes including children, are often seen biking in the wrong direction or on the sidewalks where they exist. If there are cyclists on both sides of the road or if they are riding in the wrong direction, this can create confusion amongst automobile drivers. Cycling on sidewalks can be a hazard for oncoming pedestrians. In addition to separate lanes or designated shared lanes, appropriate bicycle signage and education can reduce confusion and the potential for injurious accidents.

[82] Tefft, Brian C. AAA Foundation for Traffic Study. Impact Speed and a Pedestrian's Risk of Severe Injury or Death. September 2011. P.9. https://www.aaafoundation.org/sites/default/files/2011PedestrianRiskVsSpeed.pdf

Figure 132: Bicyclist near Walnut Street waterfront

Bicycling for leisure may not be as common on the streets of Walnut-Oak as it is in other places due to the close proximity of the Henry Hudson Trail, which allows bicycles, although the waterfront and parks may attract people who are traveling via bicycle. However, for people traveling within the Neighborhood, to specific destinations, or even to or from the Henry Hudson Trail, it is important to accommodate the additional use.

Figure 133: Bicyclists on Henry Hudson Trail

The road AADT, or Annual Average Daily Traffic, in 2013 for First Street between Walnut Street and Johnson Avenue in the Borough of Union Beach was 2,719[83] (see Appendix IV). Although this number may be greater closer to downtown Keyport to the west, a number greater than 2,000 vehicles is a good indication that "the probability becomes substantially greater that a vehicle overtaking a bicycle may also meet another on-coming vehicle[84]," according to the New Jersey Department of Transportation (NJDOT). Some streets in the Neighborhood may be too narrow or not enough traffic to warrant separate bicycle facilities or marked lanes; however, other streets such as First Street and Stone Road have the width and traffic to be able to accommodate bicycle treatments. "As a result, on these roads, some room at the edge of the roadway should

[83] New Jersey Department of Transportation. Daily Volume from 01/29/2013 through 01/31/2013. Site Name: 121314, First St-.8, 130000064_, Union Beach Boro.
http://www.state.nj.us/transportation/refdata/roadway/traffic_counts/TMS2Go/reports/121314%20on%2001-29-2013-04_19_2013.pdf

[84] NJ DOT Bicycle Compatible Roadways and Bikeways. Planning and Design Guidelines. P.6.
http://www.state.nj.us/transportation/publicat/pdf/BikeComp/introtofac.pdf

be provided for bicyclists. At low speeds, little separation is needed for both a bicyclist and a motorist to feel comfortable during a passing event. With higher speeds, more room is needed."[85]

As previously mentioned, the Henry Hudson Trail runs through the Walnut-Oak Neighborhood to the south and provides a bicycle/pedestrian-only means of travel regionally between the Township of Aberdeen and the Borough of Highlands (see Map 52). The Henry Hudson Trail was created as "rail trail", or abandoned railroad tracks converted into a public trail, in the 1990s. The trail can also be seen on Map 51 passing through the Walnut-Oak Neighborhood into the Borough of Union Beach.

Map 52: Henry Hudson Trail – North Section Map (trail shown in purple)[86]

No Bike Score® was given to the specified address on Pine Street using www.walkscore.com, but a travel time map was provided with a travel time of twenty minutes from the address. According to map, it is possible to reach by bicycle in the allotted time Laurel Avenue at Route 36 in the Borough of Union Beach to the east; Ramsey Avenue in the Borough of Keansburg to the east; Raritan High School and Veterans Park in the Township of Hazlet to the south; the intersection of Church Street at Lloyd Road in the Strathmore neighborhood of the Township of Aberdeen to the south; Bayshore Community Hospital in the Township of Holmdel to the south; Church Street at Broad Street in the Borough of Matawan to the southwest; and County Road at Route 35 in the Cliffwood Beach neighborhood of the Township of Aberdeen to the west. It takes approximately one hour and twenty-nine minutes to reach the City of Perth Amboy, a major regional employment and population center, by bicycle.[87]

[85] Ibid.
[86] Monmouth County Park System. Henry Hudson Trail. Monmouth County, New Jersey. http://co.monmouth.nj.us/documents/130/henry_hudson_trail_updated_june_2016a.pdf
[87] Walk Score® 2016. Accessed October 2016. https://www.walkscore.com/score/52-pine-st-keyport-nj-07735

Figure 134: Radius of bikeable area in 20 minutes from 52 Pine Street (2016 Walk Score®)

At minimum, the use of signage to direct cyclists to safe routes could be implemented on Borough and both signage and shoulder or shared lane markings could be added on Monmouth County DOT roads. Signage should also direct people from available parking areas to the trail.

PUBLIC TRANSIT

Keyport was once served by the Southern Division of the Central Railroad of New Jersey, opened by the Freehold and New York Railroad in 1880. The railroad eventually extended to Atlantic Highlands, Sandy Hook, and south across the Shrewsbury River Bridge. A hurricane in September 1944 destroyed parts of the railroad along the shore.[88] The railroad was rebuilt, but service between Matawan to Atlantic Highlands was eliminated in 1966. The railroad was eventually replaced in the 1990s by the Henry Hudson Trail.

Electrified streetcars, operated by the Jersey Central Traction Company, were also common along the streets of Keyport, including First Street, Front Street, and Broad Street. Operation of the streetcars began in 1904, although horse-drawn streetcars existed earlier, and ended in 1923.[89]

Today, bus lines are the only public transit option directly accessible to the Walnut-Oak Neighborhood. The 817 N.J. Transit Bus to Perth Amboy via Higher Education Center runs northbound along First Street and stops

[88] New York Times. April 25, 1942 and March 24, 1946.

[89] Jeandron, Jack. *Keyport: From Plantation to Center of Commerce and Industry.* Arcadia Publishing. 2003. https://books.google.com/books?id=oCtY4qiKmVcC&pg=PA76&lpg=PA76&dq=jersey+central+traction+company&source=bl&ots=wkiZF5vX93&sig=NhGCvjsGeKMUqWwpH1JfHh8JIeI&hl=en&sa=X&ved=0ahUKEwj1mIrerfnPAhXCgj4KHfr9Cqw4ChDoAQguMAU#v=onepage&q=jersey%20central%20traction%20company&f=false

at Cedar Street and Broadway at Johnson Avenue in Union Beach, across the Chingarora Creek. Additionally, the 817 N.J. Transit Bus toward Campbell's Junction in Middletown runs southbound along First Street and stops at Fulton Street. The 817 is the only bus to cross through the Neighborhood and does so approximately once every sixty (60) minutes. Travel from the 817 bus stop to the final destination in Perth Amboy takes approximately forty-five (45) minutes and travel to Campbell's Junction takes approximately thirty (30) minutes. The fares are exact change only and range between $1.60 and $3.80, depending on the number of zones through which a passenger is traveling[90] (see Appendix V).

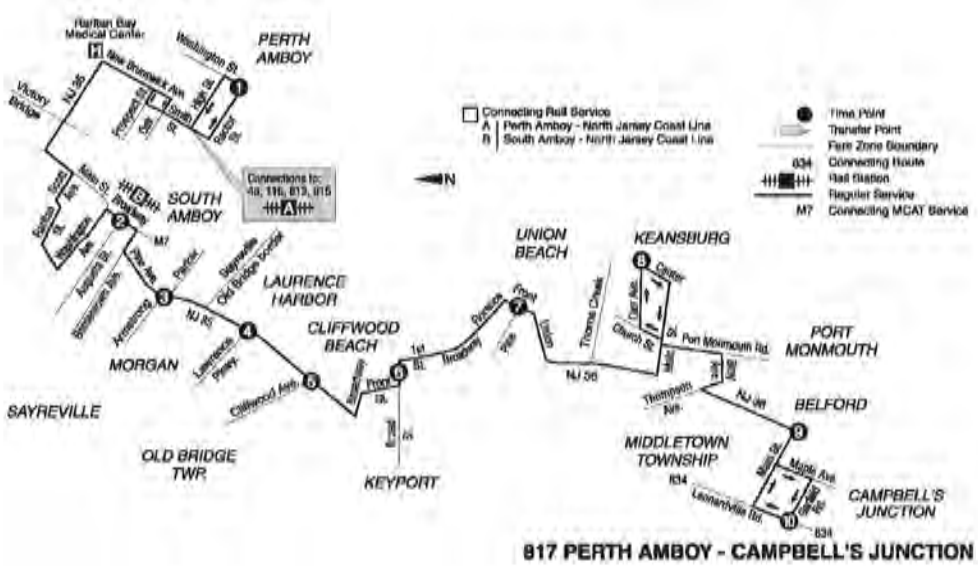


Figure 135: NJ Transit Bus 817 Perth Amboy – Campbell's Junction[91]

The map below was provided by Walk Score® and shows the areas which are accessible by public transit from a given location, 52 Pine Street, within thirty (30) minutes. The thirty-minute radius is shown as the unshaded areas of the map bounded by a green line. The green straight line segments show various transit lines – particularly the 817 bus line that runs through Keyport. The lightly shaded areas show a radius of fifteen (15) minute from any transit stop, including bus and rail.

The NJ Transit North Jersey Coastline Railroad is shown to the southwest in the shaded area, with the closest existing railroad stations to Walnut-Oak are the Aberdeen-Matawan Station and the Hazlet Station.

[90] NJ Transit, Bus 817. http://www.njtransit.com/pdf/bus/T0817.pdf
[91] Ibid.

Figure 136: Radius of transit area in 30 minutes from 52 Pine Street (2016 Walk Score®)[92]

[92] Walk Score® 2016. Accessed October 2016. https://www.walkscore.com/score/52-pine-st-keyport-nj-07735

THREATS AND CHALLENGES

The Walnut-Oak Neighborhood of the Borough of Keyport faces several threats and challenges to the livelihoods of residents and to the infrastructure that should be properly addressed as soon as possible. Some of these threats are environmental or financial in nature that stem from larger-scale issues to which the Neighborhood can only mitigate or adapt. The Borough has more direct control over other challenges, such as contaminated sites, zoning, street design, recreational opportunities, et cetera.

This section describes the extent of many of the environmental and infrastructural threats and challenges in the Neighborhood. Some solutions or strategies on how to approach these challenges are provided in the Recommendations chapter.

ENVIRONMENTAL CHALLENGES AND CONSTRAINTS

The environmental history of the Neighborhood and region is inextricably linked to the anthropological history. The hospitable and bountiful nature of Keyport Harbor likely motivated human inhabitance and then facilitated the socioeconomic and cultural advancement of the area, while the resultant development, use of resources, and pollution has contributed to the degradation of the environment that had originally attracted people.

The environmental constraints in the Walnut-Oak Neighborhood should be taken into consideration prior to development. Most significantly, the Neighborhood is impacted by water. The Borough of Keyport and the Neighborhood historically developed around the surrounding waterways due to the inherent value that they provided to industry, food sources, and transportation. Presently, the waterbodies provide a form of pleasure, but also a sense of anxiety and impairment.

The total area of the Neighborhood is 103.45 acres, which includes some water area of the Raritan Bay and the Chingarora Creek. The Neighborhood is bordered by water on all sides except for the southwestern area where it is bordered by Cedar and Fulton Streets. As such, the unique location of the Walnut-Oak Neighborhood comes with a risk for flooding. The Keyport neighborhood is subject to flooding and storm surge from Raritan Bay, due to its bayfront location, as well as flooding from the Chingarora Creek due to its low elevation along the creek bed.

Other challenges, which are detailed below, include storm surge, sea level rise, beach erosion, loss of wetlands and pollution, and contaminated sites.

HAZARDS

The Borough of Keyport Strategic Recovery Planning Report (SRPR) examines an extensive list of hazards to the Borough that were originally identified in the 2009 Multi-Jurisdictional Hazard Mitigation Plan (HMP) for Monmouth County. As part of the Risk Assessment, the HMP included a composite map of vulnerability. Throughout the entire Borough and within the Walnut-Oak Neighborhood, there is a composite of at least three hazards out of flood, wildfire, landslide, and storm surge hazards. The greatest vulnerability is throughout the wetlands and low-lying areas, as shown in Map 53 below.

As stated in the Borough SRPR, "when comparing the 2009 HMP assessment of vulnerability to the actual unprecedented experience from Superstorm Sandy, it is interesting to compare the Keyport Composite Map of

Vulnerability, shown on the following page, to Figure 12 and Figure 13," referring to the map of Sandy Storm Surge and the map of Advisory Base Flood Elevations, respectively.[93] The extent of the storm surge shown on the Sandy Storm Surge Map in the Hurricane Sandy section of this Neighborhood Plan closely matches the furthest extent of the Composite Hazard Map from the 2009 HMP. "What appears to have been underestimated in the 2009 HMP on the Composite Map of Vulnerability is the extent of the vulnerability to a composite of three hazards, as the extent of the surge in the lower lying areas of the Borough and along the creeks involved the tidal surge, flooding and wave action."

Map 53: Keyport Composite Map of Vulnerability[94] (Walnut-Oak Neighborhood outlined in red)

[93] Roberts, David G. et al. Strategic Recovery Planning Report. Borough of Keyport. 2014. P.14.

[94] "Keyport Composite Map of Vulnerability". Multi-Jurisdictional Natural Hazard Mitigation Plan – Monmouth County, New Jersey. Final 2009. URS. Figure 3c.28.

FLOODING

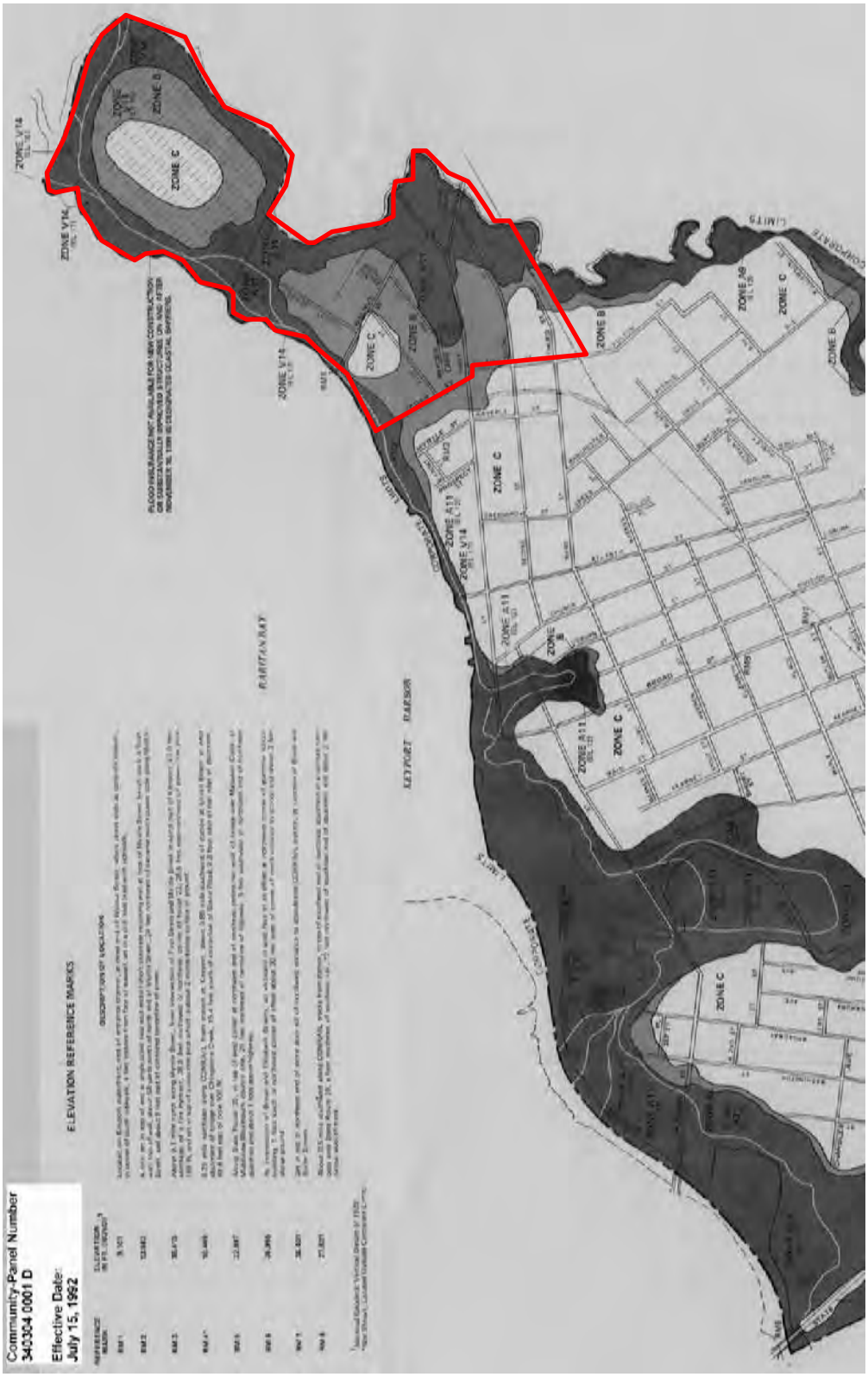
Flooding is one of the primary challenges that the Borough of Keyport and, specifically, the Walnut-Oak Neighborhood face. Flooding can occur from regular high tide events, as well as during storms and associated storm surge. This challenge will continue to intensify and become more prevalent as sea level rises. The Borough will need to find ways in which to address both regular flood events and severe storms on a more regular basis and with potentially more serious consequences.

According to the 2015 Preliminary FIRM Data for Monmouth County, the Neighborhood is located in FEMA Special Flood Hazard Areas (SFHA) VE, AE, X (Shaded) and X (Unshaded)[95]. The VE Zone is defined as a "high risk – coastal area" where a 1% or greater chance of flooding and an additional hazard associated with storm waves is likely to occur over any given year. This is also known as the base flood or 100-year flood. Nearly 17 acres of the neighborhood is within the VE Zone. The VE Zone is present along the entire Raritan Bay border and along the Chingarora Creek in the norther area. The AE Zone, which is a high risk area but not a coastal area, also has a 1% or greater chance of flooding. Just over 39 acres or 37.8% of the area is within the "AE" Zone. The AE Zone can be found mostly along the eastern border adjacent to the Chingarora Creek but a small sliver extends south along the Raritan Bay in between the VE and X (Shaded) Zones. The X (Shaded) Zone is considered a Moderate Risk Area and is between the limits of the 100-year and 500-year (0.2% chance) floods and is in the floodplain of lesser hazards. This Zone is located mainly in the southern end of the neighborhood behind the AE Zone, but a portion of it is located in the estimated landfill area in the north. The X (Shaded) Zone comprises 25.75 acres or 24.9% of the Neighborhood's area. Finally, there is an area of Low Risk, X (Unshaded), that is above the 500-year flood limit that may have pond or local drainage issues that lead to flooding. This Zone is found where the landfill is estimated to be at as well as a few small places in the southern portion of the Neighborhood.

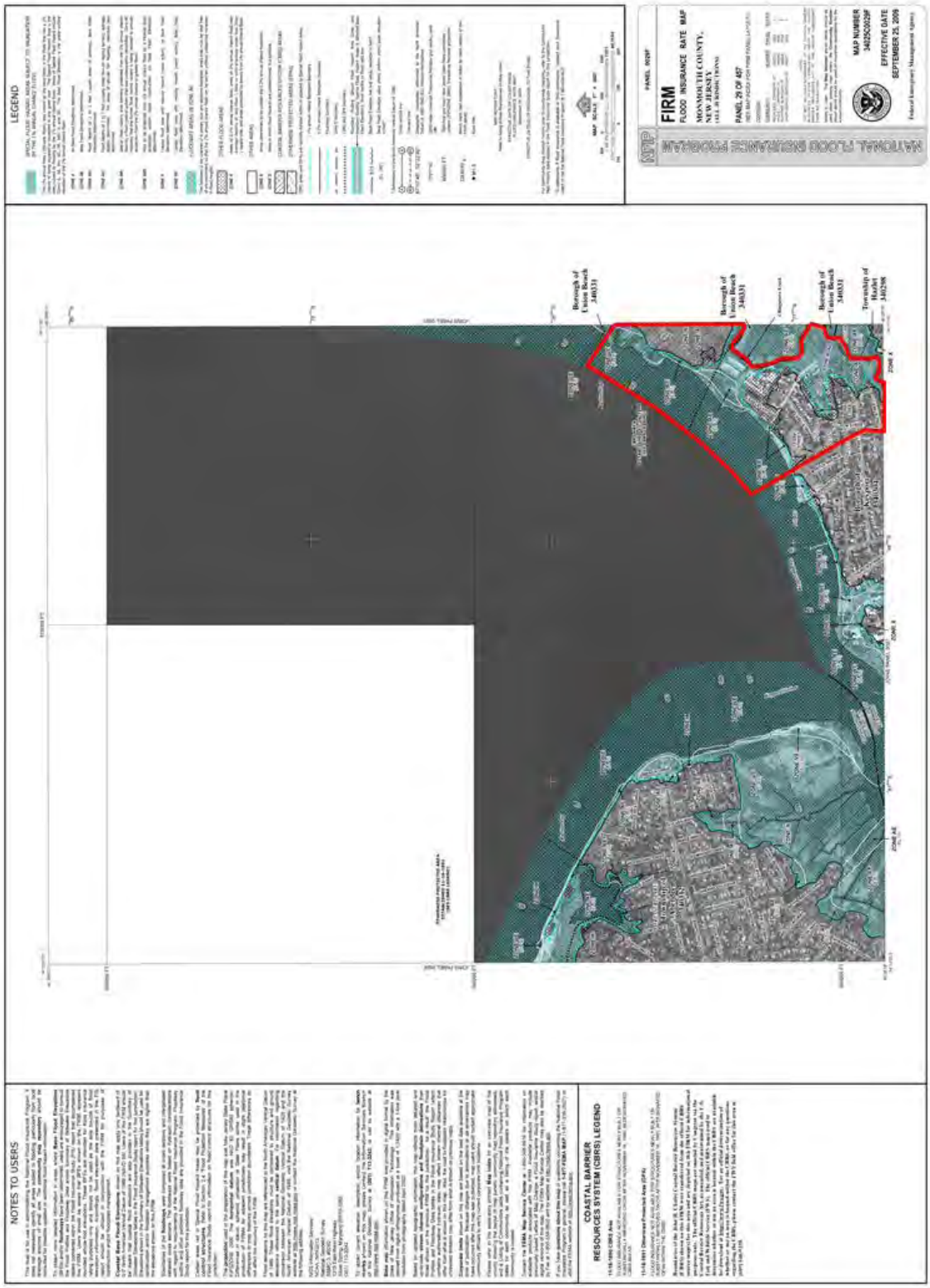
The Walnut-Oak Neighborhood is completely within flood zones; however, just over 56 acres or 54.2% of the land area is in a high risk 100-year flood area. The flood maps below show the changes in the National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRMs) between 1992 and 2009. The maps were updated after Hurricane Sandy in 2015 and can be seen in the *Hurricane Sandy* section of this Plan.

[95] http://apps.femadata.com/PreliminaryViewer/?&appid=90fb84e6570f4ec9b627cb1a95864658

Map 54: 1992 Effective NFIP FIRM (Outline of Walnut-Oak Neighborhood in red)



Map 55: 2009 Effective NFIP FIRM (Outline of Walnut-Oak Neighborhood in red)



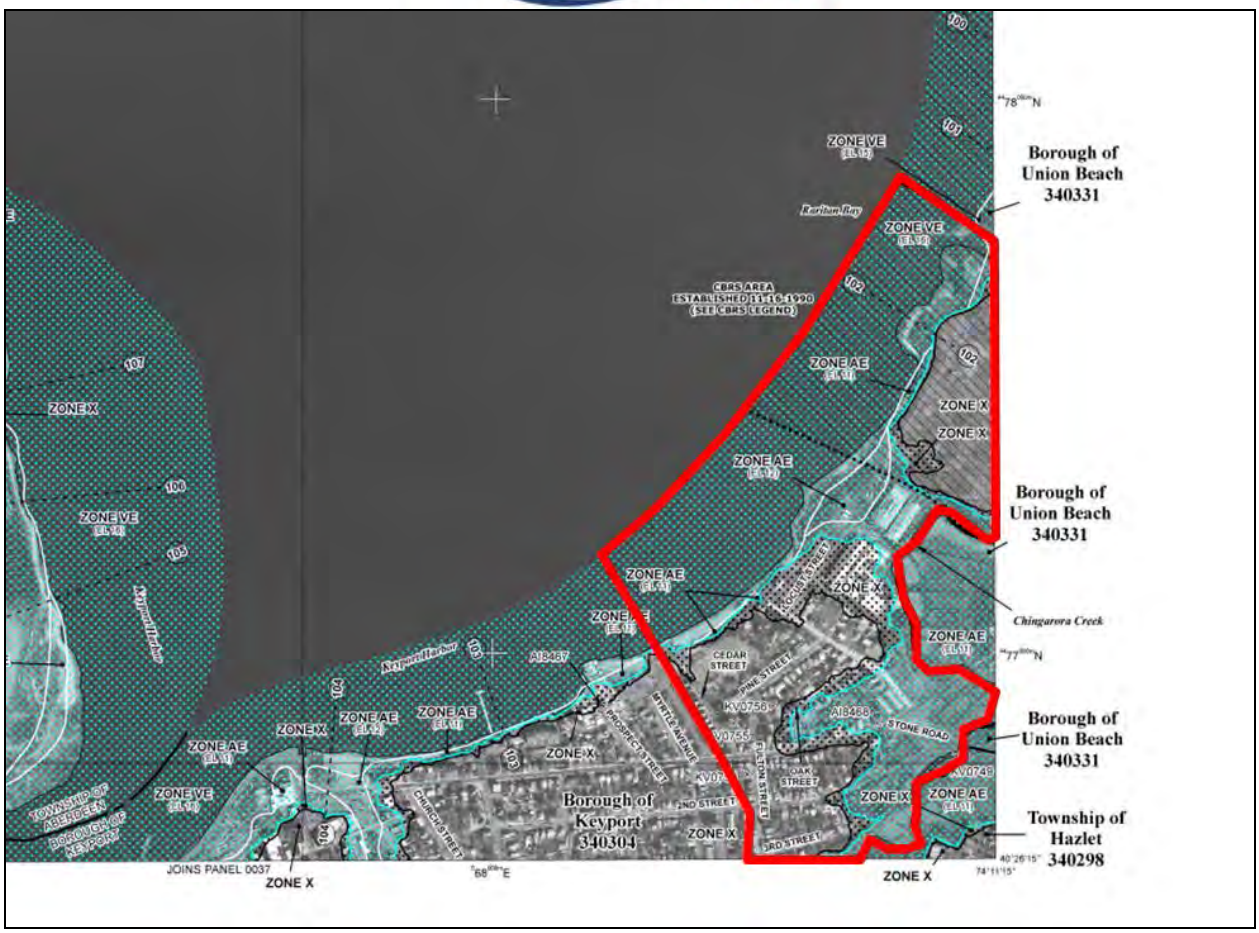


Figure 137: Subset of 2009 Effective NFIP FIRM (Walnut-Oak Neighborhood outlined in red)

The most vulnerable developed parts of the neighborhood include the Aeromarine site and Block 138 between First Street, Oak Street, Walnut Street, and Spring Street. On Block 138, the elevation drops from approximately eleven (11') feet at the highest part to the west down to approximately four (4') feet in the center and east of the Block. There are relatively steep slopes from the streets down to the lowest point in the center of the Block and, therefore, drainage is a major issue in this location. The Block is entirely developed around the perimeter, although the center (on private property) is wooded and overgrown. There is a drainage pipe in the center, but it has been anecdotally described as being consistently backed-up. Residents along Spring Street pump floodwater out to the street to the nearest storm drain, which then is drained down First Street toward Chingarora Creek, rather than remaining stagnant in the backyards. During Hurricane Sandy, stormwater came up through the basement to just below the first floor floorboards of a house on Spring Street. While the water subsided from the home, it remained in the rear yards for an extended period of time.[96]

[96] Based on a conversation with resident on Block 138 during site visit on September 23, 2016. The description is not verbatim.

Figure 138: Rear yard of an abandoned property on Oak Street, Block 138 with very low elevation and flooding problems (September 23, 2016)

Figure 139: Hose used to pump water from yards to storm drain on Spring Street, Block 138 (Google Streetview, Oct. 2015)

Additionally, flooding of the Chingarora Creek is said to be partly a result of sediment buildup in certain areas upstream. Whereas water would typically continue upstream during a storm surge (or continue downstream during rain events) before spreading outward, it has been the experience of many residents and Borough staff that stormwater tends to back up near some of the bridges and floods the surrounding neighborhoods.

Figure 140: Example of accumulation of natural materials and pollution by bridge over Chingarora Creek (August 18, 2016)

STORMS AND STORM SURGE

The most significant threat to the Walnut-Oak Neighborhood is the increased frequency and intensity of storms and the resultant storm surge. The Neighborhood's location and low elevation at the mouth of the Chingarora Creek on Keyport Harbor/Raritan Bay, which opens to the Atlantic Ocean, provides a plethora of benefits, but also positions it in the path of destructive weather and waves. The direct impact of rain and wind is currently less of a concern than the storm surge that comes from offshore during severe weather events and that funnels high levels of water up the narrow creek channels.

In regular past flood events, the wetlands could absorb a large amount of floodwater before reaching the streets and structures. However, the encroachment of development and impervious surfaces has compromised the integrity of the wetlands and stronger storms are pushing more water inland and to higher elevations than previously. While the models are still being developed and will continue to change, municipalities can expect to see unprecedented changes in the future that can potentially bring more rain, stronger winds, and higher storm surge.

According to Jeff Masters of Weather Underground:

> *"Global warming theory (Emanuel, 2005) predicts that a 2°C (3.6°F) increase in ocean temperatures should cause an increase in the peak winds of the strongest hurricanes of about about 10%. Furthermore, warmer ocean temperatures are expected to cause hurricanes to dump 20% more rain in their cores by the year 2100, according to computer modeling studies (Knutson et al., 2010). However, there has been no published work describing how hurricane size may change with warmer oceans in a future climate. We've seen an unusual number of Atlantic hurricanes with large size in recent years, but we currently have no theoretical or computer modeling simulations that can explain why this is so, or if we might see more storms like this in the future. However, we've seen significant and unprecedented changes to our*

atmosphere in recent decades, due to our emissions of heat-trapping gases like carbon dioxide. The laws of physics demand that the atmosphere must respond. Atmospheric circulation patterns that control extreme weather events must change, and we should expect extreme storms to change in character, frequency, and intensity as a result--and not always in the ways our computer models may predict. We have pushed our climate system to a fundamentally new, higher-energy state where more heat and moisture is available to power stronger storms, and we should be concerned about the possibility that Hurricane Sandy's freak size and power were partially due to human-caused climate change."[97]

Hurricane Sandy was considered to be a "one-hundred year storm", meaning there was 1% or greater chance of such a storm to occur over any given year. However, predictions are changing that show storms similar to Hurricane Sandy becoming more frequent. In coastal New Jersey, other regular storms, such as Nor'easters, also create problematic flooding situations in low-lying areas.

Another constraint to mention is the FEMA Limit of Moderate Wave Action line. This line depicts the portion of the 100-year coastal flood hazard area where "wave heights are between one and a half (1.5) and three (3) feet and where wave characteristics are deemed sufficient to damage many Nation Flood Insurance Program (NFIP)-compliant structures on shallow or solid wall foundations[98]". In the Walnut-Oak Neighborhood, this line delineation remains close to the coast; however, just to the north of the main building on Lot 15 of Block 141, the line quickly moves inland and extends into the Borough of Union Beach. It then loops back into the Neighborhood, passing the second building on Lot 15 to the north and continues along the coast of the Raritan Bay and Chingarora Creek before extending back into Union Beach in the northeast. This line shows that the northern part of Lot 15 would be disconnected from the rest of the neighborhood if 1.5 to 3 foot waves were to come to shore.

SEA LEVEL RISE

The consequences of climate change are substantially onerous, unfathomable, and in certain ways, unpredictable. The strength and frequency of storms is volatile; however, scientists have been able to predict the rise of sea level based on the likelihood of increases in global temperature. Even if present storm patterns remain the same, sea level rise will increase the impact of coastal flooding during storms.

As a coastal community, the Borough of Keyport is very vulnerable to any increase in sea level. Although the coastline along Keyport Harbor is higher in elevation relative to most other areas of the Neighborhood and may not be breached at a regular interval for many years, the backside of Walnut-Oak, which is surrounded by wetlands, is closer to existing sea level and can expect more frequent flooding events. According to the Rutgers University Institute of Marine and Coastal Sciences, "During the 20th century, sea level rose globally by 0.7 inches/decade due to warming oceans (thermal expansion) and the melting of land ice. Over the last twenty years, it has risen by about 1.3 inches/decade and appears to be accelerating."[99] In addition, many coastal areas in New Jersey are simultaneously experiencing land subsidence, which increases the likelihood of flooding.

[97] Masters, Jeff. "Hurricane Sandy's huge size: freak of nature or climate change?" Weather Underground. November 13, 2012. https://www.wunderground.com/blog/JeffMasters/hurricane-sandys-huge-size-freak-of-nature-or-climate-change

[98] https://sites.google.com/site/region2coastal/additional-resources-1/glossary#limwa

[99] Kenneth G. Miller, Robert E. Kopp, and Benjamin P. Horton. "Sea-level rise in New Jersey fact sheet". Rutgers University. Department of Earth and Planetary Sciences. Institute of Marine and Coastal Sciences. http://geology.rutgers.edu/images/stories/faculty/miller_kenneth_g/Sealevelfactsheet7112014update.pdf

"Between 1 and 1800 AD when global sea level was stable, sea level on the Jersey shore rose at an average rate of about 0.6 inches per decade. This rise was largely due to "glacial isostatic adjustment" (GIA), the ongoing response of the Earth to the melting of the great ice sheets, a seesaw effect causing the land to sink in the mid-Atlantic region while rising in formerly ice-covered areas. In the 20th century, sea level rose by 12 inches at bedrock locations (Bayonne, Trenton, and Camden). Along the Jersey shore from Sandy Hook to Cape May, it rose an additional four inches due to compaction of sediments caused by natural effects and groundwater withdrawal. There is a 95% probability that the 20th century rate of sea-level rise along the New Jersey shore was faster than it was in any century in the last 4,000 years."[100]

Therefore, as sea level rises, the Keyport area is particularly vulnerable. A sea level rise of 1.5 feet would cause the 1-in-10 year flood to exceed the highest flood level experienced over the last century.[101]

The following maps show the predicted Special Flood Hazard Area (SFHA), or flood risk, in the Walnut-Oak Neighborhood by 2050 and 2100 with four scenarios of sea level rise (i.e. lowest, intermediate-low, intermediate-high, and highest). The data was provided by NOAA, in partnership with FEMA, USACE, USGCRP, and CEQ, "based on the best available science synthesized by a panel of scientists from multiple federal agencies and academic institutions to provide to the U.S. National Climate Assessment."[102]

The future SFHA maps are another way of showing the vulnerability of the Neighborhood to flooding over the next century as sea level rises. The "lowest" (orange) SFHA is based on minimal sea level rise and includes the areas that are most likely to be inundated by the respective year, while the "highest" (red) SFHA indicates areas that would be affected by the highest predicted sea level rise, but that have the least probability. These more elevated areas still have the potential to be flooded if greenhouse gas emissions and global temperatures go unchecked. By 2050, the lowest shows +0.3 feet of sea level rise, while the highest, or least likely, shows +2.0 feet. However, +0.3 feet covers nearly half of the land area of Walnut-Oak, including the Aeromarine site and the block between Walnut Street and Oak Street. By 2100, the lowest predicted increase is +0.7 feet, while the highest is +6.6 feet. In that respect, it is best to prepare for the highest possible increase. The maps show that under the lowest increase, more than half of the Neighborhood will be under water; whereas the entire Neighborhood, save for a couple of pockets at the top of the landfill, will be under water with the highest predicted increase.

The basis of the range of scenarios for global mean sea level rise is the confidence of NOAA scientists (greater than 9 in 10 chances) that global mean sea level (based on mean sea level in 1992) will rise at least 8 inches (0.2 meters) and no more than 6.6 feet (2 meters) by 2100. The biggest uncertainty is the contribution of water from the melting of ice sheets and glaciers in Greenland and Antarctica.

- "The lowest sea level change scenario (8 inch rise) is based on historic rates of observed sea level change. This scenario should be considered where there is a high tolerance for risk (e.g. projects with a short lifespan or flexibility to adapt within the near-term)
- The intermediate-low scenario (1.6 feet) is based on projected ocean warming
- The intermediate-high scenario (3.9 feet) is based on projected ocean warming and recent ice sheet loss

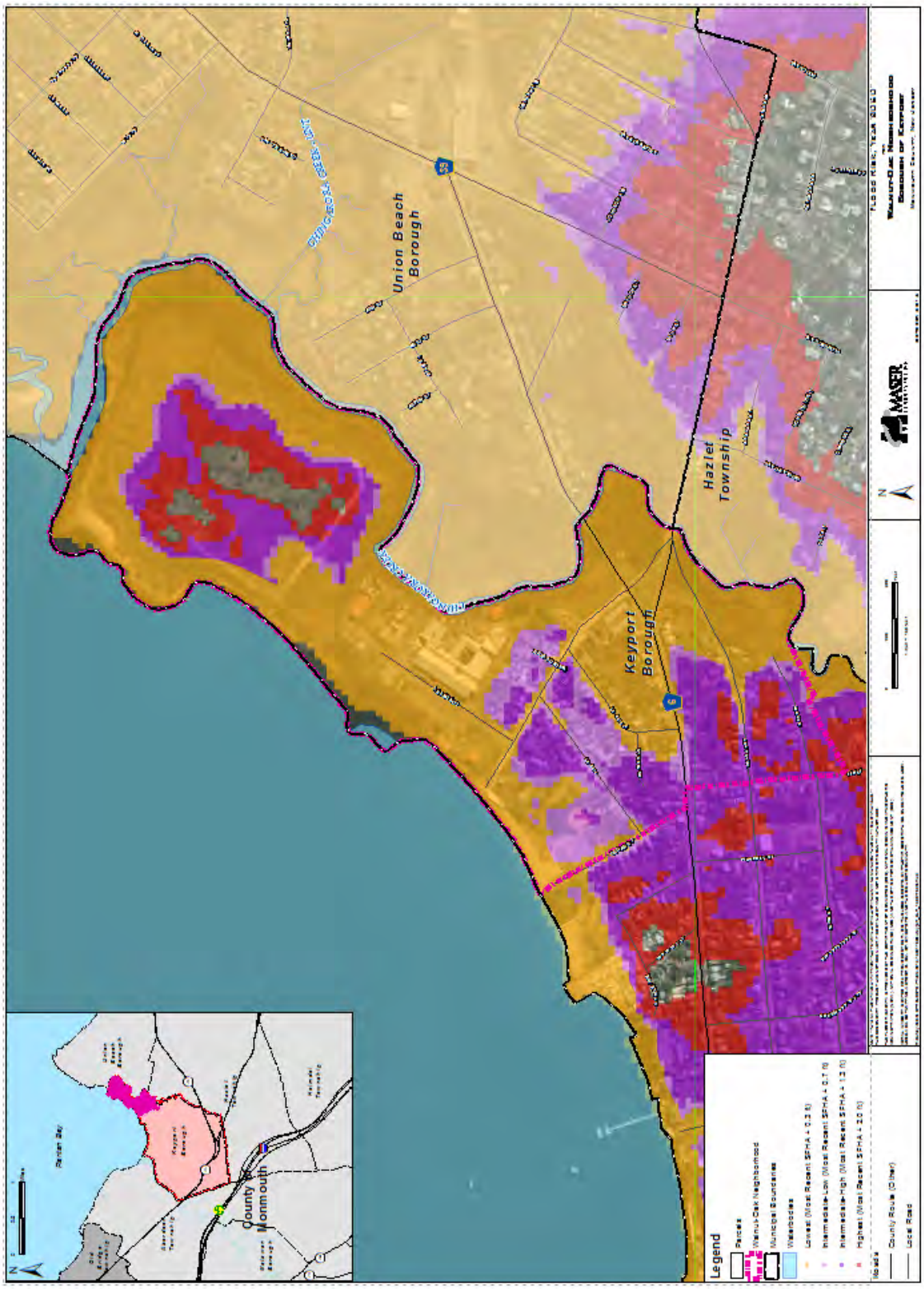
[100] Ibid.
[101] Ibid.
[102] NOAA_GeoPlatform. "Future Sea Level Rise and Most Recent Special Flood Hazard Area." Last modified December 3, 2015. http://geoplatform.maps.arcgis.com/home/item.html?id=2960f1e066544582ae0f0d988ccb3d27

- The highest sea level change scenario (6.6 foot rise) reflects ocean warming and the maximum plausible contribution of ice sheet loss and glacial melting. This highest scenario should be considered in situations where there is little tolerance for risk."

Higher mean sea levels increase the frequency, magnitude, and duration of flooding associated with a given storm. Flood maps for 2050 and 2100 for the above scenarios are shown below.

Map 56: Flood Risk, Year 2050

Map 57: Flood Risk, Year 2100



A non-profit organization, called Climate Central, has developed a tool called Surging Seas, which also shows predicted sea level rise based on increases in global temperature. The first scenario shows an increase of 2.7 degrees Fahrenheit, in which sea level covers the block between First Street, Walnut Street, Oak Street, and Spring Street; it consumes the Aeromarine Industrial site, cutting off the landfill from the Neighborhood; and encompasses the Neighborhood, swallowing the existing coastline and wetlands. The second scenario shows sea level rise at an increase of 5.4 degrees Fahrenheit in global temperature, which places the entirety of the Neighborhood under water, except a small island of the landfill (even smaller than the U.S. National Climate Assessment maps).

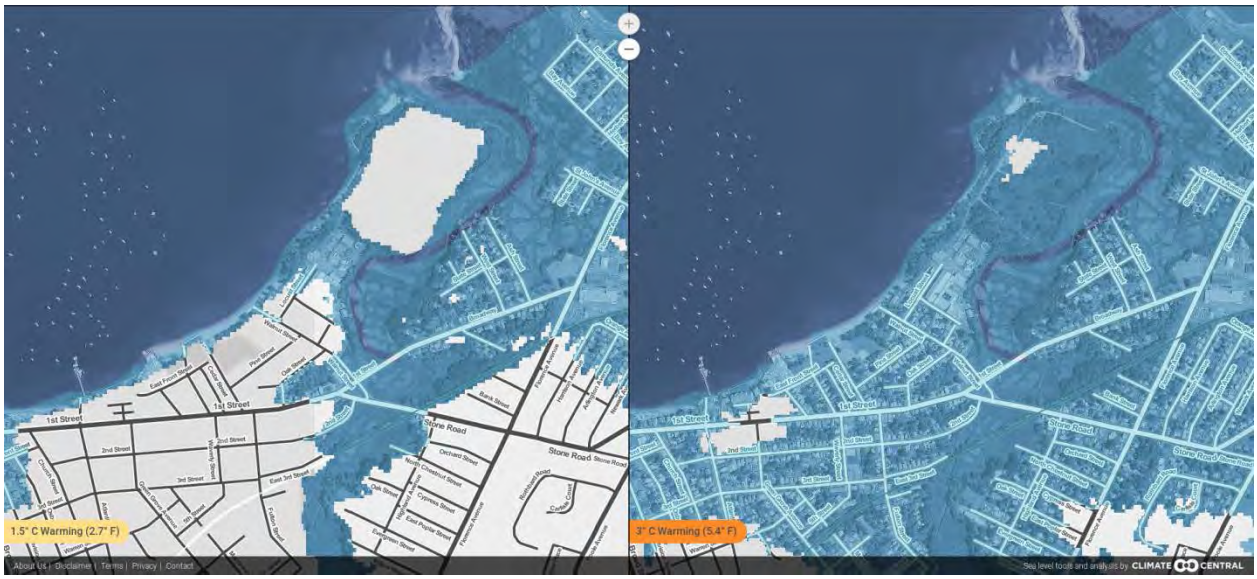


Figure 141: Surging Seas Tool shows predicted sea level with a global temperature increase of 2.7 degrees Fahrenheit (left) and 5.4 degrees (right) (Climate Central)

WETLANDS

Wetlands are an important resource because they help protect and improve water quality, store flood waters, maintain surface water flow, provide a habitat for fish and wildlife, and suppress tidal forces. The Walnut-Oak Neighborhood is located in an area that contains a total of 14.92 acres of wetlands, primarily along the Chingarora Creek in the east, but there is also an area of wetlands in the west near the Raritan Bay. The wetlands include 10.71 acres of saline marshes, 2.93 acres of phragmites dominate coastal wetlands and 1.28 acres of deciduous wooded wetlands. Additionally, a 50 foot buffer from the edge of wetlands boundaries is required by the NJ DEP Freshwater Protection Act (FWPA) would increase the undevelopable wetlands area by 11.21 acres to 26.13 acres.[103] The Chingarora Creek is classified as a FW2-NT/SE1 (Freshwater, subject to man-made discharges, Non-Trout, Saline Estuary with designated uses as shellfish harvesting in accordance with N.J.A.C. 7:12; maintenance, migration and propagation of the natural and established biota; primary contact recreation; and any other reasonable uses per 7:9B-1.12(d))[104].

[103] Some of the 50 foot buffer area comes from the wetlands on adjacent municipalities.
[104] N.J.A.C. Chapter 7:9B. Surface Water Quality Standards. P.24. October 17, 2016. http://www.nj.gov/dep/rules/rules/njac7_9b.pdf

Figure 142: Healthy wetlands along Chingarora Creek (August 18, 2016)

Although the wetlands have continued to be beneficial for the Neighborhood, they have been compromised by development, pollution, rising sea level, and land subsidence throughout modern history. Loss of wetlands can be seen through aerial imagery and mapping, while pollution can be monitored through scientific testing and visual assessment. From upstream, pollution from land-based stormwater runoff, fertilizers, and illegal dumping can have a negative impact on wetlands and water quality downstream. Pollutants accumulate and weaken natural systems, such as reefs and wetlands, which otherwise help to protect the shoreline Neighborhood from storm surges and flooding. Although chemical pollutants are generally not visible, the Creek is littered with items, such as bicycles, tires, and cans that were dumped or wash downstream.

Figure 143: Garbage and dumped items, such as bicycles, appear in the Chingarora Creek (August 18, 2016)

According to the first available aerial imagery from 1930 (below), the wetlands around the Walnut-Oak Neighborhood appear to have been much more extensive, particularly along the western edge abutting Raritan Bay/Keyport Harbor. The denser vegetation that appears in dark spots between the beach and the Bay is at least partially visible for several decades afterward; however, that which appears to be a wide swath of marsh to the west along the Bay all but disappears by 1940. We have come to the conclusion that the area is marshland based on the similarity of the image to that on the east side of the Neighborhood along the Chingarora Creek. The disappearance of the outer marshes may have been due to the Hurricane of 1938, dredging and other disturbances, or rising water levels, but never recovered.

Figure 144: 1930 Aerial Photograph, maps.njpinebarrens.com; Keyport wetlands outlined in blue by Maser Consulting

The 1930 aerial photograph also shows that the majority of the Aeromarine peninsula was wetlands at that time, including two lagoons, or coastal ponds. In fact, a 1947 Topographic Map shows that even more of the site may have been considered wetlands and that essentially only the beach area along the Raritan Bay was not. The 1947 map also shows the two coastal ponds on the Aeromarine/landfill site. Despite the changing topography, landfilling, and development, the entire peninsula was recorded as wetlands on topographic maps at least through the year 2000.

Map 58: 1947 Topographic Map (www.historicaerials.com)

New Jersey State Coastal Wetlands mapping (below) shows the upper limit of wetlands in 1970, shown along the purple line. However, it does not delineate the lower limit of the wetlands; although, it is fairly visible from the imagery. By this point, most of the peninsula had been disturbed and filled, leaving the wetlands near their present state. There was still some coastal wetland vegetation along the northwestern edge of the neighborhood along Keyport Harbor and small swath west of Locust Street. The wetlands on the Borough of Union Beach side remained much more expansive; although, the Borough is at a much lower elevation in general.

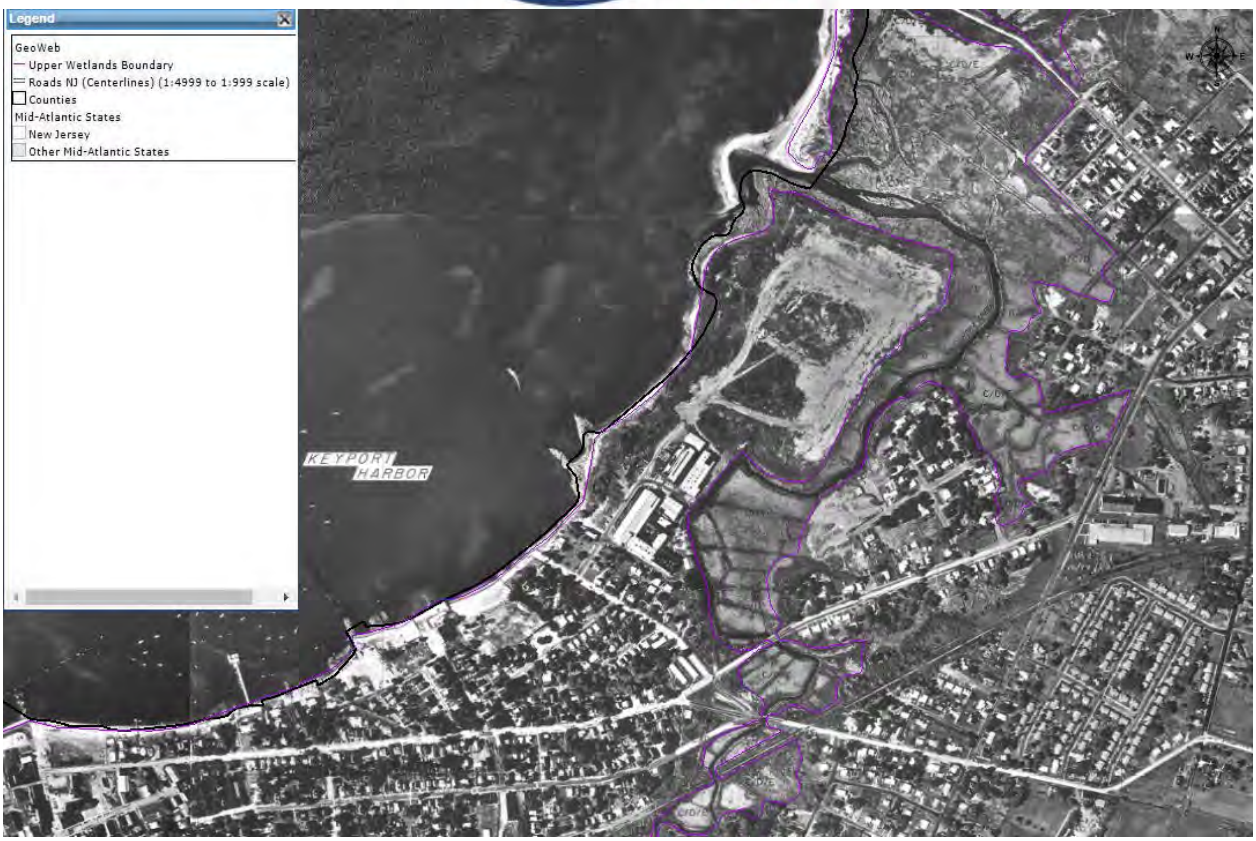


Figure 145: 1970 New Jersey Wetlands Delineation (New Jersey Department of Environmental Protection, "NJ-GeoWeb", njwebmap.state.nj.us)

The loss of wetlands continues to be a major problem, despite protection from human interaction and development, due to storms and sea level rise. These changes can be seen every few years in the aerial images shown in the Neighborhood History section of this Plan. Wetland plant and fauna species will continue to retreat in the future as long as they are forced by insurgent waters and as long as there is land available. Development and hard surfaces along the waterfront prevent the retreat of wetlands, in which case they may cease to exist and turn to mudflats.

Figure 146: Wetlands at the mouth of the Chingarora Creek that have turned into mudflats (August 18, 2016)

BEACH EROSION

As described in the Neighborhood History section of this Plan, the Neighborhood has experienced some erosion over time along the waterfront. Shoreline erosion is a natural process, but has been amplified by sea level rise. With the loss of wetlands, sand and soil along the coastline is more vulnerable to erosion because there is no vegetation to hold the sediment in place. The bayfront is most prone to erosion due to wave action. However, the north side of the Chingarora Creek along the Raritan Bay in the Borough of Union Beach has been significantly more impacted by erosion, as evidenced by the massive retreat of the beaches and wetlands. The erosion on the north side may open up the creek to heavier impact by waves from Raritan Bay and the Atlantic Ocean, increasing erosion along the southern side in Keyport.

Although erosion has not been as prevalent in the Walnut-Oak Neighborhood as it has in Union Beach, it is still a concern, especially along the Keyport Harbor waterfront. Hard structures, or shoreline armoring, such as the bulkhead at Terry Park along Keyport Harbor, are built to protect developed areas or roads from erosion, but often ultimately exacerbate the problem. Harm to the environment include narrowing the natural beach, stripping the shoreline of sand and gravel, eliminating spawning habitat for small forage fish and subjecting juvenile fish to predatory fish at high tide.[105]

"Frequently, hardened structures cause increased erosion in areas farther down the coast by retaining erodible sediment behind the structure and sometimes interrupting alongshore transport of sediment to those properties. This means that if an adjacent property owner has a seawall or revetment, the neighboring

[105] Dunagan, Christopher. "Could Shoreline Armoring Finally Be Declining in Puget Sound?" Puget Sound Institute. August 13, 2015. http://blog.pugetsoundinstitute.org/2015/08/could-shoreline-armoring-finally-be-declining-in-puget-sound/

property's beachfront may be impacted in the future."[106] According to a study of Raritan Bay, New Jersey, bulkheads and seawalls are the most common shoreline features. However, one of the key findings is that "The net effect of the use of shore-parallel walls in estuaries can be significant reduction or elimination of sandy beach environments," (Jackson, 1996).[107]

The bulkhead may be a medium-term solution to the problem of erosion, but overtopping may occur when waves are higher than the bulkhead. Although Bay is generally calm and the bulkhead is tall enough to handle the tides of the Bay day-to-day, wave action from storms can compromise its effectiveness, drawing sediment from both sides of the wall. Additionally, groundwater and rain that permeate the soil can create pressure behind the bulkhead and cause it to topple.

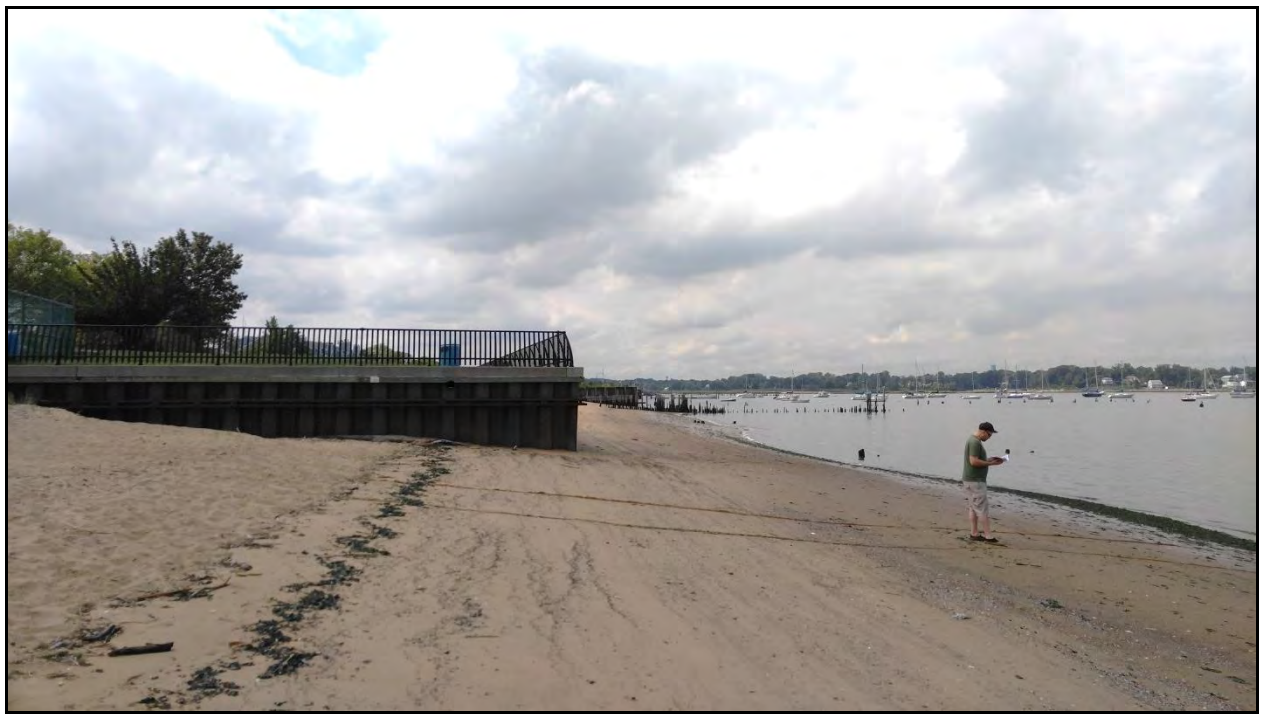


Figure 147: Hard structures along the bayfront, such as the bulkhead at Terry Park, are vulnerable to and often exacerbate erosion of surrounding sediment if significant wave action occurs (August 18, 2016)

[106] RI Shoreline Change Special Area Management Plan. http://www.beachsamp.org/resources/coastalpropertyguide/erosion-sealevelrise/

[107] *Mitigating Shore Erosion along Sheltered Coasts*. Chapter 1: Introduction. p.16. National Research Council of the National Academies. National Academies Press. 2007. https://www.nap.edu/read/11764/chapter/3#24

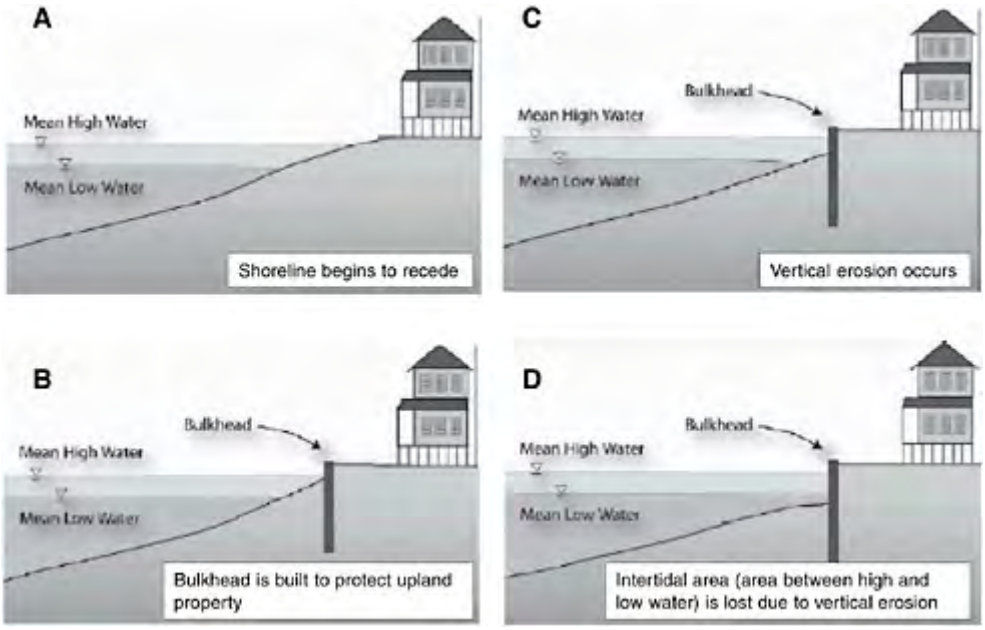


Figure 148: Progression of a typical response to bay erosion. When the shoreline is receding (A), the homeowner builds a bulkhead to protect the upland property (B) which begins to interfere with the nearshore processes, causing vertical erosion of sediment in front of bulkhead (C), which leads to loss of the intertidal habitat (area between mean high and low water) (D).[108]

CONTAMINATED AND LANDFILL SITES

There are at least three known contaminated sites within the Walnut-Oak Neighborhood, which are described in further detail below. These include the Aeromarine Industrial Park site and Terminal, and by extension, the former landfill; as well as Stone Road Bridge.

The Walnut-Oak Neighborhood contains two areas with Historic Fill. The "Brownfield and Contaminated Site Remediation Act" requires the DEP to map regions where large areas of historic fill exist. The data gathered from the DEP website contains historic fill areas greater than five (5) acres and was updated in January of 2016. Historic Fill is defined as "non-indigenous material placed on a site in order to raise the topographic elevation of the site" on the DEP website109. The first historic fill area is that of the landfill located in an unused area of Lot 15 of Block 141 that was in operation during the 1960s and 1970s. This historic fill area is approximately 29 acres or 28% of the total Neighborhood Area. To the south, around the First Street/Stone Road intersection is a smaller historic fill area that is closer to development but only contains a vacant apartment and one home.

[108] Ibid. P.51. Modified from Tait and Griggs, 1990, and Douglass, 2005a,b.
[109] http://www.state.nj.us/dep/njgs/geodata/dgs04-7.htm

Map 59: Historic Landfill Areas and Known Contaminated Sites in Walnut-Oak

AEROMARINE INDUSTRIAL PARK AND LANDFILL

The Aeromarine Plane and Motor Company was known for manufacturing early American aircrafts such as sea planes or flying boats. The company was also the first to successfully land an air craft onto a military vessel. Despite its achievements, Aeromarine operated for only 14 years, from 1914 to 1930. After the closing of the company, the property remained vacant until around the 1960s. During the 60s, the northern area of the property operated as a landfill. In 1979, the landfill was closed and forgotten. It is estimated that garbage is buried across 51 of the 62 acre property and has begun to leach into the Raritan Bay. It has been noted by former employees of the landfill and residents of the Borough, that large items, such as cars and buses, may have been dumped into the former lagoons that occupied the site. Much of this type of dumping occurred prior to many formal regulations guarding the protection of waterways and wetlands.

Map 60: Existing Land Use Map of Aeromarine/Landfill Site – Extent of Landfill (Phillips Preiss Shapiro Associates, Inc., 2005)

Due to the heavy industrial use, as well as the municipal waste dump, site remediation is required before this property can be developed. It is considered an "Active Site" of known contamination, which has one or more active cases or remedial action permits where contamination has been confirmed. Luckily in October 2005, the site was designated as a Brownfield Development Area (BDA) which qualifies it for various grants from NJDEP and the EPA. Currently, the DEP is undergoing site investigation to determine the extent of the contamination. Once this is completed, remedial action along with a remedial action report are to be completed. See the Images below for the case file and timeline.

SRP CASE OVERSIGHT REPORT

AEROMARINE INDUSTRIAL PARK
55 WALNUT ST
Keyport Boro, NJ

PI Number(Case)	G000030506
Activity Number	LSR120001
Bureau	LSR
Document Title	961211151810 AEROMRNE -OBR BDA
Case Status	LSRP Oversight
Case Status Date	5/8/2012
Confirm Contamination	Yes
Case Manager	FINDLEY, ANTHONY
Phone	(609) 292 - 1388

Remedial Level	Start Date	End Date
C3: Multi-Phased RA - Unknown or Uncontrolled Discharge to Soil or GW	10/2/2003	

Case Types	Start Date	End Date
BDA	4/1/2006	
Developer	10/2/2003	
LSRP Default Category	5/8/2012	
MOA	10/2/2003	
Spill Act Discharge	12/11/1996	

LSRP Name	MATTHEW J MAURO
Business Phone Number	(732) 545 - 9525

Case Tracking Tool By PI Number

PI Number Entered : G000030506

This report allows the user to identify incomplete upcoming and past due tasks associated with a case. This report does not capture every regulatory or mandatory timeframe due date established in Site Remediation Rules (i.e. ARRCs, UST, ISRA or Technical Requirements). In some instances, the Department may only become aware of a due date after the due date has passed and for which these timeframes apply.

If data errors are suspected, please contact the compliance assistance duty officer at 609-633-1464.

PI Name	County	Municipality
AEROMARINE INDUSTRIAL PARK	Monmouth	Keyport Boro

Activity Number	Name	Document Title
LSR120001	AEROMARINE COMPANY	961211151810 AEROMRNE -OBR BDA

Schedule :

Task	Due Date	Completed Date
Date Remediation was Required to be Initiated	7/25/2012	12/11/1996
Remedial Investigation to be Completed	5/7/2016	
Remedial Investigation Regulatory Timeframe	5/7/2016	5/7/2016
Remedial Action Regulatory Timeframe	5/7/2019	5/7/2019
Remedial Action Report Due	5/7/2019	
Remedial Action to be Completed for All CAOCs	5/7/2019	

Historical images of the site, and the type of manufacturing and materials used on-site, give insight into the potential contamination that could be found in the industrial complex. During the manufacturer's time of operation in the early twentieth century, there were few, if any, environmental regulations, to protect the environment and ensure proper disposal or care of chemicals and machinery. Some of the departments in the industrial complex included a machine shop, plating department, blacksmith shop, printing department, and motor assembly, shown in the images below.[110]

Figure 150: Plating Department

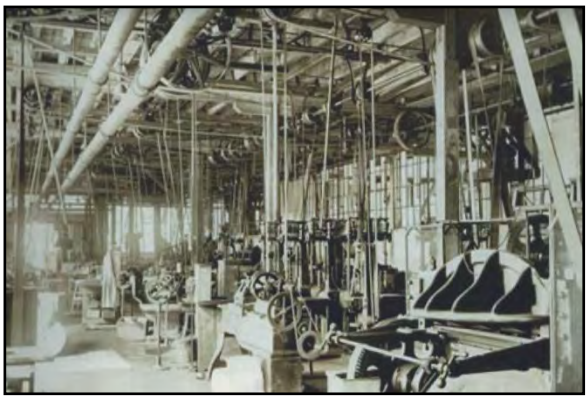


Figure 149: Machine Shop

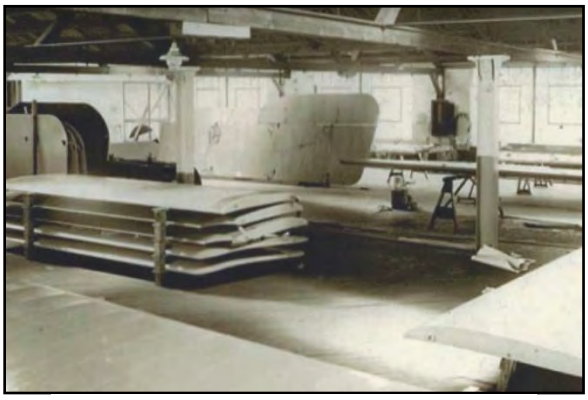


Figure 152: Printing Department

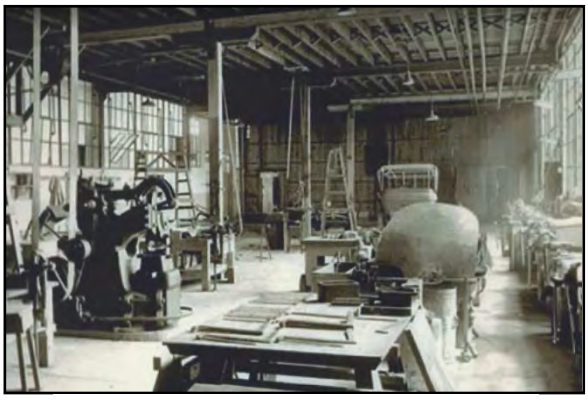


Figure 151: Blacksmith Shop

Figure 153: Motor Assembly

[110] Figure 149 through 20 were sourced from "History of Aeromarine-Klemm Aircraft in Keyport, NJ." Jersey Bayshore Country TV. https://www.youtube.com/watch?v=WfHA31DOHJs

Some of the challenges with this site will include remediation and cleanup, in addition to the impact on sea level rise and flooding. For each development proposal, a study will need to be conducted as to whether the ground is able to support the development and how or if toxins may affect the people who use the site. Currently, landfill caps can be seen around the property to prevent the leaching of gases, such as methane. However, the site is still littered across the surface with metals and garbage, as shown below. With much of the Aeromarine site currently being used for parking for trucks, it is also possible that petroleum oils have contaminated the surface. Although some sections of the main industrial building are still occupied, other areas of the site are not structurally sound and will either require demolition or intensive restoration.

Figure 154: Landfill cap

Figure 155: Metals found on-site

Figure 156: Typical litter found across the site

The Aeromarine and landfill sites collectively create environmental and infrastructural challenges. In 2005, the Aeromarine Area Redevelopment Plan was adopted by the Borough. This plan aimed to create residential and recreational uses based on the marketability of the waterfront property. Residential uses would come in the form of single family, townhouse and multiple residences but could not exceed 5 units per acre. Recreational uses include planted vegetation, courtyard areas, a gazebo and a trail that circles the property. The plan called for the residential development to be located in the north east of the site to take advantage of the scenic views of the Raritan Bay and Chingarora Creek while avoiding the high cost of cleaning up the heavy industrial use for residential use in the south of the property. An environmental impact statement is required to address the landfill contamination and remediation. In 2006, the Monmouth County Bayshore Region Strategic Plan was adopted which recognized the need for Keyport to clean up and redevelop the Aeromarine/landfill site into a successful and attractive use.

The Aeromarine Area Redevelopment Plan's Solar Overlay Amendment was adopted in 2010 which allowed another viable use for the Brownfield. This amendment allows for a ground-based solar panel facility to be

located on the estimated landfill area of the site. Since the adoption of the Redevelopment Plan, it has been difficult to get approval to develop on the property because of the landfill and its unknown pollution. This has influenced the idea that the "highest and best use" for the Brownfield is a solar farm. During Hurricane Sandy, almost all of the property was flooded except for the elevated landfill portion. Because of this, residential uses would be at a high risk of flooding if they were placed anywhere else other than on top of the landfill once cleaned up. This adds onto the reasoning behind a solar and/or wind energy facility being the best use for the property.

Figure 158: Existing view of parking areas and exterior of Aeromarine industrial buildings

Figure 157: Existing view of former Assembly building at Aeromarine site

STONE ROAD BRIDGE

Stone Road on the Borough of Keyport side, between the border of Union Beach and First Street, and the surrounding area is a site of historic landfill. This property is 9.22 acres and contains much of the extreme south eastern area of the Neighborhood, including managed estuarine estuary and low-lying vacant land, as well as land on which an apartment building and a single-family house are built. Stone Road is a Category A site, which is closed and no longer requires remediation. The Lead/Status of the site includes Licensed Site Remediation Professional (LSRP) Oversight, per the Site Remediation Reform Act (SRRA) of 2009. Direct Department oversight is required for sites that are not in compliance with Department regulations, or violate a mandatory timeframe.[111] Stone Road Bridge has a remediation level of 2-10 Areas of Concern (AOCs).

[111] Overview of the Licensed Site Remediation Professional (LSRP) Program. New Jersey Department of Environmental Protection (NJDEP). June 2014. http://www.nj.gov/dep/srp/srra/lsrp/lsrp_program_overview.pdf

UNION BEACH ARMY CORPS OF ENGINEERS PROJECT

The Army Corps of Engineers project in the Borough of Union Beach is a response to the damage that occurred in the neighboring borough to the Walnut-Oak Neighborhood of Keyport. The project seeks to create a large-scale, comprehensive system of engineering that includes revetment walls, groins, tide gates, dunes, and levees. This project is outlined in the Hurricane Sandy section of this Plan.

The project may potentially create unintended negative consequences for the Borough of Keyport and the Walnut-Oak Neighborhood, as it remains unprotected. It is feared that stormwater will instead be redirected around Raritan Bay and into Keyport Harbor and upstream into Chingarora Creek. Armoring structures, as previously noted, have the potential to exacerbate erosion and flooding problems downshore.

PUMP STATIONS

There are two pump stations in the Neighborhood – one over the bulkhead at the end of Cedar Street where it meets the beachfront and one to the southeast of the First Street-Walnut Street intersection. The pump stations are used to regulate flood water by pumping excess water from low-lying areas in creeks and pipes to an elevation high enough that will allow the stormwater to then flow by gravity downstream. Although these are crucial components for delaying stormwater and reducing the impact of flooding, they are only useful when the water is at a level that is lower than the pump station itself.

The pump station on Cedar Street was rebuilt after Tropical Storm Irene in 2011. Although the station is elevated on the bulkhead, its location at the beachfront on Keyport Harbor makes it vulnerable to future storms and sea level rise. The First Street pump station is located on Block 140, Lot 4 adjacent to the wetlands of the Chingarora Creek. This station is elevated approximately ten feet on a mound covered with grass and gravel and with a paved drive. The base of the elevated area is regularly saturated or has standing water.

Figure 159: Pump station at Cedar Street bulkhead (September 23, 2016)

Figure 160: Pump station at First Street (August 18, 2016)

DRAINAGE AND OUTFALL PIPES

Due to the age of the Neighborhood, there are only a few areas with storm drains and pipes that connect to a stormwater sewer system. These exist near the intersections of First and Walnut Street, Spring Street near First Street, Walnut Street and Stone Road, Third and Fulton Street, the eastern end of Second Street, and at the north end of Cedar Street at the pump station.

Therefore, the Borough uses monolithic curb and sidewalks in Walnut-Oak that help guide stormwater to either side of the street and run downhill, eventually to a storm drain. As shown in the image below, the curbs are constructed with concrete rather than asphalt. While they generally help guide the water down the streets, if it goes over the curb level, it begins to flood yards rather than be directed into pipes. Additionally, the curbs often have a buildup of leaves and detritus, which is either carried downstream or blocks and redirects the stormwater.

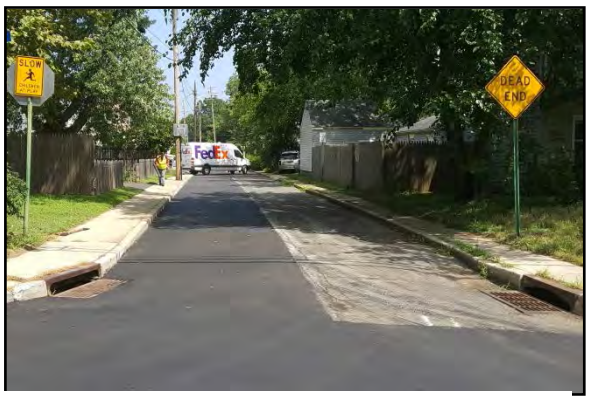


Figure 161: Storm drains on both sides of Third Street at Fulton Street (August 18, 2016)

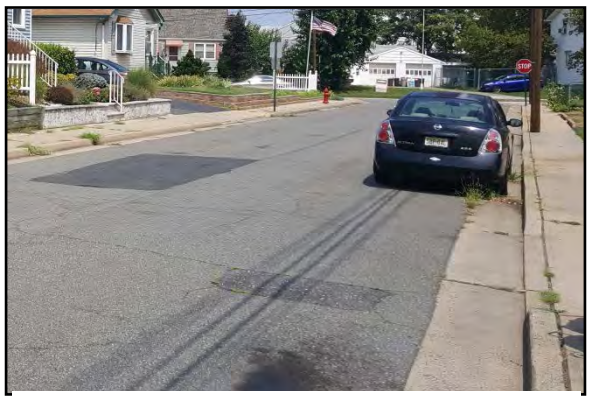


Figure 162: Monolithic curb and sidewalk along Pine Street to guide stormwater (August 18, 2016)

In addition to the pump stations and monolithic curbs, there are two outfall drains from Walnut Street onto the beachfront along Keyport Harbor. Rather running through a pipe, water runs down either side of the street through a curb cut, and through a hole where it runs down the side of the street bulkhead. This has clearly had a negative impact on the structural integrity of the concrete bulkhead by eroding away the wall itself and the sand below.

Figure 163: Outfall from Walnut Street through concrete bulkhead onto Harbor beachfront (August

Figure 164: Decline in elevation of Walnut Street with drainage from Walnut Street through outfall into Keyport Harbor with cut in sidewalk (August 18, 2016)

BULKHEADS AND SHORELINE STRUCTURES

According to the Superintendent of the Department of Public Works in the Borough of Keyport, Scott Hicks, on a site visit on September 23, 2016, the bulkhead at the end of Cedar Street over Keyport Harbor is in good condition and has not been subject to any severe erosion, despite the problems typically associated with waterfront hard structures, as shown in Figure 148. The bulkhead, which also supports Theresa Avenue (Terry) Park and a pump station, is approximately eight (8') feet from the low tide mark to the top. Tides vary between approximately -0.2 feet at low tide and 5.6 feet at high tide.

Figure 165: Bulkhead at Cedar Street over Keyport Harbor beachfront (August 18, 2016)

However, the height of the bulkhead quickly decreases where it meets Cedar Street and Cedar Street Park along the beachfront. The bulkhead then changes from steel sheet piles to an older, wooden structure that is only a foot or so above the sloping beach. Where these two bulkheads interlock, there is a washed out area of the beach that allows access under the bulkhead.

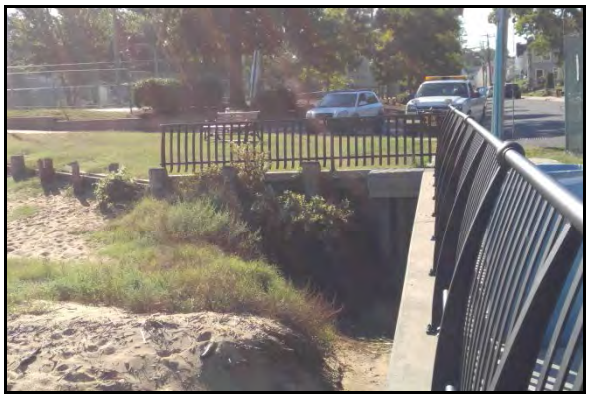


Figure 166: Edge of bulkhead where it meets Cedar Street and Cedar Street Park (September 23, 2016)

Walnut Street also ends at the beachfront along Keyport Harbor/Raritan Bay and is held up by a concrete bulkhead of approximately eight (8') feet in height above the high-tide mark. There are two drainage outfalls in the form of holes in the concrete on either side of the street. As of the time of a site visit in August 2016, the bulkhead was showing sign of distress, particularly around the drainage areas, where the concrete was crumbling and the sand around the outfall was eroding.

The concrete bulkhead meets a steel bulkhead on a private property to the south, which is approximately ten (10') feet in height above the high tide mark. On the north side of the road, there is a grouted rock revetment. However, the property on the north side has no revetment or bulkhead, but a vegetative buffer and there is evidence of a previously existing concrete block wall, which has since been strewn across the beach in pieces.

Figure 167: Concrete bulkhead and outfall pipe at Walnut Street at Keyport Harbor beachfront (August 18, 2016)

Other areas of the shoreline in the Walnut-Oak Neighborhood are lined with marshes, sand dunes, rock, concrete riprap, and bulkheads in various places. The northeast end of the Borough and Chingarora Creek is lined with estuarine marshes, while the middle section of Aeromarine along the Bay is lined with rock and concrete, and the western end of the property has dunes, vegetated buffers, and concrete stone, which appears to have been broken apart. Many properties to the southwest of the Neighborhood have bulkheads along the beachfront and the beach becomes narrower. The Walnut-Oak Neighborhood has a much wider beachfront and natural landcover than the rest of the Borough, which is advantageous.

Figure 169: Riprap (stone and concrete pieces) along Aeromarine site waterfront on Raritan Bay (August 18, 2016)

Figure 168: Riprap (concrete debris) and vegetated buffer along Keyport Harbor shoreline (August 18, 2016)

STREET AND SIDEWALK CONDITIONS

The condition of the streets and sidewalks throughout Walnut-Oak varies, but overall are in fair to poor condition. This is discussed further in the Mobility section of this Neighborhood Plan; however, this is important to reiterate as it is a significant challenge for maintenance, mobility, and accessibility. Flooding, for example, is not only a consequence of poor street conditions and low elevation, but also exacerbates the poor conditions.

Figure 170: Conditions on Walnut Street (August 18, 2016)

Figure 171: Examples of sidewalks in poor condition with overgrowth throughout the Walnut-Oak Neighborhood (August 18, 2016)

Even on dry days without rainfall, high tides at current sea level cause flooding along the Chingarora Creek that may impact surrounding low-lying streets, particularly First Street and Stone Road. While the water does not typically reach the paved area of the street, there is often standing water on the sides of the street. On days of full moon high tides or storm events, the water from the creek may encroach the roadways and occasionally make them impassable.

Figure 172: Flooding along Chingarora Creek on First Street between bridge & Walnut Street on a "dry" day (August 18, 2016)

Many intersections are also lined with potholes and temporary asphalt patching, with underlying structural or drainage issues. The intersection of Walnut Street and First Street and that of Snyder Lane at Spring Street, for instance, are low spots in the road, which not only experience flooding and prevent flow of traffic, but then also experience fissures and fill with gravel and debris. The Department of Public Works has to close roads and place warning signs for traffic intermittently.

Figure 173: Intersection of Walnut Street & First Street (August 18, 2016)

TRAFFIC INTERSECTIONS

Traffic in the Walnut-Oak section of the Borough is very light to moderate, although the busiest times of the day are in the morning and evening rush hours with vehicles traveling between Keyport and the Borough of Union Beach or the Township of Hazlet. Traffic, therefore, also has limited impact on delays or the structural integrity of the roads.

While the intersections may not be a major concern for vehicular traffic, very few of the intersections address pedestrian or bicycle safety and, instead, rely on pedestrians taking risks to cross the road. Additionally, the infrastructure at many intersections is not suited for people with disabilities. Whether at a minor crossing, such as Walnut Terrace at Walnut Street or a more moderate crossing, such as across First Street at Spring Street, more consideration should be given to the safety of pedestrians.

Figure 175: Intersection of Third Street at Fulton Street (August 18, 2016)

Figure 174: Sidewalks end abruptly and there are no crosswalks or ramps along Stone Road (August 18, 2016)

Some intersections have sidewalks with ramps, but that force pedestrians out into the street in order to meet the opposite ramp. Others do not have ramps and or meet curb and also lack crosswalks. Many sidewalks are overgrown while roads are cracked and uneven, or filled with sediment. See the Mobility section of this Neighborhood Plan for more detail on sidewalks, crosswalks, trails, and streets.

Figure 176: Intersection of Walnut Street and Oak Street (August 18, 2016)

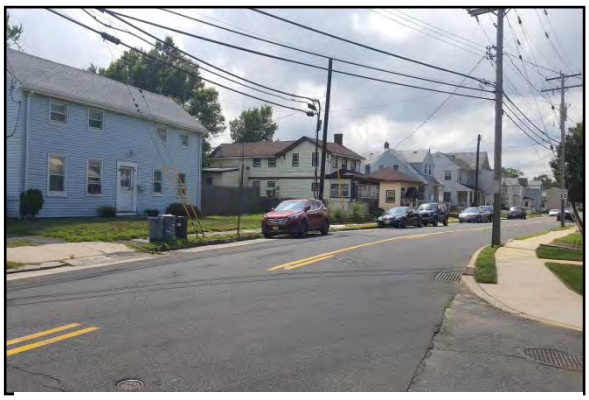


Figure 177: Intersection of First Street and Spring Street (August 18, 2016)

Figure 178: Ramps force pedestrians into the middle of oncoming traffic at Fulton & Second Street (left); No ramp is provided on some intersection corners, such as Locust Street at Walnut Street (right)

BRIDGES

There are two bridges in the Walnut-Oak Neighborhood of Keyport, which both connect to neighboring municipalities and major roads. The First Street Bridge connects Keyport to the Borough of Union Beach to the northeast, while the Stone Street Bridge connects Keyport to the Township of Hazlet to the southeast. First Street and Stone Road are both Monmouth County roads and pass over the Chingarora Creek.

Figure 179: First Street Bridge over Chingarora Creek (August 18, 2016)

Figure 180: Sidewalk along First Street Bridge into Borough of Union Beach (left); Chingarora Creek below north side of First Street Bridge (right)

Still, the bridges are often impassable, as two of the lowest areas of the Neighborhood are found at the base of the bridges on either side. First Street is particularly vulnerable to flooding, from Stone Road up to the bridge. As shown in Figure 172, water from the Chingarora Creek extends past the marsh and encroaches upon the road, even on days without rainfall, but regular tide. The situation is excessively worse with rainfall, storm surge, and high tides. The highest elevation of the bridges is approximately nine (9') to ten (10') feet in height, which is lower than the surge from Hurricane Sandy; therefore blocking any passage.

Figure 182: Stone Road Bridge across Chingarora Creek (seen from Henry Hudson Trail – August 18,

Figure 181: View of Chingarora Creek and Henry Hudson Trail to east from Stone Road Bridge (August 18, 2016)

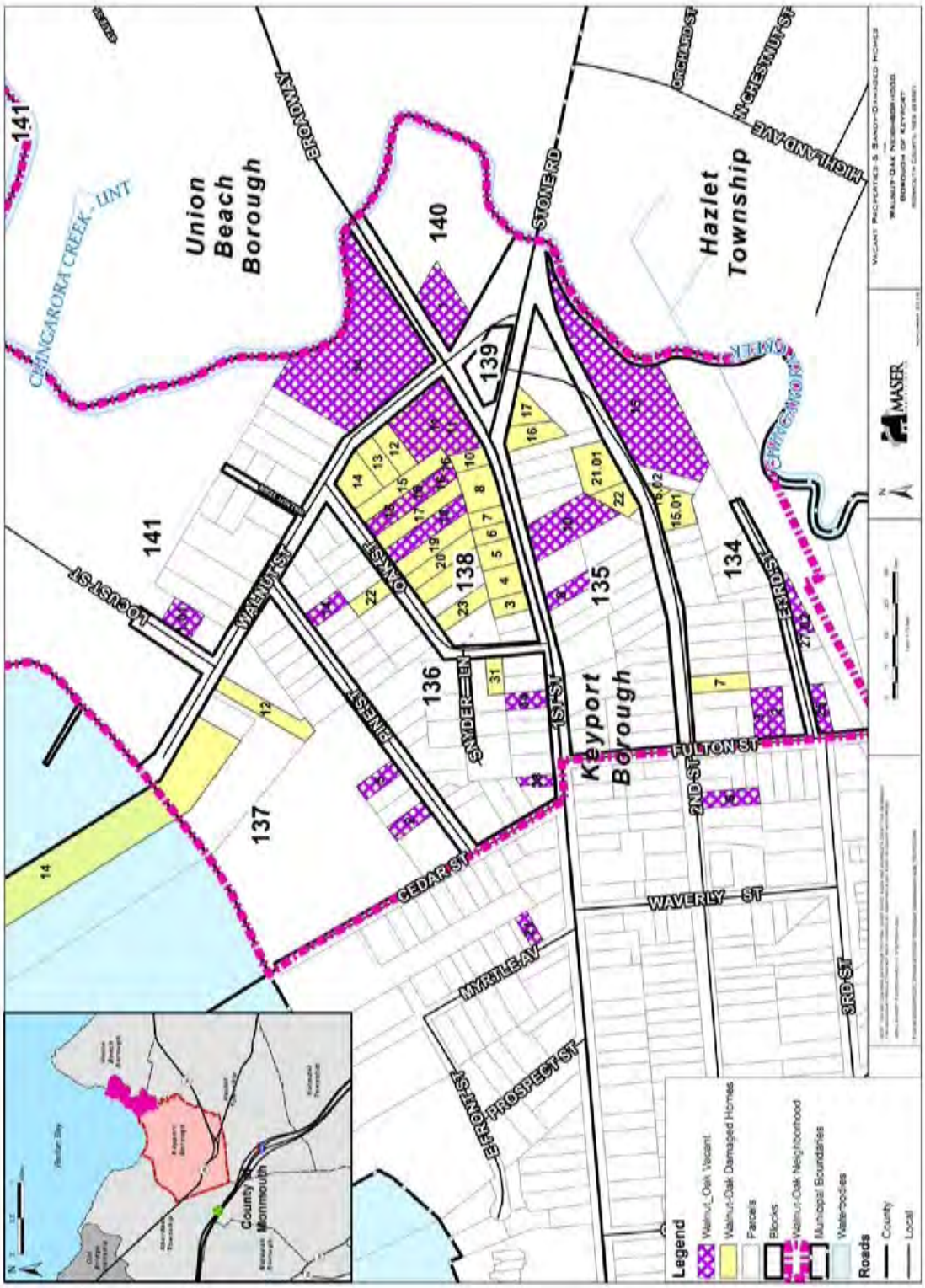
VACANT PROPERTIES

There are a total of eighteen (18) identified vacant parcels within the Walnut-Oak Neighborhood, based on a variety of sources. These were provided by a list of "abandoned properties" by the Borough of Keyport, site visits, and from the Monmouth County MODIV data, which identifies undeveloped vacant properties. These properties are discussed in some more detail in the Land Use and Development Patterns section of this Neighborhood Plan.

Although these properties do not all match per each list, the totality of the vacancies identified are shown in Map 7, along with Sandy-damaged homes. These vacancies are important to note as a threat, challenge, or constraint to the structure of the Neighborhood, but also as an opportunity. The reasons for the vacancies may vary for each one, but it is also possible that there is a larger problem that needs to be addressed, especially if they appear in a pattern or in particular areas of the Borough, as they do in the Walnut-Oak Neighborhood. Although only two (2) of the vacant properties overlap with Sandy-damaged homes, several of the properties are impacted by frequent flooding, flood regulations, building restrictions, and/or are in low-lying areas. They tend to be clustered along the Chingarora Creek, First Street, and Third Street.

The two (2) existing vacant properties that were also damaged by Hurricane Sandy include Block 138, Lots 11 and 16. It is also important to note that the map shows damage to homes, but not all vacant properties are developed.

Map 61: Vacant Properties and Homes Damaged by Hurricane Sandy in Walnut-Oak Neighborhood

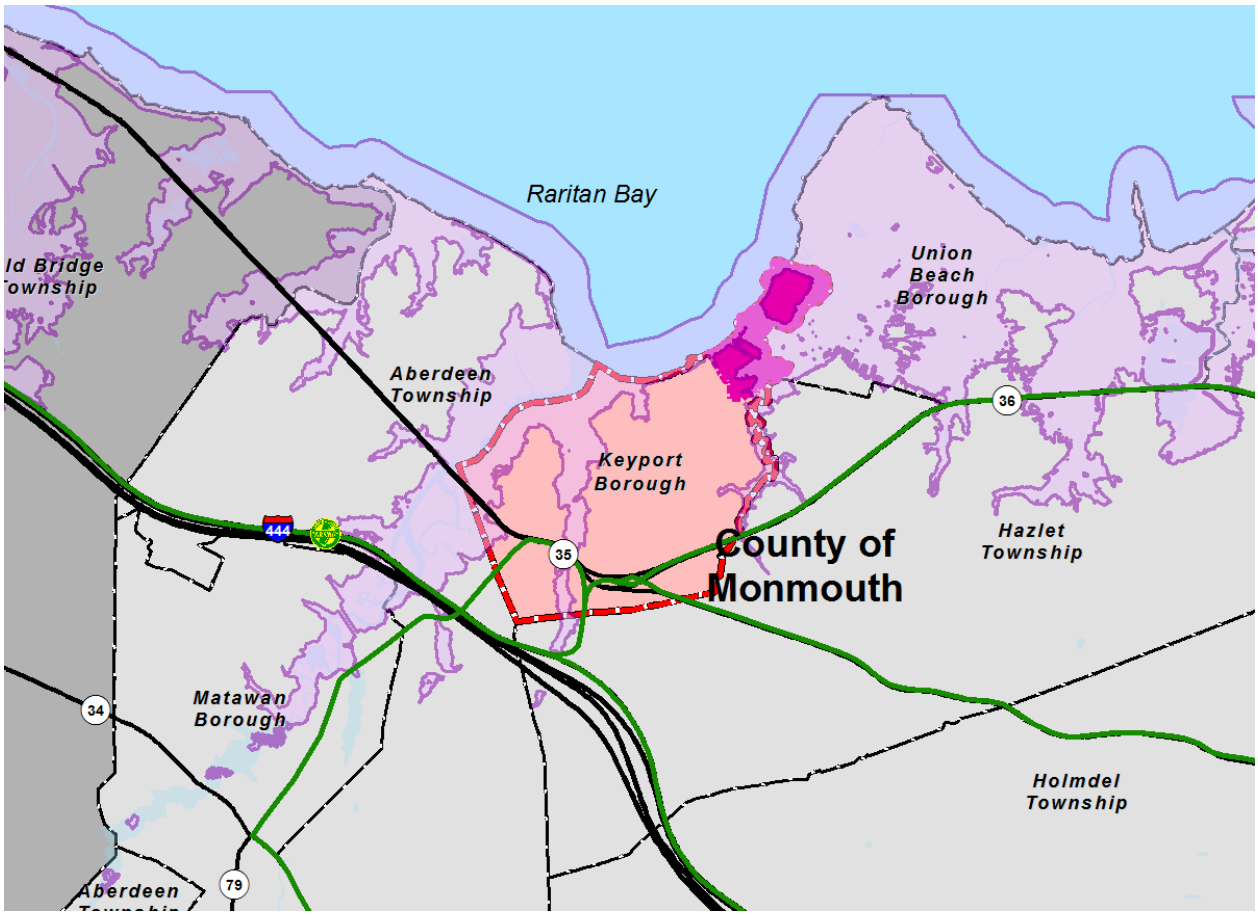


EVACUATION ROUTES

With potentially increased sea level and frequency and intensity of storms that affect storm surge and flooding, it is critical for coastal communities to have contingency plans for residents to get to safety or for emergency access into an area.

There is currently no evacuation route established in or near the Walnut-Oak Neighborhood, nor any of the other neighborhoods severely affected by Hurricane Sandy or regular flooding. While it is important to evacuate residents prior to a storm event, it is also vital that roads into the Neighborhood can be accessed in case of emergency. Route 35, Route 36, Maple Place, and the Garden State Parkway are considered evacuation routes in Keyport, which run along the south of the Borough.

Map 62: Existing Evacuation Routes in the Borough of Keyport with Storm Surge from Hurricane Sandy



RECOMMENDATIONS

RELATION TO OTHER PLANNING DOCUMENTS

STRATEGIC RECOVERY PLANNING REPORT

The Strategic Recovery Planning Report (SRPR) for the Borough of Keyport was completed in 2014, prepared with a grant from the New Jersey Department of Community Affairs (NJDCA) Post Sandy Recovery Planning Assistance Program. The SRPR addressed the impact of Hurricane Sandy and assessed the needs, as well as strengths, weaknesses, opportunities, and threats to the Borough. Following the assessment, the SRPR developed recommendations and an Action Plan, similar to this Neighborhood Plan but on a Borough-wide level, in order to recover and become more resilient. The recommendations and action items identified in the SRPR that are relevant to the Walnut-Oak Neighborhood are described below and expanded upon.

PROJECTS IDENTIFIED FOR UPDATE TO MONMOUTH COUNTY ALL HAZARD MITIGATION PLAN

1. Cedar Street Pump Station Improvements
    a. *The electrical equipment at the pump stations at Cedar Street and First Street should be elevated above the Advisory Base Flood Elevation (ABFE), should be retrofitted for floodproofing, and hooked up to an emergency backup generator. The Borough should consider relocating the pump stations, with any available funds, to higher ground and further from the shoreline. If existing park or open space is the most viable option, the land on which the pump stations currently exist could be swapped.*

STAKEHOLDER RECOMMENDATIONS

1. Repair the outfall at Beach Park and make other improvements to existing stormwater management facilities to improve capacity and prevent backwater flooding from Raritan Bay.
    a. *The outfalls at Walnut Street should also be improved and drain into a naturally filtering bioswale or rain garden before emptying into the Raritan Bay.*

2. The Harbor Commission recommended dredging the silted channels of the Luppatatong Creek, advancing of the Army Corps recommendations for a levee and/or wave break, and replacing damaged bulkheads at the ends of streets like Walnut Street. Acquisition of the Ye Cottage Inn with Blue Acres funding for expansion of the recreational waterfront was also recommended, potentially with enhanced transient boater facilities and water taxis covered by a Boaters Infrastructure Grant (BIG).

    a. *Considering the significant structural repair needed at the end of Walnut Street on the road, sidewalks, drainage, and bulkhead, and the use of the location almost exclusively for passive recreation, the Borough should consider removing part of the bulkhead and road back to the existing vegetated buffer, after assessing the potential effect, if any, on adjacent private property. The paved area at the existing street-end could be replaced with a bioswale and newly constructed bulkhead with both natural drainage and improved pipe systems and a flood-tolerant garden or estuarine vegetation and dunes below, to which filtered runoff would drain from the bioswale. The end of Walnut Street should be considered public access under the New Jersey Department of Environmental Protection (NJDEP) Green Acres or Blue Acres programs.*

b. *A horseshoe-shaped road from Walnut Street around the Aeromarine site along the Chingarora Creek could act as a levee for the interior neighborhood, while also providing necessary access to the site.*
c. *A permit would be required to allow dredging of the Chingarora Creek, which is often silted, although elevated bridge structures over the Creek may allow for better flow of water and sediment downstream.*

Based on the Needs Assessment and Vulnerability Analysis, the SRPR recommended a much more extensive series of projects, which are organized into three categories: Stormwater Management (infrastructure); Hazard Mitigation; and Preparedness. The projects that are relevant to the Walnut-Oak Neighborhood Plan area are included below:

STORMWATER MANAGEMENT

1. Elevate First Street over Chingarora Creek to improve stormwater drainage and prevent blockage during storm events.
    a. *This recommendation is still relevant. The Borough of Keyport should work with the Borough of Union Beach and Monmouth County to elevate First Street between Stone Road and the Union Beach municipal boundary (or farther) to prevent road closures during regular high tides and storms. An engineering study should be done to elevate the bridge an additional height both to allow passage for vehicular traffic on First Street and to prevent silting and blockage of floodwater in the Chingarora Creek.*

HAZARD MITIGATION

1. Elevate Occupied Structures
    a. Necessary for occupied properties in special flood hazard areas where bulkheading is not an option or is not practical to achieve resiliency.
        i. *Occupied structures along Walnut Street, Cedar Street, Locust Street, Walnut Terrace, First Street, and Oak Street may be prioritized to be elevated. Very few structures in the Neighborhood abut a body of water; however, some of the flood hazard areas that are also the lowest and most vulnerable are located slightly inland and should be elevated.*

2. Replace or combine rip-rap with bulkheading in areas of extreme coastal erosion
    b. Conventional rip-rap was insufficient to withstand erosion and scouring from Sandy's surge. Concrete bulkheads of insufficient height and/or design were also broken up by the surge. Rip-rap should either be replaced or used in combination with bulkheading.
        i. *Increased height of existing bulkheads may be necessary in areas of extreme coastal erosion or along developed shorelines. However, this should be used sparingly, as determined by structural engineers, and public coastal areas should use living shorelines or more secure rip-rap and ecologically enhanced revetments, where possible.*
3. Army Corps of Engineers Study Recommendations
    c. Alternative #7 of the Study proposes the combination of elevated bulkheading and flood prone properties, such as the parking lot of the First Street Firehouse, to create the effect of a levee with an elevation of 12.5 feet. Other alternatives included a wave break in the Harbor.
        i. *The Borough should continue to monitor and comment on recommendations provided by the Army Corps of Engineers to ensure that any projects meet the needs of the Borough and Harbor neighborhoods and any negative impact is minimized.*

4. Acquire key properties for open space expansion
    a. *Coastal and riverine properties may be acquired through NJDEP's Blue Acres Program, which allows willing landowners to offer their properties (including structures) for sale that have been damaged by, or may be prone to incurring damage caused by storms or storm-related flooding, or that may buffer or protect other lands from such damage.*

       The NJDEP Green Acres Program "provides low interest (2%) loans and grants to municipal and county governments to acquire open space and develop outdoor recreation facilities."[112] There are matching grants to acquire land, as well. Green Acres spaces are to remain in the public domain. Ralph Pier in Keyport was replaced using Green Acres funding.

5. Restoration of Walnut Street bulkhead and beach access
    a. *The Borough should consider removing the end of Walnut Street and rebuilding the bulkhead further upland using corrugated interlocking steel with an ecologically enhanced revetment (See above reference) around the base on the beach to protect from erosion and to absorb the impact of waves and land-based runoff.*
    b. *Additionally, the Borough should construct an ADA-accessible ramp from the sidewalk to the beach to provide public access.*

PREPAREDNESS

1. Design Standards (integrating elevated structures into community design character)
    a. Develop design standards to address the visual impact of mitigation measures such as elevating bulkheads, elevating buildings on foundations or pilings, etc. Such design standards might include requirements for skirting exposed pilings, parking under the lowest habitable floor, using exterior decking to stagger stairways to elevated first floor levels, etc.
        i. This Plan includes recommendations for design in the section on Design Standards below.
2. Hardening of Infrastructure – The Borough's water and sewer capacity was impacted by either flooding or loss of power. Operating equipment at pump stations needs to be either raised above flood levels or hardened for protection against future events.
    a. *As previously stated, critical infrastructure, such as pump stations, need to be raised or hardened; however, this recommendation should be revisited for shorelines, roads, and other infrastructure that may benefit from other methods of protection.*
3. Backup generators are also needed to keep critical facilities operating during future power loss over extended periods.
    a. Backup generators are necessary to keep pump stations working during flood events. However, if they are not elevated and they are underwater, backup power to the stations is ineffectual. Nearby fire stations and other emergency services should also have backup generators.

MONMOUTH COUNTY BAYSHORE REGION STRATEGIC PLAN, ADOPTED, 2006

The Monmouth County Planning Board prepared a regional planning study of the Bayshore area in 2005 and 2006. The study was prepared with input from all of the municipalities in the Bayshore region, stakeholders and citizens. The Plan was adopted in May 2006 and contains a number of action–oriented strategies relating to growth initiatives, preservation strategies, transportation improvements, housing issues and design guidelines.

The Plan indicated that the top issues for the Borough of Keyport include waterfront development; downtown revitalization; and cleaning up and creating a viable use of the Aeromarine site. It also recognizes the

[112] State of New Jersey Department of Environmental Protection. Green Acres Program. January 5, 2016. Accessed November 10, 2016. http://www.nj.gov/dep/greenacres/local.html

Aeromarine Redevelopment Area, the Henry Hudson Trail and the existing Borough parks. The Plan notes the following that may be relevant to the Walnut-Oak Neighborhood:

1. Potential "Bayshore Drive" along First Street and West Front Street;
2. Proposed Bikeway along the Bay shoreline and on Beers Street; and,
3. Proposed pedestrian path along the bay front.

KEYPORT WATERFRONT AND DOWNTOWN IMPROVEMENT PLAN

The Steering Committee of the Smart Growth study entitled the Keyport Waterfront and Downtown Improvement Plan led an extensive public outreach effort that yielded objectives from their report to the Mayor and Council in a memo dated October 7, 2004. The following objectives are those that relate to the Walnut-Oak Neighborhood Plan area:

- Preserve "small town" quality and the role of all of its components (one "walkable" place with business, residential, recreation, and transportation).
- Maintain Keyport as a "recreational port and place" that values "traditional waterfront uses" (fishing, crabbing, swimming, boating, nature watching), beach parks, marinas, and new opportunities for waterfront recreation and business.
- Preserve historic character of our buildings, both commercial and residential.
- The revitalization and optimization of the waterfront is the key to Keyport's future—a new waterfront park should become a vibrant public space and a "town square."
- Reinventing the waterfront as a "multi-activity" area, integrating open space recreation with business opportunities with family-friendly events and traditional waterfront activities.
- Public accessibility to the waterfront, beaches, and creeks.
- Harmony with the natural environment, preservation of wetlands (including Matawan, Luppatatong, and Chingarora Creeks and Brown's Point) and creation of new, eco-friendly ways to explore the environment.
- Multi-modal transportation linkages within Keyport and to transportation hubs in neighboring towns, such as Hazlet (bus and train), Matawan (train), and Belford (ferry). Providing a variety of transportation options is desirable.
- Responsibly manage Keyport's existing character as a single family home small town, while providing new residential opportunities in the downtown through a new mixed use zone and a townhome "GC residential buffer" zone.
- Low density development with design standards that echo current Keyport architectural gems.
- Maximum respect for the property rights of private property owners.
- Owner-occupied residential properties should not be acquired through eminent domain outside the scope of the common law.

KEYPORT WATERFRONT COMMITTEE REPORT (2004)

The Waterfront Committee was established to provide public input to the Keyport Redevelopment Plan. Committee members mapped elements of the waterfront areas, took photographs, made observation, and identified strengths and weaknesses of the downtown public areas and waterfront public parks. The committee reached a consensus on the following goals and guiding principles that it believes will promote water access and enhance the future of Keyport:

- Planning should benefit Keyport community before outside interests;
- Preserve/maintain marine businesses;
- Water access to and along beach and or creeks should be required;

- Design with integration of nature/eco-tourism element in mind;
- Maximize open space for recreation: less space for parking more for recreation;
- Redevelopment does not mean crowding;
- Textures and vistas should be attractive and use inviting design elements;
- Design ring road with mixed activities in mind i.e. rear store access, kid/family friendly and public events, marine related fishing/boating;
- No acquisition through eminent domain for transfer to private redevelopment.

MONMOUTH COUNTY MULTI-JURISDICTIONAL NATURAL HAZARD MITIGATION PLAN

As part of the Subset of Action Types Considered to Achieve Mitigation Goals in the Mitigation Strategies chapter of the County Natural Hazard Mitigation Plan, there are fourteen goals. Six of the goals that are included in the Monmouth County Plan relate to the challenges faced in the Walnut-Oak Neighborhood, as it is relevant to this Neighborhood Plan. [113]

- Goal 1: Promote disaster-resistant development.
- Goal 2: Build and support local capacity to enable the public to prepare for, respond to, and recover from disasters.
- Goal 4: Reduce the possibility of damage and losses due to flooding caused by floods, hurricanes, and nor'easters. Specifically, some of the actions include:
    - 4.B. Limit uses in floodways to those tolerant of occasional flooding, including but not limited to agriculture, outdoor recreation, and natural resource areas.
    - 4.E. Identify and document repetitively flooded properties. Explore mitigation opportunities for repetitively flooded properties, and if necessary, carry out acquisition, relocation, elevation, and flood-proofing measures to protect these properties.
    - 4.F. Conduct a routine stream maintenance program (for currently non-participating communities) and seek financial assistance to clean-out stream segments with heavy sediment deposits (i.e., this could be through participating in the Monmouth County/Bridge Commission routine stream maintenance program).
    - 4.G. Develop specific mitigation solutions for flood-prone roadways and intersections in conjunction with State DOT. Develop a work plan for when sites will be surveyed and what role can the local government play in selection and implementation of mitigation activities (e.g. any monetary or contextual support through the local capital improvement plan).
- Goal 7: Reduce the possibility of damages and losses due to coastal erosion and wave action. Specifically, some of the actions include:
    - 7.A. Establish an erosion setback line which is located landward of the first stable natural vegetation at a specified distance based on the long-term rate of erosion.
    - 7.B. Implement V Zone construction requirements for new development located in Coastal A Zones (for communities not currently implementing these requirements).
- Goal 13: Reduce the possibility of damage and losses due to tornadoes and high winds caused by windstorms, hurricanes, and nor'easters. Specifically, some of the actions include:
    - 13.D. Adopt an ordinance to require hurricane clips on new construction.
    - 13.E. Install hurricane clips and wind shutters on existing development – particularly emergency facilities and shelters built before existing codes were adopted to offer a degree of wind protection in compliance with the applicable codes and standards.
- Goal 14: Reduce the possibility of damages to emergency facilities from flooding, wind damage and wildfire damage. Specifically, some of the actions include:
    - 14.A. Conduct a study to determine the year-built and level of protection (flood, surge, wind) for each emergency facility.

[113] Multi-Jurisdictional Natural Hazard Mitigation Plan – Monmouth County, New Jersey. Draft – 2014 Plan Update. Table 6.1. "Subset of Action Types Considered to Achieve Mitigation Goals." P.6-6. Prepared by URS.

- On completion of 14.A., seek funding for mitigation projects for emergency facilities not currently designed for protection from flooding and high wind.

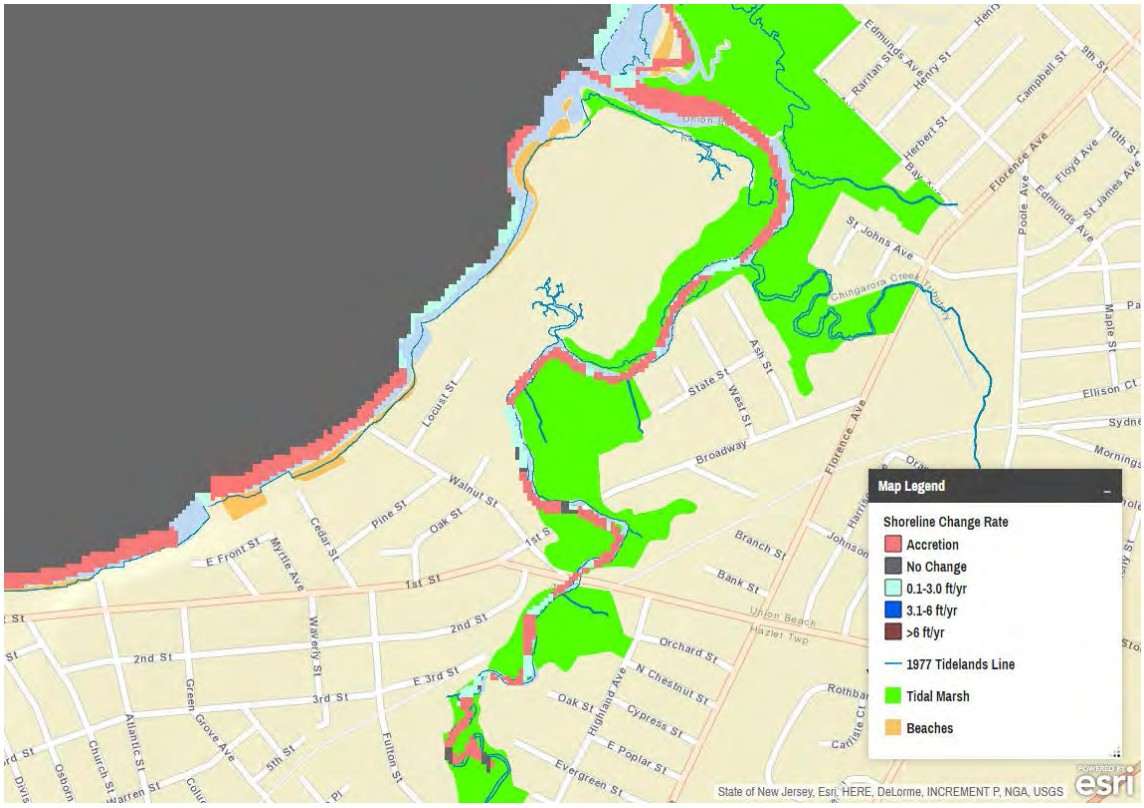
FLOOD MITIGATION AND MANAGEMENT

Flood mitigation may generally include techniques that deflect floodwater before it reaches the Neighborhood, while flood management techniques attempt to minimize the impact of floodwater by diverting it. Adaptation techniques adjust the development practices of people to reduce the impact of flooding on the built environment and are discussed more thoroughly in the Design Guidelines section of the Recommendations. Additional flood management methods are included throughout the Recommendation of this Plan, such as in Landscaping and Green Streets.

SHORELINE TREATMENTS

The Borough of Keyport shoreline, from Keyport Harbor and Raritan Bay to Chingarora Creek and its tributaries, is vulnerable in many locations to the effects of erosion or submersion. This is particularly worrisome in a densely populated, low-lying area surrounded by water. Storms and flood events may increase the rate of erosion or movement of sediment, in addition to flooding nearby properties, which make them further vulnerable to flooding in the future. Where there are vulnerable populations or infrastructure, certain treatments may be utilized to stabilize the shoreline and protect from regular flood events and rising seas. Although accretion of sediment also occurs along the shoreline and within the Chingarora Creek, it is often sediment brought downstream that causes backup or deflection of water elsewhere. The accretion is likely also minimal to the impact of sea level rise. Below is a map of projected shoreline change at current levels and the 1977 Tidelands line.

Map 63: Shoreline Change Rate[114]



The Nature Conservancy (TNC) developed the Restoration Explorer App that maps out the New Jersey shorelines and proposes enhancement techniques for areas experiencing disturbance, such as erosion. TNC and researchers at the Center for Remote Sensing and Spatial Analysis at Rutgers University in New Jersey found that at least 85% of the seven set parameters (6 out of 7) must be met in order to qualify the technique as applicable to an area of shoreline[115]. Parameters described as "not applicable", or N/A, are counted as a "yes". The parameters are listed below and descriptions of each technique follow:

- Tidal Range (ft)
- Shoreline Change (Erosion vs. Accretion) (ft/yr)
- Coastal Ice Cover (frequency)
- Wave Height (ft)
- Slope (%)
    - Shoreline Slope
    - Nearshore Slope
- Salinity (ppt)

Additionally, the U.S. Army Corps of Engineers has identified twenty (20) risk management strategies for coastal communities through their 2015 North Atlantic Coast Comprehensive Study Report. Some of the approaches are structural, while others are natural and nature-based features (NNBF), and others are non-

[114] The Nature Conservancy. "Coastal Resilience". 2016. http://maps.coastalresilience.org/newjersey/

[115] Lathrop, Richard. "Documentation for TNC Restoration Explorer App." August 2015. http://www.maps.coastalresilience.org/newjersey/plugins/restoration-explorer/njmethods.pdf

structural (policy-based). Some strategies may not be applicable to the Walnut-Oak shoreline, but may need to be considered at a larger-scale to minimize risk. Those that may be considered, to varying degrees, are included below, divided between areas of low-level wave energy and moderate- to high-level wave energy. Some of the non-structural strategies are included in the Zoning and Land Use recommendations section. It is important to consider all alternatives strategically and for their short- and long-term impacts on the community.

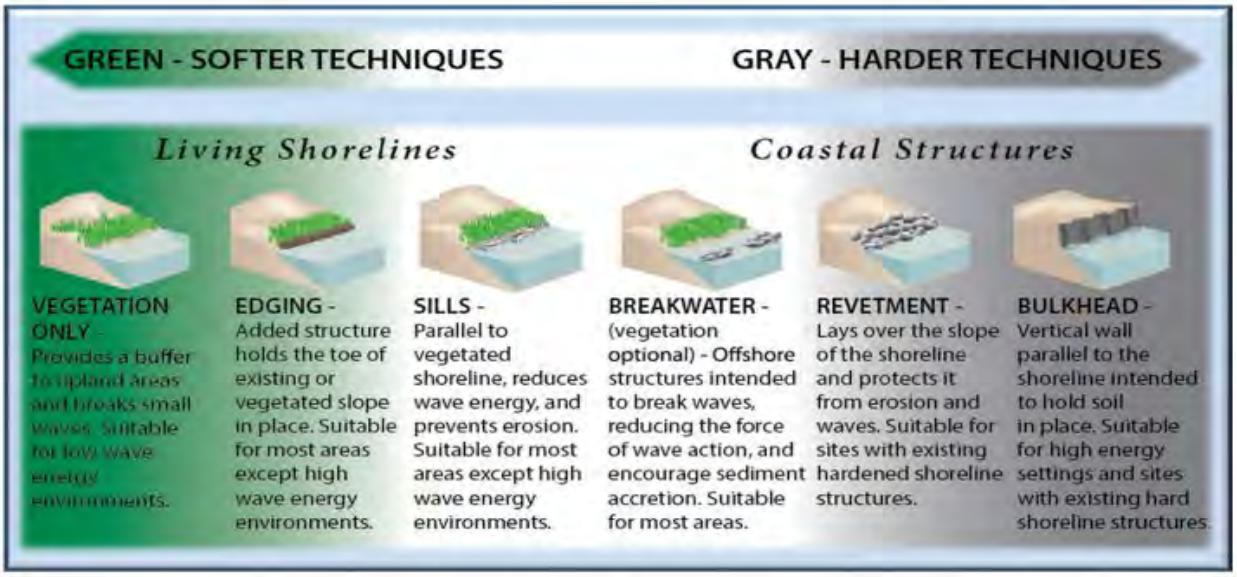


Figure 183: *Various shoreline-stabilization methods are shown, ranging from "green" living shorelines to hardened structures, shown in gray. Image: NOAA*

TIDAL MARSHES (LOW-LEVEL WAVE ENERGY)

Tidal marshes are marine landscapes that contain wetlands along the coasts of tidal basins, including estuaries, which are frequently inundated by flooding from the daily tidal flow of the adjacent ocean or major water body. Tidal marshes can range between freshwater, brackish, and saline, and are normally categorized into the lower, or intertidal, marsh and the upper, or high, marsh. The intertidal zone in saline marshes is flooded daily and then re-exposed by the tide. Tidal marshes are typically characterized as having a mix of tall and short saline-tolerant grasses, such as tall and short Smooth Cordgrass (Spartina alterniflora), Spike Grass, and Saltmeadow Rush (Juncus gerardii). Tidal marshes are important because they help to buffer stormy seas, slow shoreline erosion, and are able to absorb excess nutrients before they reach oceans and estuaries.[116]

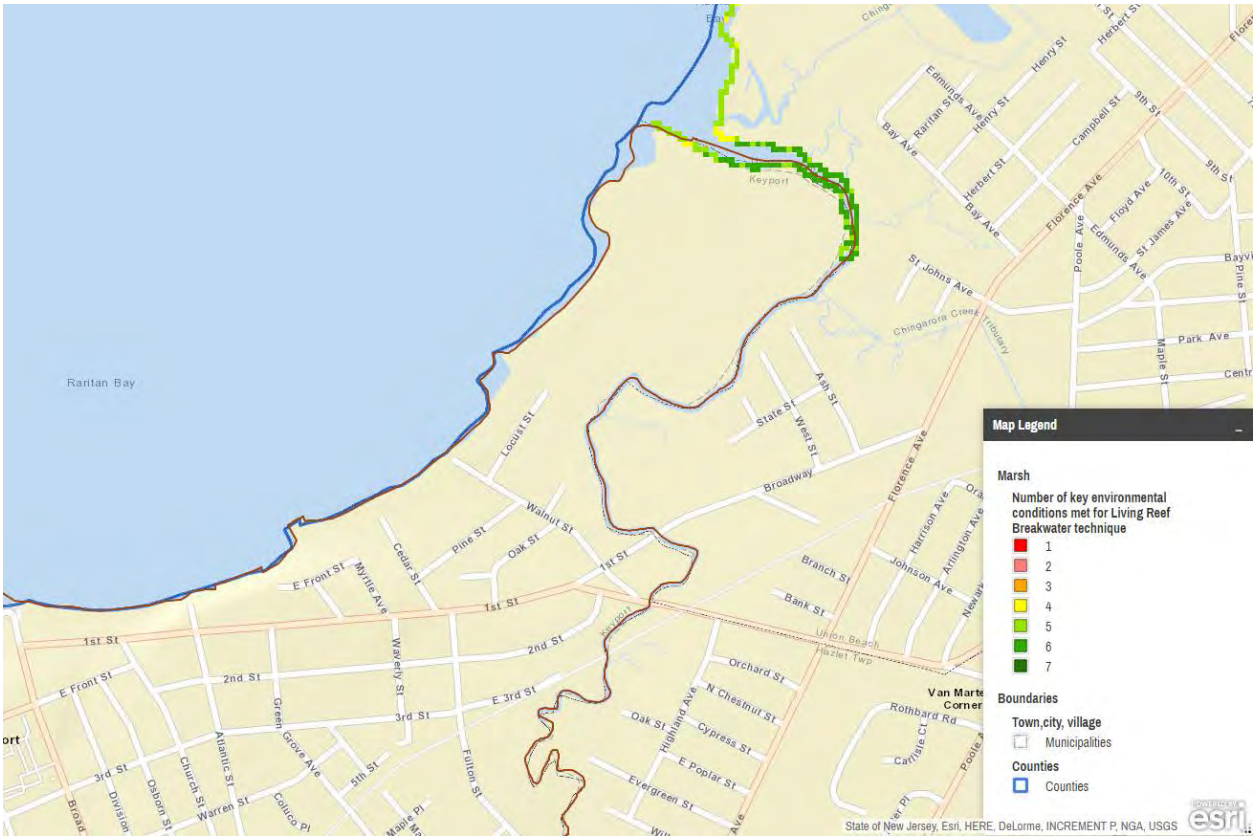
For the saline and brackish tidal marsh shorelines, which exist primarily along the north and northeast portions of the Walnut-Oak Neighborhood along the Chingarora Creek bordering the Borough of Union Beach, there are at least five shoreline enhancement options that can address shoreline edge erosion. Techniques include nature-based living shorelines, living reef breakwaters, marsh sills, breakwaters, and ecologically enhanced revetments. In total, all techniques, with the exception of nature-based living shorelines, are applicable at specified locations along the shoreline. Below are the shorelines enhancement techniques that may be appropriate to consider for the Chingarora Creek.

[116] EPA.gov. Wetlands Classification and Types. Classification of Wetlands – Marshes. https://www.epa.gov/wetlands/wetlands-classification-and-types#marshes

LIVING REEF BREAKWATERS

Living reef breakwaters use a heavily-weighted substrate, such as reef balls, bagged shells, or oyster castles to provide a durable aquatic habitat for reef species to settle and build a "living" reef. The reef structure serves as a breakwater, slowing wave energy from eroding the sensitive shoreline. Generally, a breakwater will be submerged at high tide, but somewhat visible at low tide. Although these reef structures are located close to the shore and are unlikely to interfere with water activities or boaters, it may be necessary to place a buoy for watercraft users to be aware of the structure. A marsh habitat should be able to grow in the protected area. This type of shoreline enhancement technique may be suitable along the northern end of the Chingarora Creek near where the mouth meets the Raritan Bay. The marshes in the Creek are more protected than the bayshore, but experience slightly more wave action than the inner Creek. A living reef breakwater will reduce the impact from open water and allow marsh to continue to expand behind it.

Map 64: Map of suitable locations for a living reef breakwater[117]



[117] The Nature Conservancy. http://maps.coastalresilience.org/newjersey/

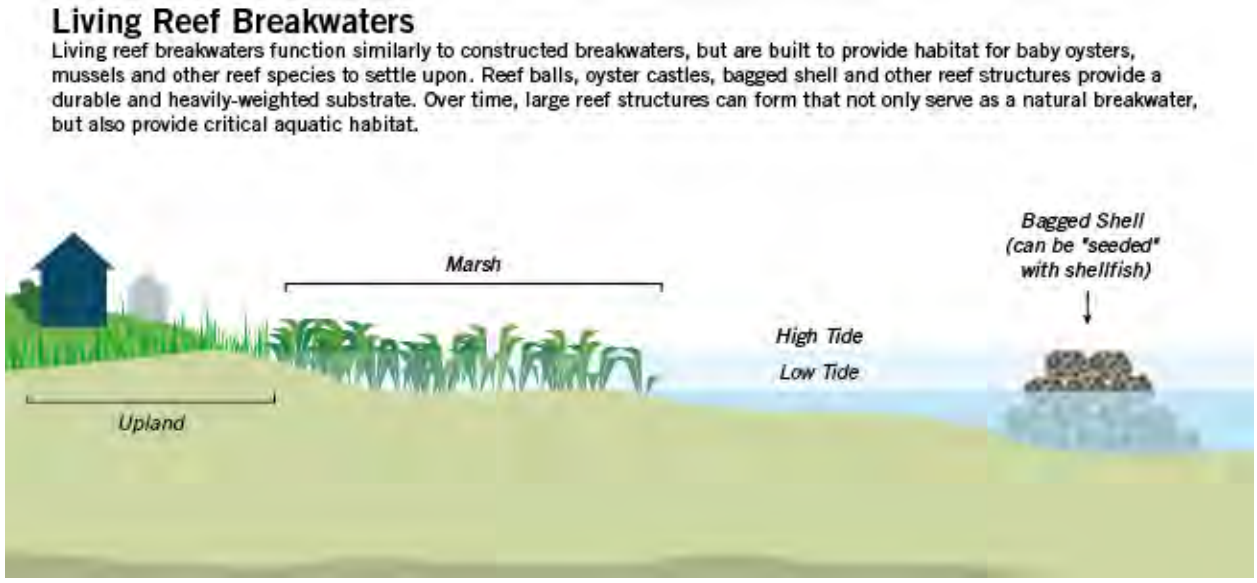


Figure 184: Diagram of a living reef breakwater in a tidal marsh (*Source: The Nature Conservancy*)

MARSH SILL

A marsh sill is another suitable technique for vulnerable shorelines in tidal marshes. This would usable slightly inward of the mouth of the Chingarora Creek where wave action is minimized and new marsh plants are able to grow. The sill is a structure of rocks or bagged oyster shells that sits just below the high tide line parallel to shore, while new marsh vegetation is often planted between the sill and existing marsh to speed up and enhance shoreline stabilization.

Map 65: Map of suitable locations for marsh sills (*Source: The Nature Conservancy*)

Marsh Sill

Marsh sills are low elevation structures (e.g., rocks or bagged oyster shell) that run parallel to the shoreline and are below water at high tide. The area between the sill and the marsh is often filled and planted with marsh vegetation to speed up shoreline stabilization.

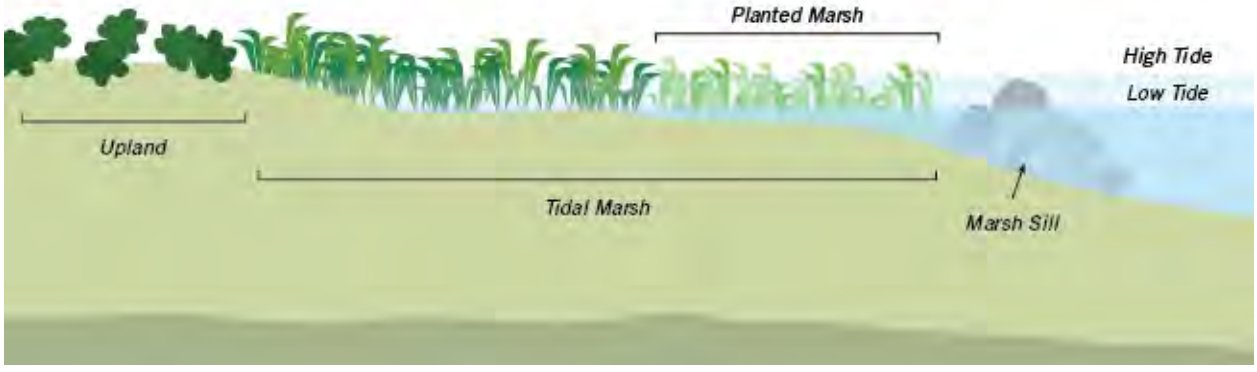


Figure 185: Diagram of a marsh sill in a tidal marsh (*Source: The Nature Conservancy*)

LIVING SHORELINES

In certain strategic of the Neighborhood along the Chingarora Creek and protected areas of Keyport Harbor, such as parks, public space, street ends, or coves, the Borough may want to consider studying the replacement of bulkheads and other hard structures with "living shorelines". This may not practical along some of the Bay

side due to potential high-level wave action and sediment erosion; however, the Creek provides an easier and calmer transition zone. Living shorelines have a breakwater of rocks, a strand of coastal wetlands and beach, then a bankface, and an upland buffer. Wetlands and natural structures are better at absorbing the impact of floodwater, particularly long-term.

Figure 186: Living shoreline example (NOAA)

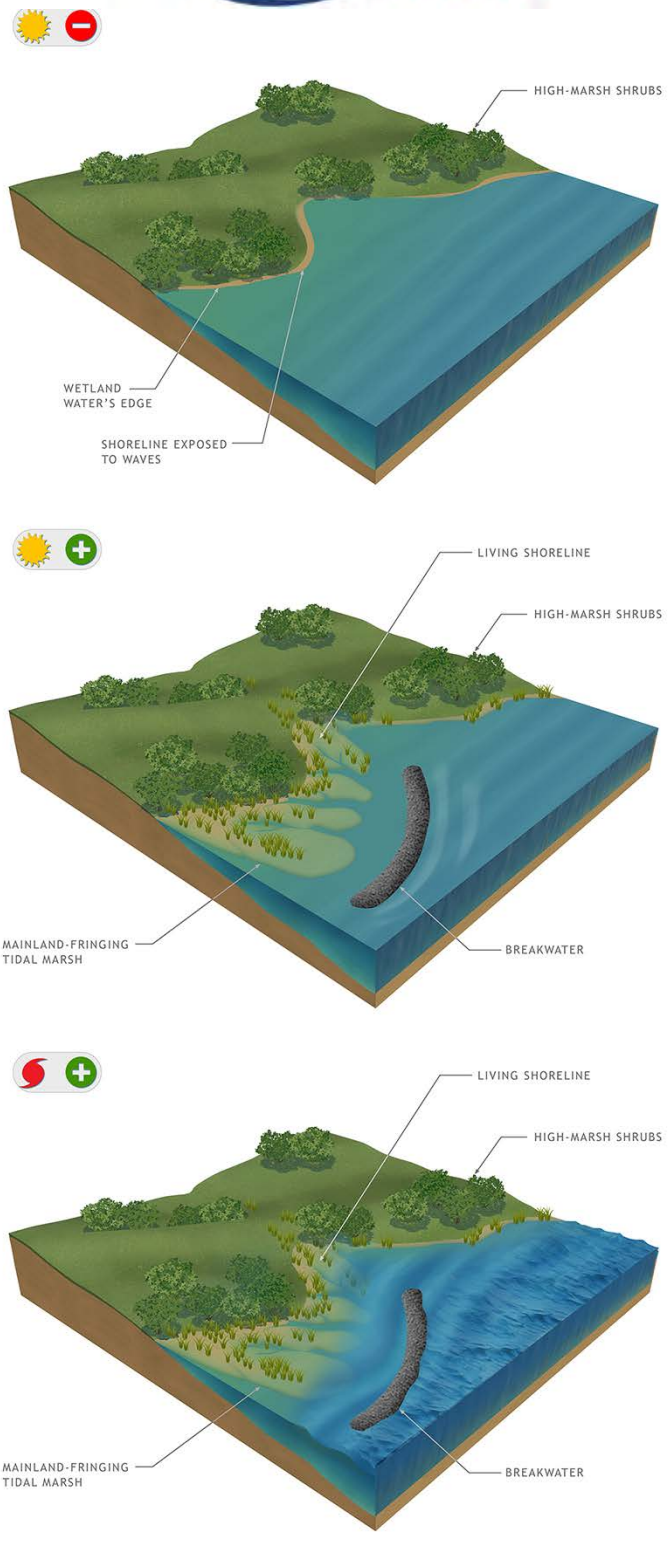


Figure 187: Diagram of expected impact of breakwater and living shoreline on coastal stabilization[118]

[118] U.S. Army Corps of Engineers - North Atlantic Division. "North Atlantic Coast Comprehensive Study Report." http://www.nad.usace.army.mil/CompStudy.aspx

FORESTED, BEACH, OR BULKHEAD SHORELINES (MODERATE- TO HIGH-LEVEL WAVE ENERGY)

Forested, beach, and bulkhead shorelines differ from tidal marshes by the type of vegetation, or lack thereof, and that they are not regularly submerged by the tides. These shoreline types can be found directly along tidal basins, estuaries, rivers, or oceanfront. Forested shorelines typically contain non-saline-tolerant vegetation/forests. Beaches are typically gently sloping rock- or sand-covered shorelines, which may experience tides and regular shifting of substrate. Bulkhead shorelines are manmade vertical retaining wall structures used to slow erosion of beaches, bluffs, or other land from the water, often made of steel or vinyl. Bulkheads cause wave reflection, which can redistribute the sand alongshore and often intensify erosion with a domino effect. According to the New Jersey Department of Environmental Protection (NJDEP) Division of Land Use Regulation, "An area containing sensitive and endangered plant species for example, may be irreparably damaged by bulkhead activities."[119]

Forested, beach, and bulkhead shorelines exist primarily along the western portion of the Walnut-Oak Neighborhood along Raritan Bay. According to The Nature Conservancy, there are at least four shoreline enhancement options that can address shoreline edge erosion for these types of shorelines. Techniques include beach restoration, living reef breakwaters, breakwaters, and ecologically enhanced revetments. In total, all techniques meet at least six parameters and are applicable at specified locations along the shoreline. In addition, some strategies from the U.S. Army Corps of Engineers are included as structural alternatives. For the purpose of this Plan, some of these recommended techniques may also apply to developed areas with semi-hardened shorelines.

BEACH RESTORATION

Beach restoration, or replenishment, "requires placing additional sand along a shoreline to help maintain habitat for key species – like horseshoe crabs, red knots and piping plovers – that use sandy beaches for spawning or feeding. The natural sloping beach allows waves to break across the sand, minimizing erosion of the shoreline edge." However, beach restoration should be used sparingly, as it focuses solely on replenishing sand to beaches. This activity becomes a very frequent, expensive project that often requires State and Federal funding. Using dunes, vegetation, and properly placed revetments, along with occasional sand replenishment allows the beaches to actually begin to replenish themselves. According to The Nature Conservancy mapping, beach restoration meets the key environmental conditions and is an appropriate technique for the Keyport Harbor/Raritan Bay frontage.

[119] State of New Jersey Department of Environmental Protection – Division of Land Use Regulation. "Bulkheads." http://www.nj.gov/dep/landuse/activity/bulkhead.html

Map 66: Map of suitable locations for beach restoration (*Source: The Nature Conservancy*)

Figure 188: Diagram of beach restoration (*Source: The Nature Conservancy*)

SUBMERGED AQUATIC VEGETATION

Areas with moderate wave energy and high erosion where small, cliff-like formations are occurring may benefit from submerged aquatic vegetation. This may need to be used in addition to other techniques that are slightly more structural if dealing with developed and populated areas. Submerged aquatic vegetation may be

useful to curb erosion and soften the shoreline, but may not prevent it entirely or protect vulnerable communities. Submerged aquatic vegetation performs many important functions, including: wave attenuation and sediment stabilization, water quality improvement, primary production, food web support for secondary consumers, and provision of critical nursery and refuge habitat for fisheries species.

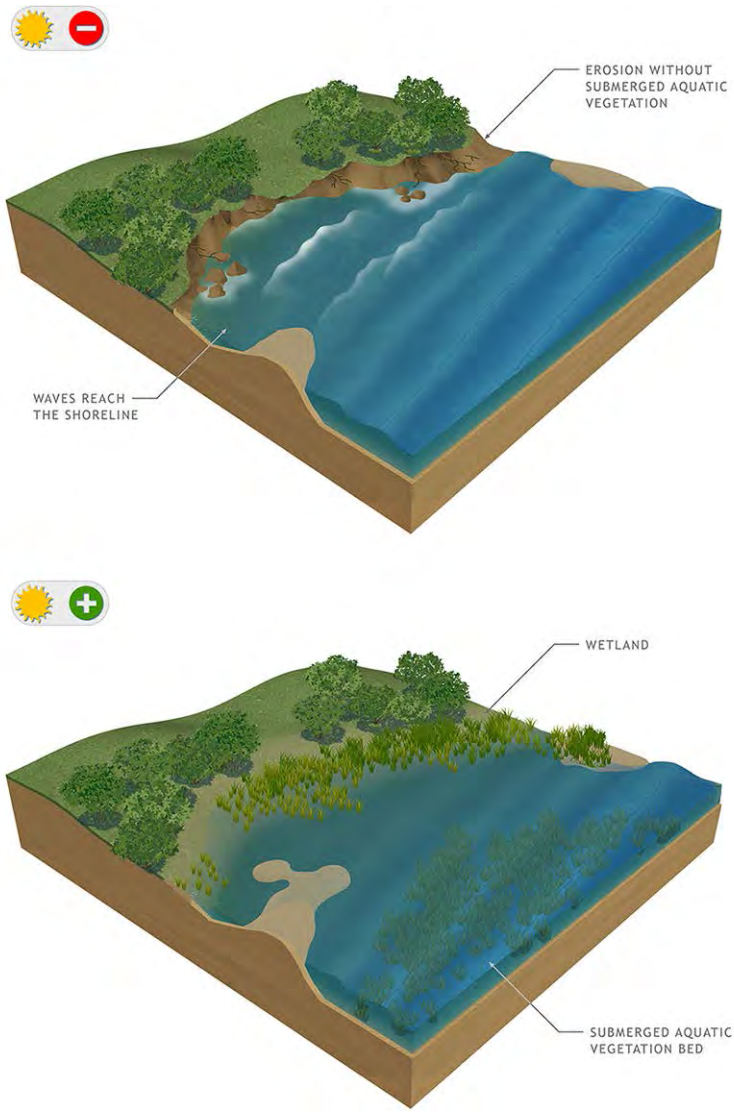


Figure 189: Diagram of expected impact of submerged aquatic vegetation on coastal stabilization (*Source: U.S. Army Corps of Engineers*)

BREAKWATERS

Breakwaters, like living reef breakwaters, are constructed parallel to the shoreline and used to minimize wave action on the shore behind them. A limited impact zone behind the breakwater allows marsh vegetation to reestablish itself and grow and typically submerged aquatic vegetation will be planted in the mid-tide zone between the breakwater and existing upper marsh. Breakwaters are located deeper in the water along more open shorelines, but visible at low tide and high tide. This type of enhancement would be well-suited along the

Keyport Harbor/Raritan Bay shoreline, particularly toward the mouth of the Chingarora Creek where erosion is more prevalent.

Map 67: Map of suitable locations for breakwaters (*Source: The Nature Conservancy*)

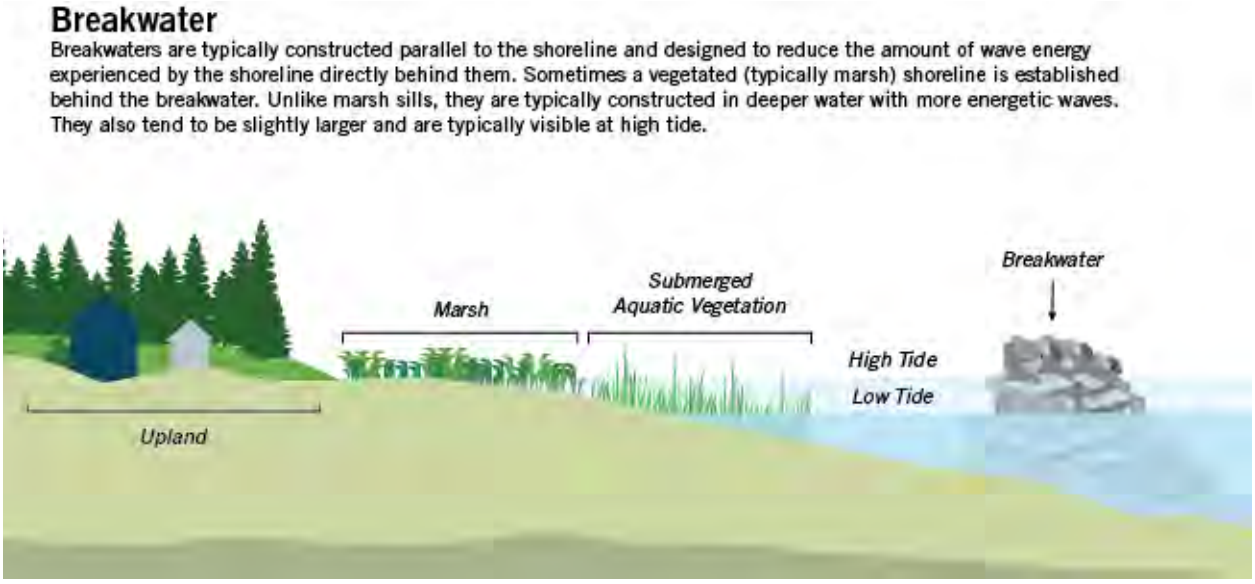


Figure 190: Diagram of a typical breakwater enhancement (*Source: The Nature Conservancy*)

REVETMENTS

Revetments are onshore hardened structures with the principal function of protecting the shoreline from erosion. Revetments typically consist of a cladding of stone, concrete, or asphalt to armor sloping natural shoreline profiles. Although a conventional stone revetment is more preferable to a bulkhead, it is less preferable to an ecologically enhanced revetment or natural shoreline, where it is acceptable. A hardened revetment may be the only alternative for certain developed areas or roadways along a coast before a bulkhead or seawall is necessary. A conventional revetment is not recommended at this time.

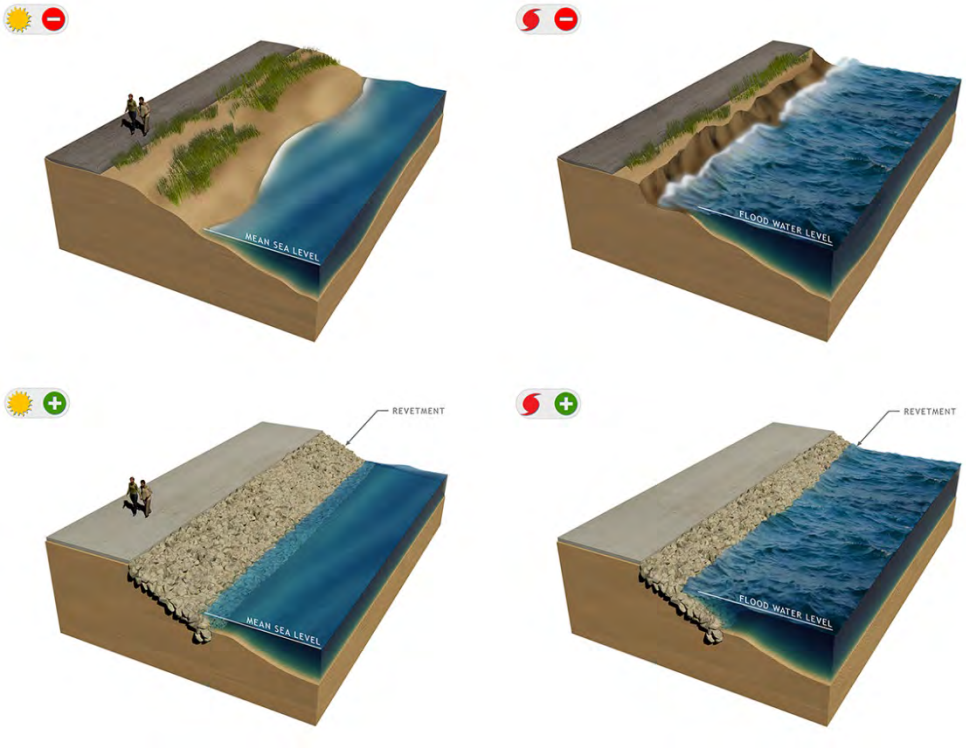
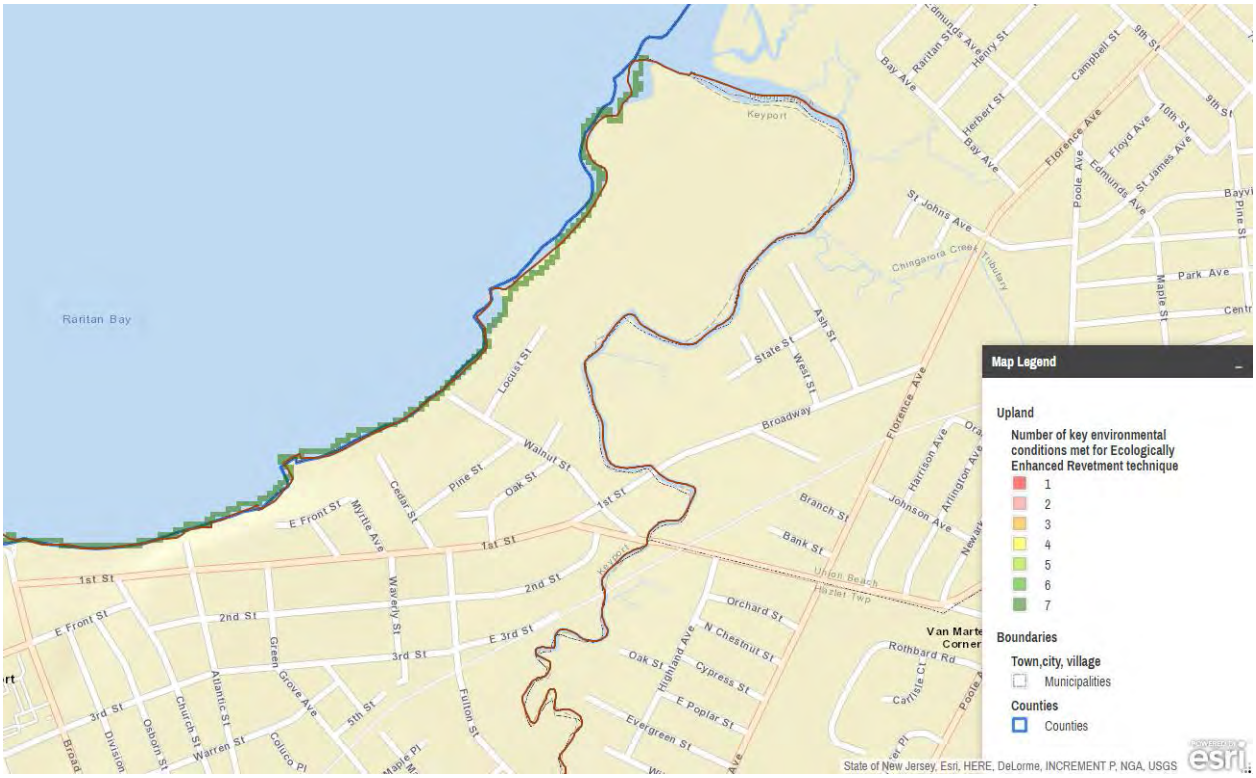


Figure 191: Diagram of expected impact of stone revetments on coastal stabilization (*Source: U.S. Army Corps of Engineers*)

ECOLOGICALLY ENHANCED REVETMENT

Ecologically enhanced revetments are typically constructed of stone, felled trees, or broken up concrete and placed along a shoreline, which may be either open coastal locations or sheltered areas, such as a creek. Unlike most revetments, these are meant to be porous and allow vegetation to grow within and between the stones. The more durable substrate provides a foundation, as well as protecting the upland shoreline vegetation and sediment. This type of shoreline enhancement might be suitable along public waterfronts at Cedar Street, Walnut Street (if the bulkhead is moved upland), and along the Aeromarine site.

Map 68: Map of suitable locations for ecologically enhanced revetments (*Source: The Nature Conservancy*)



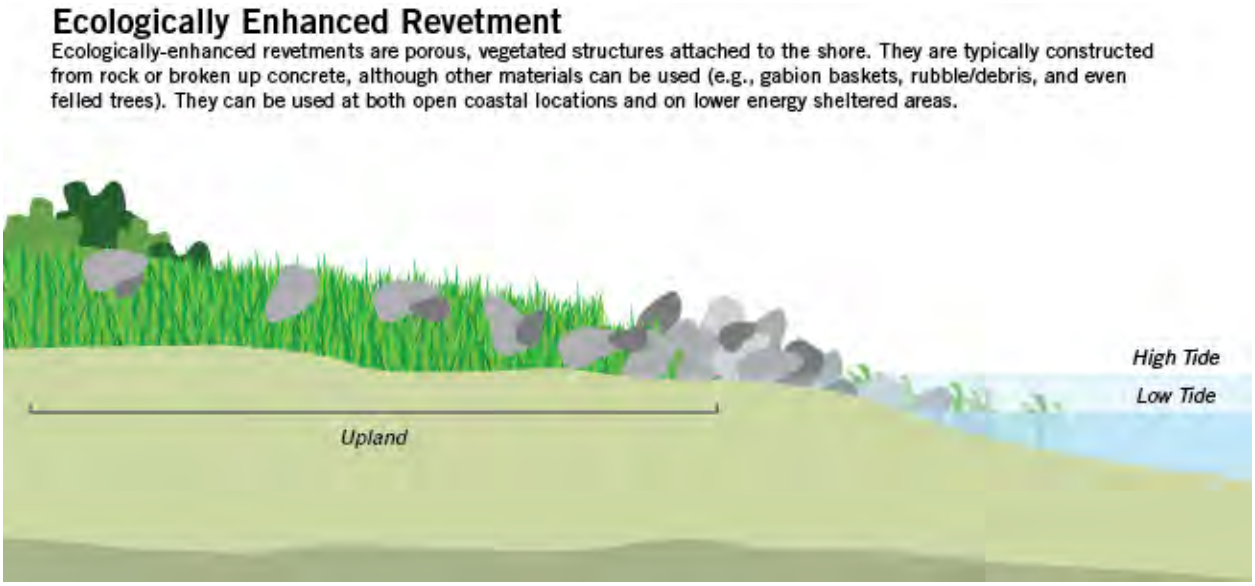


Figure 192: Diagram of a typical ecologically enhanced revetment (*Source: The Nature Conservancy*)

Figure 193: Existing bulkhead at Walnut Street street-end (top) and rendering of a new bulkhead with ecologically enhanced revetment where there is existing bulkhead (bottom) (*Source: Maser Consulting, P.A.*)

Figure 194: Existing map with Walnut Street bulkhead at beachfront (top) and rendering of a new bulkhead with ecologically enhanced revetment where there is existing bulkhead (bottom) (*Source: Maser Consulting, P.A.*)

BULKHEADS

Bulkheads are hardened structures that act as walls primarily to retain soil and protect a developed area or landscape from erosion. Bulkheads should be used in areas that experience minimal wave action, although however, they are often used in moderate- to high-wave action areas along Keyport Harbor or Raritan Bay that are exposed during storms. However, bulkheads are not recommended as the first choice of defense against erosion, as they may often exacerbate erosion or redirect wave energy to neighboring properties.

> *"When waves encounter a water-retaining structure, a significant amount of the wave's energy is directed downward to the area where the wall and soft sand or earth meet. As a result, the shore on the retaining side of the bulkhead or seawall is subjected to a significant amount of water force, which can cause the land to erode more quickly than if there were no wall. A bulkhead or seawall must be tall enough to prevent waves from lapping over the top of the structure; insufficient height could result in waves overtopping the structure and eroding the land. In addition, groundwater and rain percolating through soil can cause pressure that could eventually topple a bulkhead or seawall. To ensure that a water-retaining structure remains upright, weep holes should be placed along the bottom of it to relieve built-up water pressure."*[120]

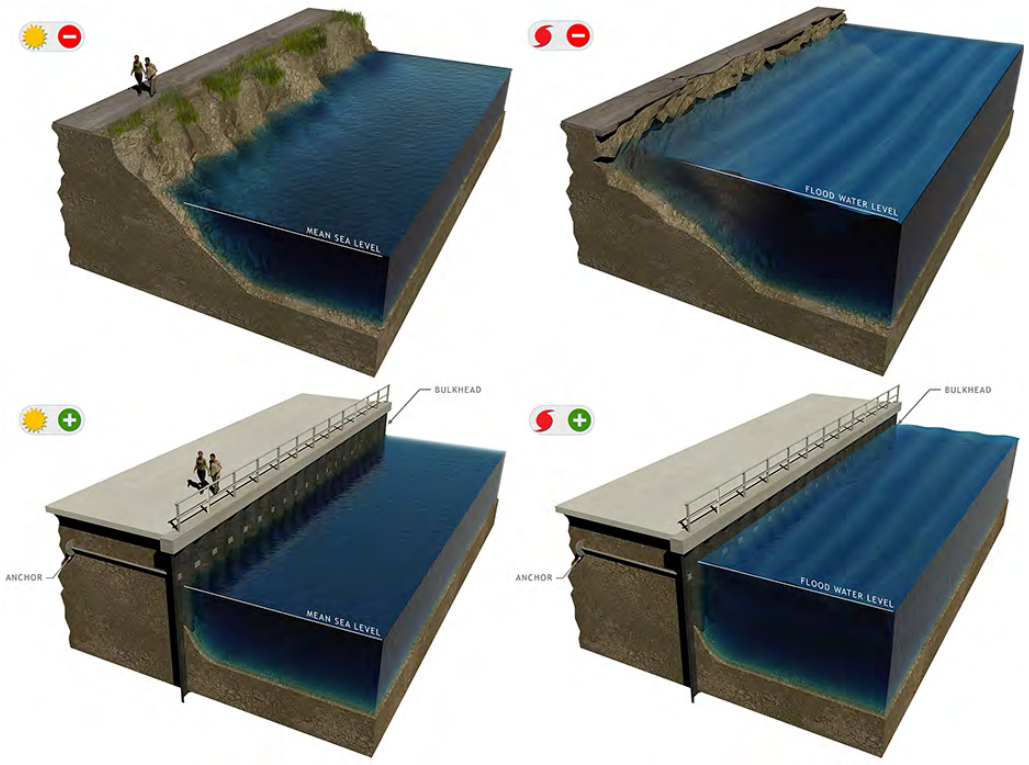


Figure 195: Diagram of expected impact of bulkheads on coastal stabilization (*Source: U.S. Army Corps of Engineers*)

Bulkheads may be used where existing development is very close to an eroding edge, but if there is available waterfront and low- to moderate-wave action, especially along public open space, it is recommended that bulkheads be replaced with ecologically enhanced revetments or living shorelines, where appropriate. In

[120] Murphy, Sandra. http://www.ehow.com/info_8721431_types-bulkheads-seawalls.html

terms of public land, is recommended that the street-end of Walnut Street be moved upland and the concrete bulkhead be removed. A steel bulkhead, similar to that at Cedar Street, should be placed around the new street-end, while an ecologically enhanced revetment should be placed on the Bay side of the bulkhead, with a wide section of beach to remain.

DRAINAGE IMPROVEMENTS

A drainage system can carry water away via conveyance systems and, during times of high water, may store water until it can be carried away in storage facilities. Conveyance systems utilize measures such as pump stations, culverts, drains, and inlets to remove water from a site quickly and send it to larger streams. Storage facilities are used to store excess water until the storm or flood event has ended. Currently, the most prolific drainage method in the Neighborhood is monolithic curbs and gutters to drain water down streets where storm sewers do not exist, due to the age of the Neighborhood.

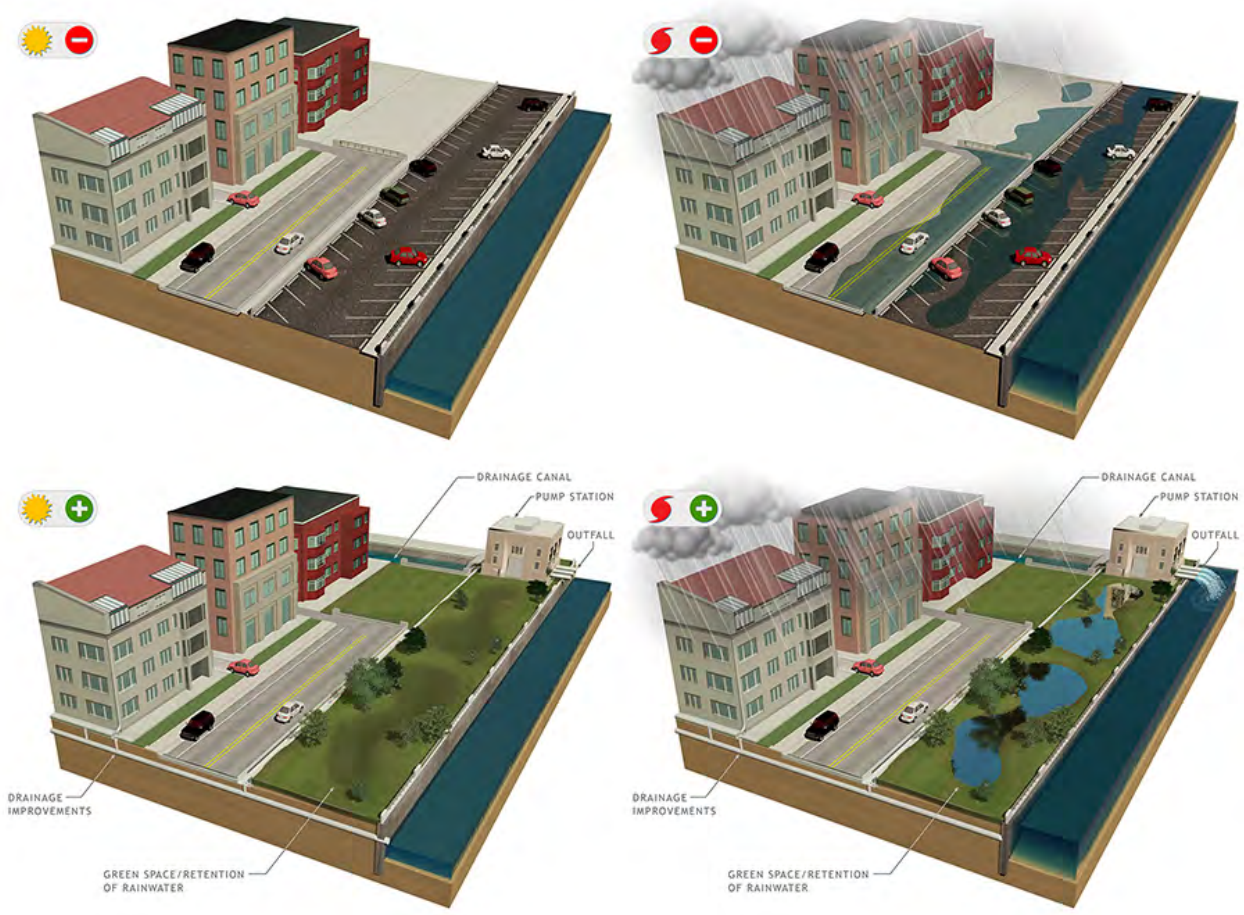


Figure 196: Diagram of expected impact of drainage improvements (*Source: U.S. Army Corps of Engineers*)

In order to effectively drain areas of floodwater, pipes need to be inspected, maintained, or upgraded where they exist and placed in strategic areas where they do not. A drainage pipe running through the center of Block 138 from Spring Street toward the Chingarora Creek appears to be regularly backed up and inaccessible. This is one of the lowest areas of the Neighborhood and requires significant improvement. It is recommended that with any new development on Block 138, that an easement be requested for the Borough to make and

maintain improvements to flood-prone areas in the center of the Block. On the other hand, it was recommended by the Supervisor of the Department of Public Works of the Borough of Keyport that the storm drain under property of Block 138, Lot 11 be removed in order to reduce flooding of properties on Oak Street, which would need to be explored further.[121]

Pipes should be regularly flushed and maintained to remove debris or silt. Large vegetation that might prevent drainage because of fallen branches, such as shrubs and trees, are discouraged near the openings of drainage pipes. Water should pass through natural filtration of plants and substrate instead of being released immediately into the Creek. Bioswales should be built to handle 24-hour flood events.

PUMP STATIONS

Pump stations are located in low-lying areas and are necessary to move stormwater out of vulnerable areas. Their location also makes them vulnerable. Subject to available funding, the pump stations at First Street and Cedar Street, in particular, should be retrofitted for resiliency, including elevating or flood-proofing critical equipment, constructing barriers, and installing backup power supplies (generators). Such improvements might be scheduled for capital improvements.

Additionally, the Borough should look into grant funding for adapting or improving Supervisory Control and Data Acquisition (SCADA) to allow staff to monitor station operations from remote locations to maximize the performance of each pump station.

LAND USE, DEVELOPMENT, AND ZONING

ACQUISITION AND RELOCATION

As much as it is considered to be a land use decision, the act of acquisition and relocation of structures is also a flood prevention method and shoreline treatment. Often considered a drastic approach to storm damage reduction, property acquisition and structure removal are usually associated with frequently damaged structures. Implementation of other measures may be effective, but if a structure is subject to repeated storm damage, this measure may represent the best alternative to eliminating risks to the property and residents.

Although acquisition and relocation is not a priority for the Neighborhood at this point, it may become one as sea level continues to rise, putting homes that are at lower elevations at risk of causing significant damage. This would likely apply to properties directly along Keyport Harbor or on Block 138. However, this strategy would only be utilized with permission from property owners willing to sell their titles. The Borough may also decide to help relocate property owners and structures to other available land that is at a higher elevation and out of a flood hazard area. However, there is minimal available land that is not in a flood area of size significant enough to replace every property.

Properties may be acquired through the New Jersey Department of Environmental Protection (NJDEP) Blue Acres Program, which allows willing landowners to offer their properties (including structures) for sale that have been damaged by, or may be prone to incurring damage caused by storms or storm-related flooding, or that may buffer or protect other lands from such damage. The Borough and County should work together with owners of properties abutting the Chingarora Creek and Keyport Harbor/Raritan Bay, so that property owners

[121] Conversation with Scott Hicks, Supervisor of Borough of Keyport Department of Public Works. September 23, 2016.

may be properly compensated for their property while relieving them of the impact of natural disaster, and returning the land to open space for stormwater retention or mitigation and recreation.

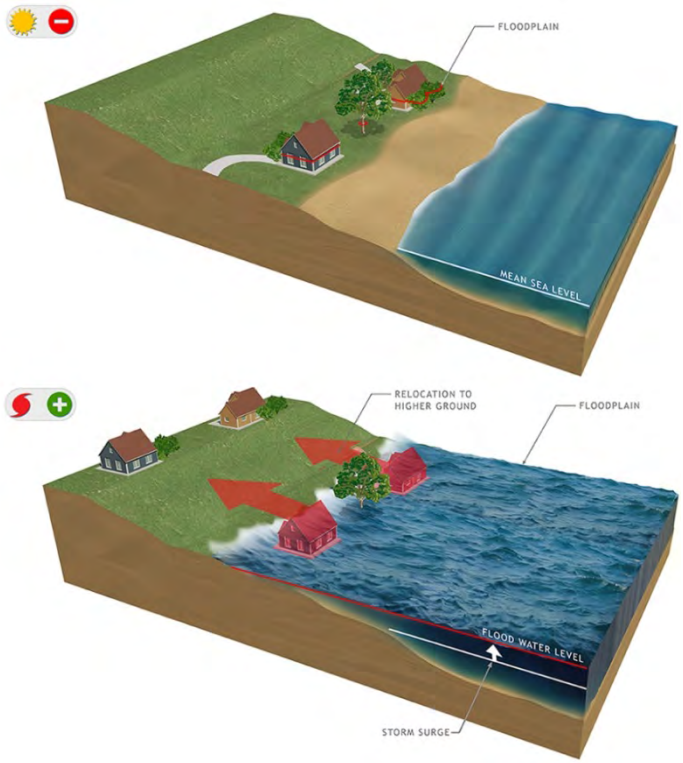


Figure 197: Diagram of expected impact of acquisition and relocation of homes (*Source: U.S. Army Corps of Engineers*)

LAND USE MANAGEMENT/ZONING AND FLOOD INSURANCE

Communities participating in the National Flood Insurance Program are proactive in promoting floodplain management and flood risk awareness.

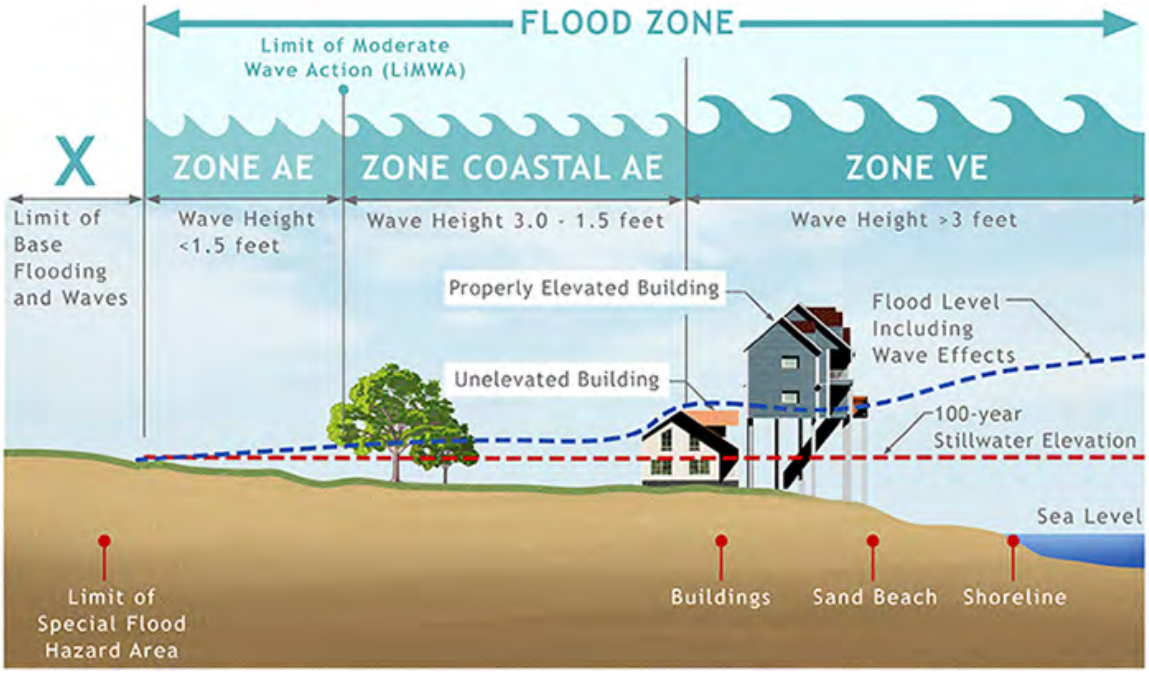


Figure 198: Diagram of flood zone levels (*Source: U.S. Army Corps of Engineers*)

BULK STANDARDS

Bulk standards govern the dimensions of properties and, therefore, to a certain extent the design of a structure on that property, in order to ensure sufficient light, air, and safety. In this case, bulk standards are also intended to ensure proper flow and drainage of floodwater and ensure access to structures that need to be elevated to reduce the damaging impact on residents.

After reviewing the bulk standards for the RA and RA (P.I.D.) zones, this Neighborhood Plan recommends the following be considered by the Borough for the Walnut-Oak Neighborhood:

FLEXIBLE FRONT YARD SETBACKS

Homes are presently required to have a 20 foot front yard and 15 foot rear yard in the RA zone. However, lot depth varies within the neighborhood, with some well over 200 feet in depth and others less than 90 feet. However, due to flooding and the resultant flood zones, large portions of many lots, especially the rear yards of lots on Block 138, are generally impractical to develop.

Many properties do not meet the required front yards, which is likely a pre-existing condition due to the number of historic homes built prior to zoning. Coupled with the need to elevate homes in low-lying areas and add exterior staircases for entrances, the required front yard depths can pose significant limitations on density.

To this end, the Borough could amend the front yard setback reducing the minimum requirement for the front yard from 20 feet to the prevailing front setback to provide homeowners more flexibility. A reduced or flexible front yard setback will also match the historic character of the Neighborhood and contribute more to creating an inviting streetscape. The Borough might also consider a maximum setback to prevent homes from being too far back from the street and to prevent damage from flooding from the low spots in the rear yards.

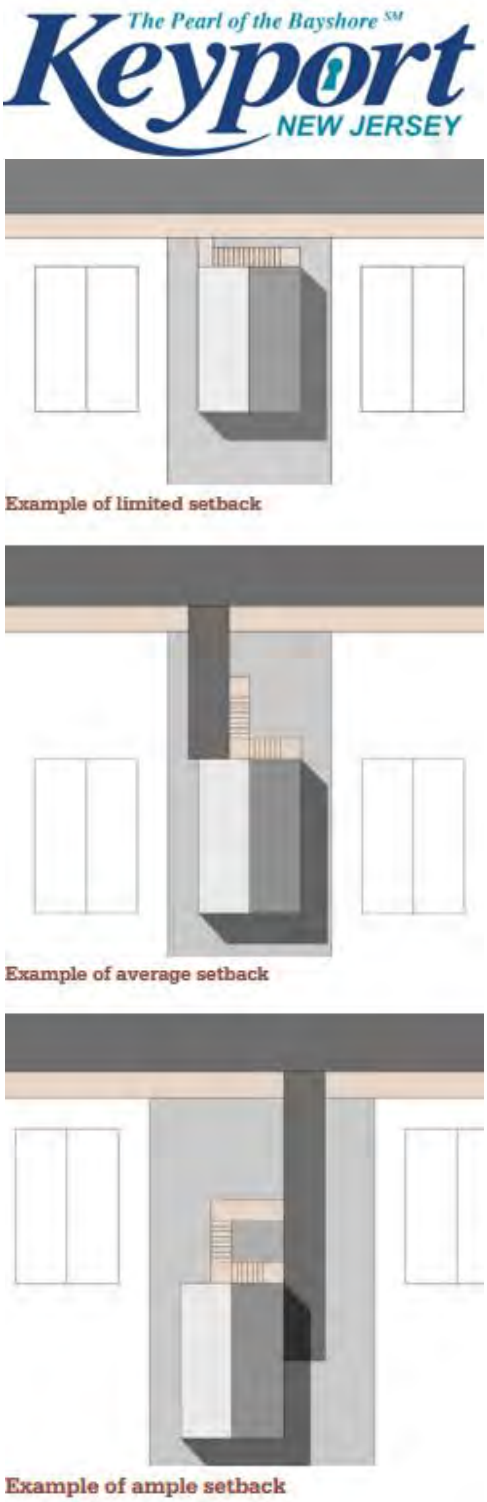


Figure 199: Examples of parcel layout for sufficient spaces for new or expanded stairs[122]

FLEXIBLE SIDE YARD SETBACKS

Lot widths vary greatly within the Walnut-Oak Neighborhood. However, as described previously, nearly 100 lots around the Neighborhood have a lot width of forty (40') or less, according to the Borough of Keyport Tax Map. Presently, the code requires one side yard of a principal building to be 6 feet wide and the combined

[122] Elevation Design Guidelines. Mississippi Development Authority. Site Design Guidelines. Prepared by URS. P.9. http://www.nj.gov/dep/hpo/hrrcn_sandy_pdf%20files/mississippi.pdf

yards not less than 16 feet in the RA zone. A lot that is forty (40') feet in width would be restricted to a home that is only twenty-four (24') feet wide in the RA zone and a lot that is thirty-five (35') feet would result in a home only nineteen (19') feet wide, which is not practical or desired in today's residential designs. Two options are presented for the Borough's consideration.

The first option is to reduce the side yard setbacks for lots with a width of forty (40') feet or less. A sliding scale could be provided to offer homeowners looking to rebuild with variance-free options. Lots between thirty-one (31') feet and 39.9 feet (in width) could be permitted side yard setbacks of 4 feet each, for a total of 8 feet. Lots smaller than thirty (30') feet, of which there are a few, could be permitted a side yard setback of 0 and 3 feet, for a total of 3 feet.

The second option for the Borough's consideration regarding undersized lots is a development concept called "zero-lot line". A zero-lot line home essentially places the home on one side yard line, allowing for a generous side yard on the other side that functions as the home's outdoor space in conjunction with the rear yard. On lots narrower than 40 feet, the zero-lot line concept provides one useable side yard instead of two unutilized side yards. As shown in Figure 200, the homes are located along one property line. This alternative would provide more flexibility to owners of undersized lots (less than 40 feet wide) and produce usable side yards instead of useless slivers.

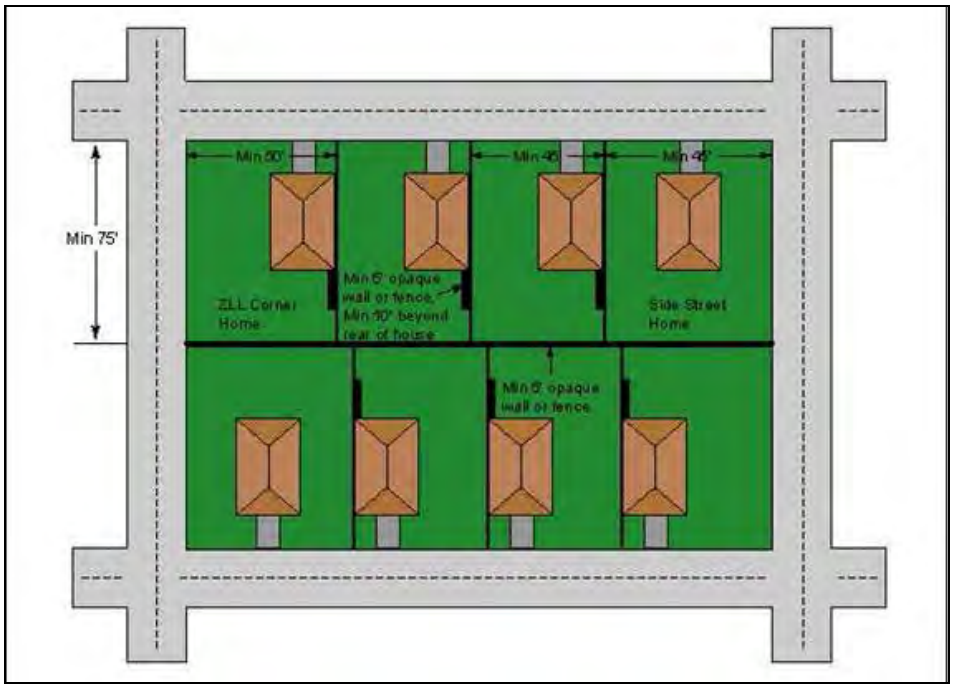


Figure 200: Illustration of zero-lot line properties

The potential amendments to the side yard parameters for the RA zone might include:

Table 10: Amendments to Side Yard Setbacks

Lot Width (ft)	One Side Yard (ft)	Combined Side Yards (Both) (ft)
20 – 30.9 feet	0 and 3	3
31 – 39.9 feet	0 and 4	8
40 – 49.9 feet	0 and 12	12

Lots that are fifty (50') feet and greater in width could maintain the existing side yard setback requirements with two yards, so that larger homes do not overpower adjacent smaller lots.

CORNER LOTS

Corner lots should be built to the corner of the intersection, with a reduced front yard setback and allowing for a larger side and rear yard setback, while also recognizing the need for traffic sight lines. Bulk standards should be developed specifically for development of corner lots in the RA district, to resemble something similar to the image shown below. Corner lots should also have specialized standards for fencing and hedges to allow proper sight distance.

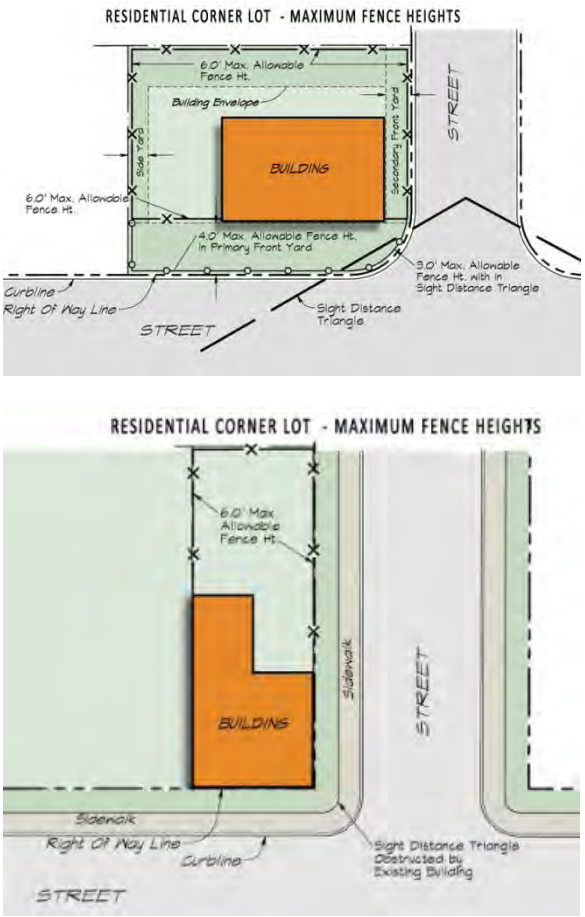


Figure 201: Corner Lot Treatment (Courtesy of Lancaster, PA)[123]

PARKING

Currently, the Borough's zoning code requires 2.5 off-street parking spaces per dwelling unit. However, this parking requirement is excessive for small or narrow properties in the Walnut-Oak Neighborhood, particularly for single-family homes in a dense and walkable area. The Borough should consider reducing the requirement for residential parking requirements by defaulting to the Residential Site Improvement Standards (RSIS) of

[123] City of Lancaster, PA. Chapter 300: Zoning. Article VII: Supplementary District Regulations. Section 300-25: Fencing, Walls and Hedges. http://ecode360.com/8122831

New Jersey, N.J.A.C. 5:21, which states that the parking requirement per dwelling unit is determined by housing unit type and size. A 2-bedroom single-family detached house requires 1.5 parking spaces and a 3-bedroom requires 2 parking spaces.[124]

VACANT OR ABANDONED PROPERTIES

Following Superstorm Sandy, some property owners throughout the Borough who endured major damage to their homes and/or could not afford the pursuant repairs and insurance were forced to leave their properties behind or have been unable to make improvements. Several years later, there are some properties with structures that remain abandoned, have not been demolished, and continue to deteriorate, or that sit empty and have not been rebuilt. These properties rest in a state of limbo because the property owners will not or cannot take responsibility and the Borough has not established the necessary conduits for acquiring or selling such properties nor holding the owners accountable.

Long-term abandoned or vacant properties pose a serious health and safety risk to residents. Below are some recommendations for properties and buildings that have remained abandoned or in disrepair for a long period of time, in response to concerns raised by residents.

1. There are still several homes that sit abandoned. The Borough needs to be more aggressive in taking action and holding property owners accountable.
2. The Borough should look into the possibility of acquiring properties when they cannot hold property owners accountable or when property owners are unable to rebuild. Certain properties, particularly repetitive losses, should be strategically held for water retention areas, doubling as public open space, while others that are less strategic could be resold.

Figure 202: Example of damaged and vacant property at First & Walnut Street (Google Streetview, October 2015)

3. The Borough could consider downzoning strategic properties where multiple vacancies exist and encourage development of double lots to decrease density and provide more permeable coverage in flood-prone areas, while recovering some of the tax base.
4. The Borough should encourage landscaping and public use for any strategic lots that cannot be built upon or improved by the property owner for any reason and that cannot reasonably be sold or acquired by the Borough or County.

[124] Table 4.4. Parking Requirements for Residential Land Uses. N.J.A.C. 5:21-4.14. 2013. P. 49. Accessed November 17, 2016. http://www.state.nj.us/dca/divisions/codes/codreg/pdf_regs/njac_5_21.pdf

More so than Sandy-damaged properties, there are also a number of properties in the Walnut-Oak Neighborhood that have remained vacant or unbuilt entirely. Most of these properties are located along the Chingarora Creek and vulnerable to flooding. Those properties that cannot be reasonably developed without putting structures and residents in the way of harm should be considered for acquisition by the Borough if a property owner is willing to sell. Otherwise, some incentives could be devised and implemented to encourage development and redevelopment that will be suitable for the site, improve the Neighborhood character, and meet the requirements of the Flood Prevention Ordinance.

The Borough has the opportunity to conduct an Area in Need of Rehabilitation report to determine whether the Neighborhood or the Borough as a whole can be designated. This designation will allow property owners a 5-year tax abatement to make improvements to their properties, if they so choose. The study must show that:

1) A significant portion of structures therein are in a deteriorated or substandard condition and there is a continuing pattern of vacancy, abandonment or underutilization of properties in the area, with a persistent arrearage of property tax payments thereon or
2) more than half of the housing stock in the delineated area is at least 50 years old, or a majority of the water and sewer infrastructure in the delineated area is at least 50 years old and is in need of repair or substantial maintenance; and
3) a program of rehabilitation, as defined in section 3 of P.L.1992, c. 79 (C.40A:12A-3), may be expected to prevent further deterioration and promote the overall development of the community."[125]

AEROMARINE SITE

Although a redevelopment plan for the Aeromarine site had already been prepared in 2005 for residential units, trails, and a restaurant, and a 2010 overlay for a solar energy facility was added, there has been no redevelopment of the site. Several businesses still exist within the aging industrial complex, although they are not highly visible or accessible.

It should also be remembered that much of the area along the Creek and the industrial complex area was under water during the storm surge of Hurricane Sandy, which temporarily left the landfill as an island. Buildings or roads on the lower portions of the site should either be discouraged or elevated and floodproofed as much as possible to avoid significant damage during a flood event. Buildings on the landfill site would potentially be disconnected from the rest of the Neighborhood without elevated roads. Additionally, the industrial area and the landfill require remediation that could be very expensive and time-consuming.

Prior to any redevelopment, Block 141, Lot 15 (Aeromarine/landfill site) should be subdivided into lots appropriate to the existing and proposed uses. Single-family homes, such as the one at the northeast corner of Walnut Street and Locust Street, should not be on the same lot as a major public park or industrial complex, even if they are under the same property ownership. Certain scenarios that propose uses that are not currently permitted may require rezoning or an amendment to existing zoning in order to permit development.

[125] Area in Need of Rehabilitation: Exploring the Potential and Limitations. New Jersey Future Redevelopment Forum. March 4, 2011. http://www.njfuture.org/wp-content/uploads/2011/06/Babineau_forum2011.pdf

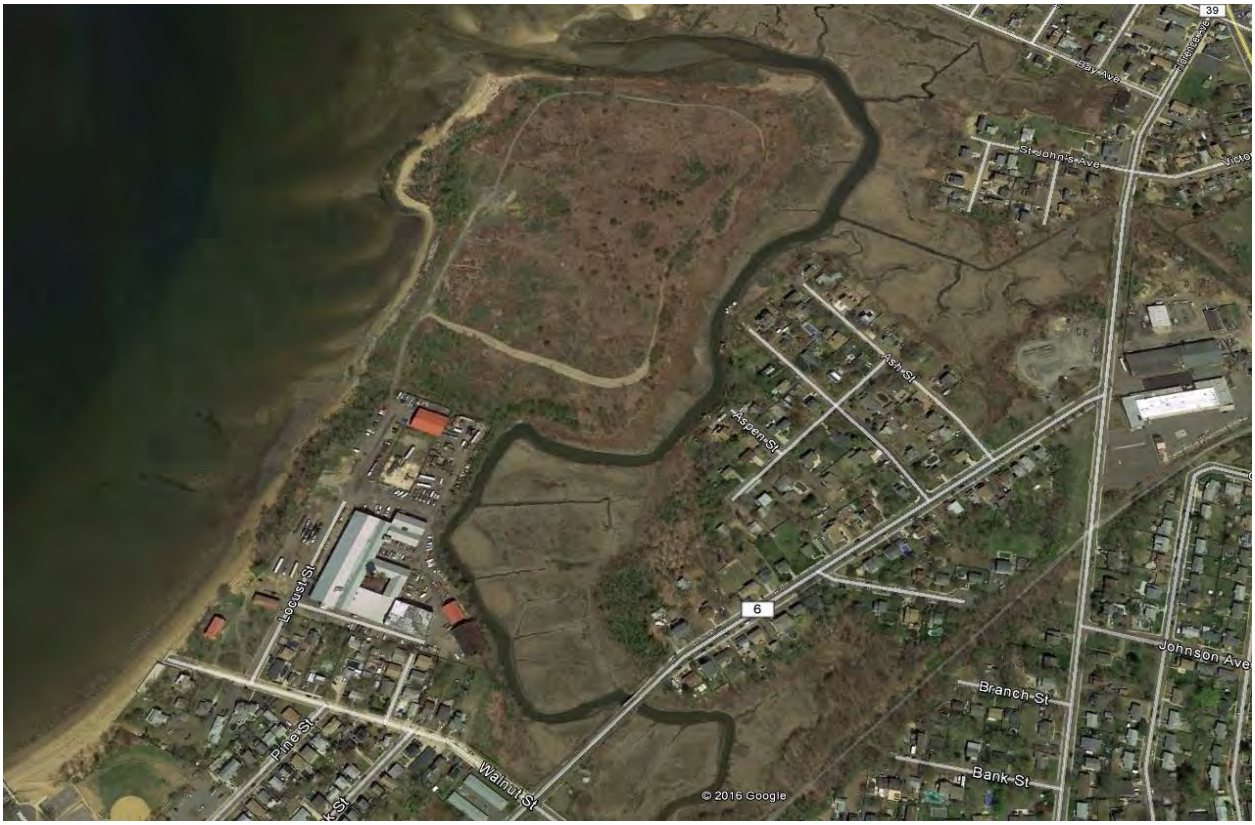


Figure 203: Existing map of Aeromarine site and surrounding area (Google Maps, 2016)

The Borough should continue to revisit different ideas for the site and provide incentives for redevelopment. In any case of redevelopment, a publicly-accessible road with sidewalks and/or a trail should be provided to and around the site, as well as providing some degree of open space for the public. Much of this will be worked out in a Developer's Agreement, but it is in the Borough's interest to have demands set that will protect the public interest. A few scenarios are provided below:

SCENARIO ONE

The simplest repurposing of the Aeromarine and landfill site may be to allow and help nature to reintegrate into the site. This may still require some cleanup and remediation, depending on the extent of the plan, but could more or less be turned into a nature refuge or preserve. Improved trails could circumnavigate the perimeter of the site along the existing clearings, while new and improved sidewalk connections will provide access from the Walnut-Oak Neighborhood to the site.

In this scenario, the Aeromarine industrial complex may remain or be demolished, as the nature trails and refuge can mostly be confined to the former landfill area and along the Chingarora Creek. However, it would be most ideal for the entire area to cleared and revegetated, except for a permeable parking area. A small kiosk or visitor center, depending on the scale and intention for the nature trails, could be placed at the entrance. Rentals for kayaks or other small non-motorized watercraft could be rented from the visitor center for use in the Creek with a launch area from the parking area.

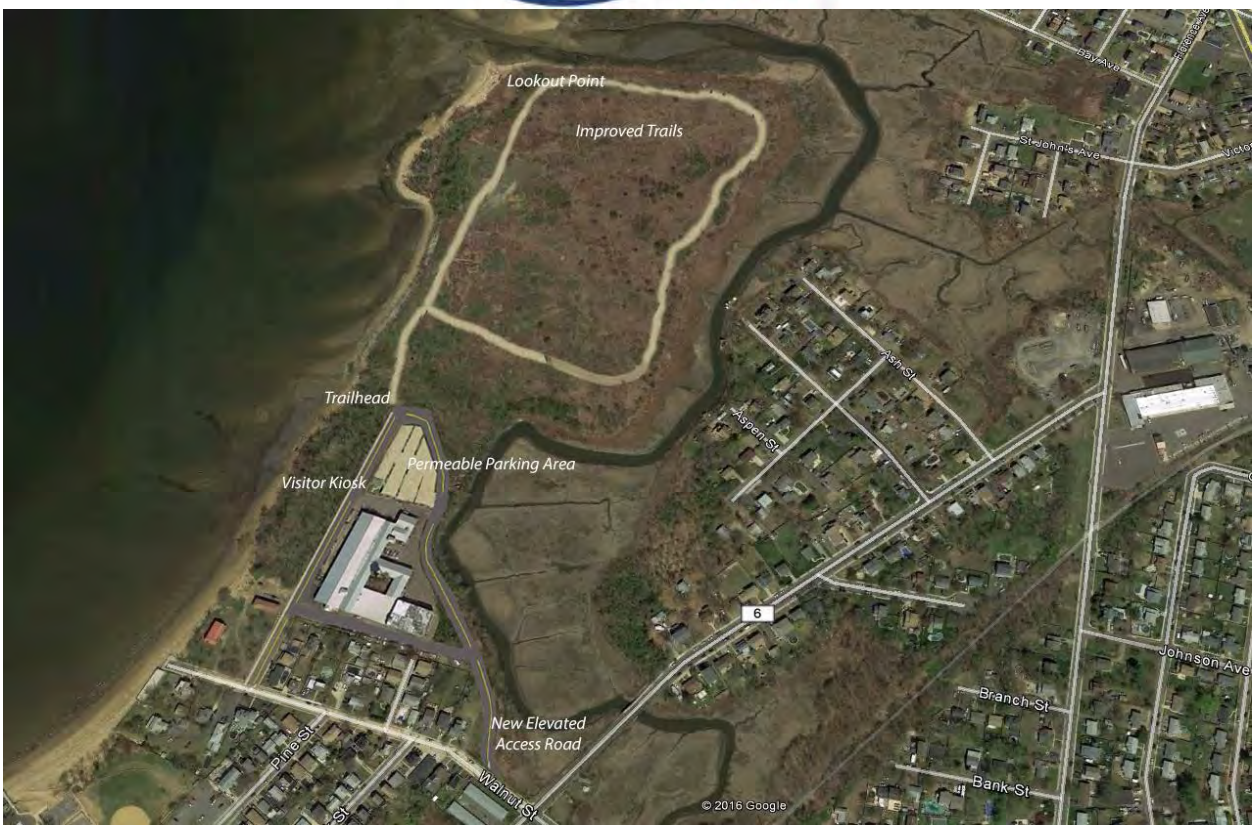


Figure 204: Scenario One with improved trails and visitor kiosk, kayak launch

SCENARIO TWO

Scenario Two envisions greater multiplicity of recreational uses of the site, which may or may not require the removal of the existing industrial complex, but would require continued remediation of the landfill. In addition to a "nature walk" around the perimeter of the site, larger sports fields, such as a soccer field, could be place on the site; whereas, there is very little to no open space available in the rest of the Borough for such a recreational use. A designated beach area is also a possibility, especially along the northern Bayfront where the beach is wider, or where accretion of sand is naturally occurring so that replenishment is not necessary. In addition to recreational fields, other outdoor venues could be created, either permanently or temporarily, such as a stage for music, theater, or movies.

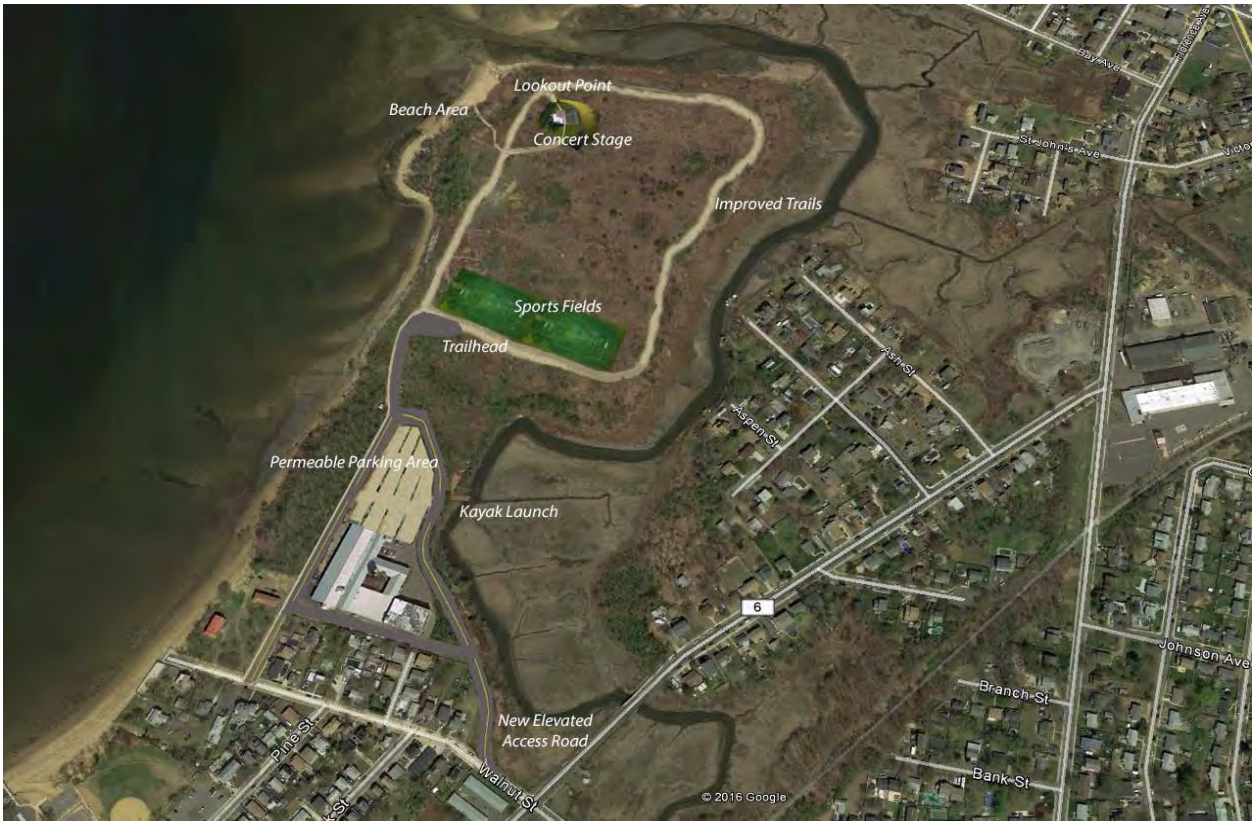


Figure 205: Scenario Two with larger recreational amenities

SCENARIO THREE

In Scenario Three, a less intensive recreational use could be a campground, either managed privately or by the County or State. A campground would allow individual camp sites for tents, RVs, and/or cabins. This would give people the opportunity to camp along the shore, which is a unique experience, as well as the many other recreational activities available, such as fishing, kayaking, canoeing, stand-up paddle boarding, and hiking, and would provide a rare panoramic vista of the Bayshore area. A campground would likely be run seasonally from spring through autumn. Remediation of the site would be necessary before installing any plumbing and electrical, and it is ideal if the industrial complex and development were removed.

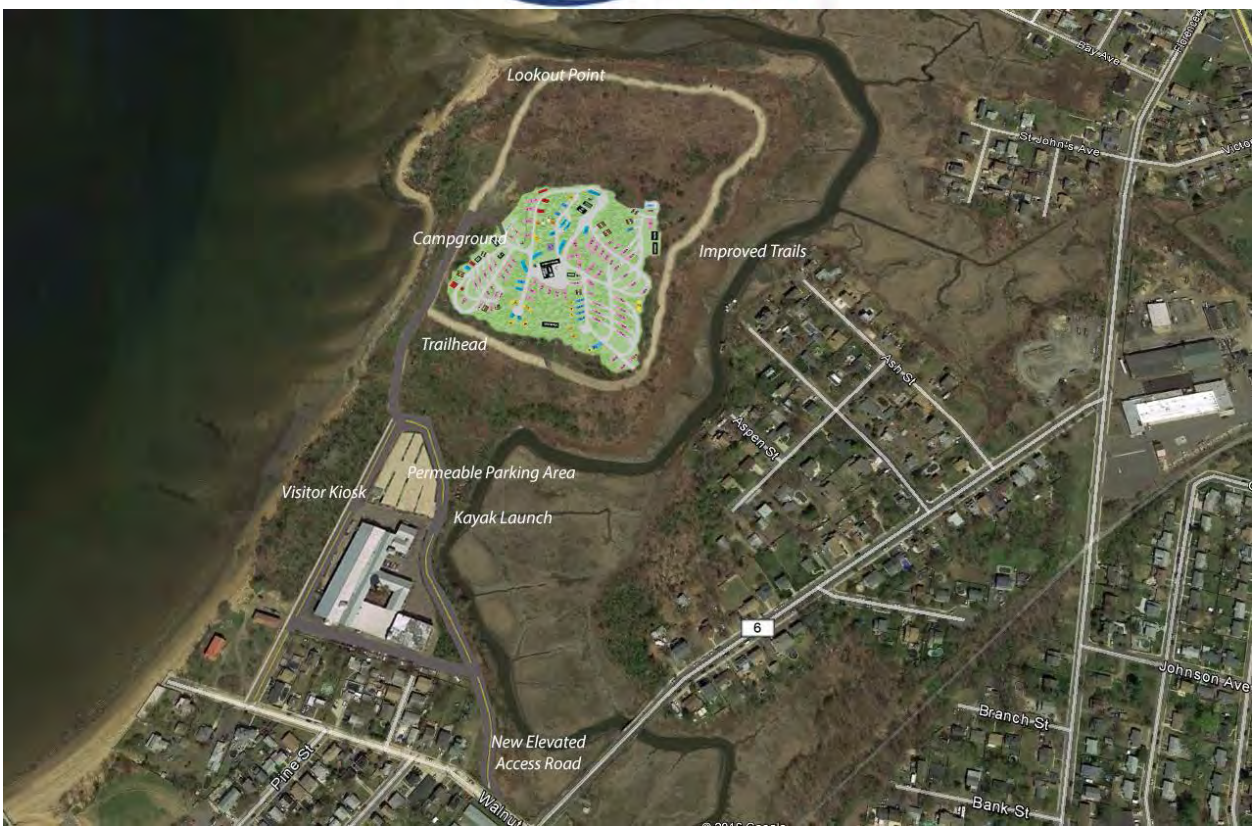


Figure 206: Scenario Three with a campground, trails, and kayak launch (*Image courtesy of Beaver Lake Campground, https://www.beaverlakecampground.net/*)

SCENARIO FOUR

Scenario Four retains the existing Aeromarine complex and industrial or commercial businesses and use floodproofing or dryproofing techniques to protect the integrity of the structures. The parking areas would be improved for public parking and the existing buildings could be retrofitted to permit more of a commercial center with niche or creative shops, markets, and light industries, such as woodworking.

Figure 207: Farmers market in historic Velvet Mill, Stonington, CT[126]

SCENARIO FIVE

Scenario Five may include the rebuilding of a commercial complex or elevating of the Aeromarine complex, as well as some multi-family residential above it. Light industrial could potentially be combined with residential above if the industries are not in use after a certain time of the evening, do not produce harmful or nuisance odors, gases, waste, or noise. Parking for residents could be provided below the elevated building or in an adjacent on-site permeable parking area.

[126] "Destination: The Winter Stonington Village Farmers' Market at The Velvet Mill." Connecticut Food & Farm Photographer. Feb. 7, 2014. Accessed Nov. 17, 2016. http://ctfoodandfarm.com/destination-the-winter-stonington-village-farmers-market-at-the-velvet-mill/

Figure 208: Scenario Five with elevated mixed-use development, trails, and public plaza (*Image courtesy: The News Journal, http://www.delawareonline.com/story/news/local/2016/03/02/mixed-use-development-underway-pike-creek/81107184/ and Starr Whitehouse, http://www.starrwhitehouse.com/progress/windward-school-residential-tower-plaza/*)

SCENARIO SIX

The original adopted uses of the Redevelopment Plan for townhouse-style apartments on the former, remediated landfill, as well as a restaurant and trails would be part of Scenario Six. A solar farm would be another use under this scenario, as it is a permitted use as per the 2010 overlay. This is the most intensive use of the site and would require elevated roads from the landfill site to Walnut Street.

NEIGHBORHOOD CHARACTER

DESIGN GUIDELINES

Providing greater resiliency against flooding, storm damage, and even demographic shifts in the future greatly depends on the development and design guidelines and planning practices that occur during the post-Sandy recovery process. In particular, the elevation of existing residential buildings as a result of recovery grant programs, as well as the elevation of new construction based on compliance with Flood Damage Prevention, will be significant factors. These are considered adaptation techniques to natural occurrences that are seen as inevitable. The following design guidelines are intended to integrate the potential for elevated buildings with existing non-elevated residences to soften the visual impact on the Neighborhood. Additionally, there are numerous opportunities to introduce new landscaping and street treatments in certain areas that permit more pervious surfaces and stormwater management.

BUILDING STYLES

The style of residences throughout Walnut-Oak is varied, as noted in the Neighborhood Character section of the Existing Conditions Analysis of this Plan. However, most of the buildings have a historic character, despite their architectural style. Most homes are located close to the street, have simple designs, a gabled roof, two- to two-and-a-half stories in height, a front porch, and are elevated a few feet above street level. As previously noted, this is also different on each street of the Neighborhood.

Using existing building styles, especially of historic homes that make up a large percentage of the Neighborhood, in addition to elements that will help to make the structures more resilient and contribute to the streetscape, will greatly enhance the character of the Neighborhood. Examples of residential design elements to use are shown below:

Figure 209: Brick steps and front sun room/entryway

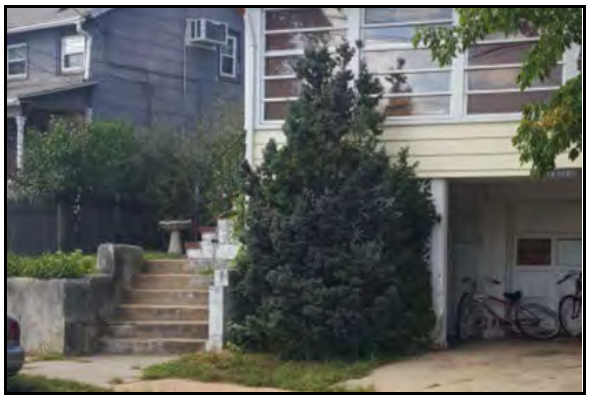


Figure 210: Wraparound, in-ground front steps; floor-to-ceiling windows provide unique design

Figure 211: Integrated color scheme; front steps; elegant pillars under roof; open front porch

Figure 212: Integrated color scheme; accent features around façade; gabled roof

Figure 213: Contrasting façade color and window shutters

Figure 214: Elevated structures, large wraparound porches

Figure 215: Large-paneled siding; understated, but unique garage entrance

Figure 216: Symmetrical design of building; unique window shapes

ELEVATED HOMES & BUILDING RETROFIT

A non-elevated structure in the flood zone is prone to flooding. Building retrofit measures include elevation of a structure or possibly dry flood-proofing of a structure. Elevation of a structure is usually limited to smaller residential and commercial buildings. Whether a structure may be elevated depends on a number of factors, including the land elevation, foundation type, wall type, size of structure, condition, etc. In Walnut-Oak, homes

within Block 138, along the Harbor, and near the Creek, or generally within a flood zone, are those that may require retrofit or elevation the soonest.

With limited storm sewers throughout the Neighborhood and some very low spots in elevation, excessive storm surge and floodwaters may be pushed into low-lying properties. Therefore, it is recommended that homes on the low sides of streets be elevated and allow water to flow as needed rather than into the structure. Bioswales along the streets should be able to absorb some excess water. Homes along the south side of Oak Street, in particular, should be elevated.

Figure 217: New, elevated home on 2nd Street w/ stone foundation, wood siding and historic character (August 18, 2016)

Figure 218: An existing, elevated townhouse structure on Second Street in Walnut-Oak (August 18, 2016)

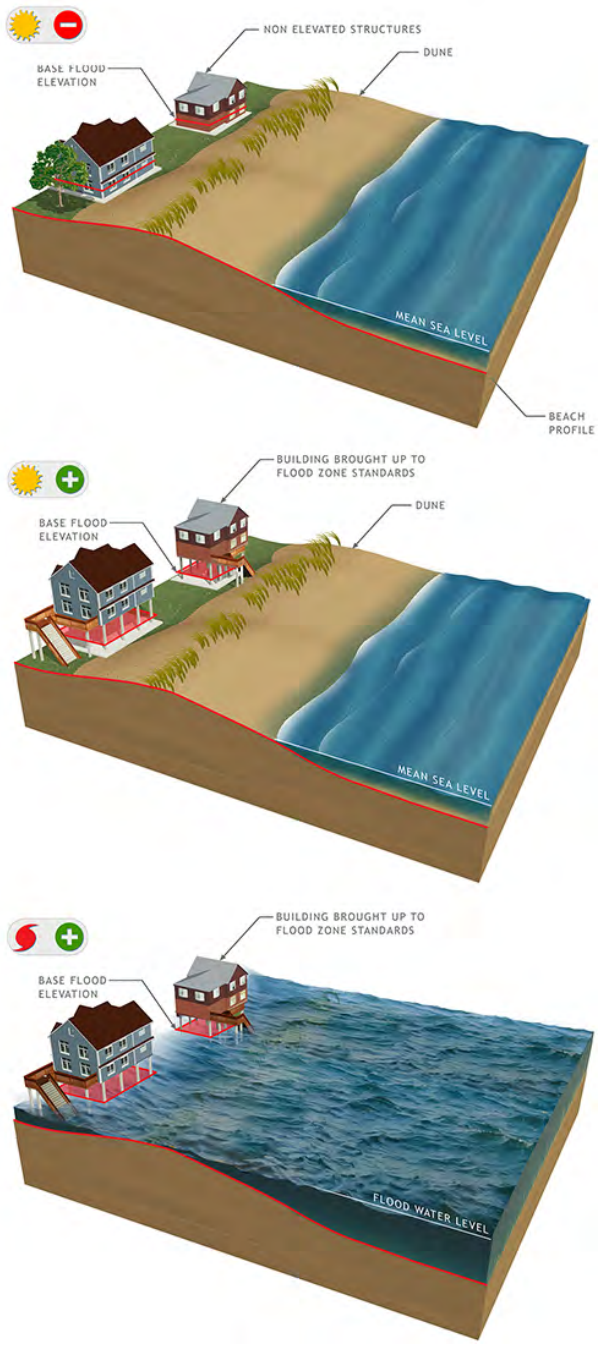


Figure 219: Illustration of impact of flooding on structures that are retrofitted/elevated (*Source: U.S. Army Corps of Engineers*)

The elevation of residential homes is usually accomplished by either the use pilings or by increasing the height of foundations and crawl spaces by adding courses of masonry block. To the extent that property owners determine to increase the elevation of the lowest habitable floor to the "Design Base Flood Elevation" in the Flood Damage Prevention Ordinance (usually the "Advisory" or "Preliminary" Base Flood Elevation plus freeboard), the height difference between the grade and the first floor can be considerable, causing a design challenge to access the elevated building. Few property owners have chosen to upgrade and raise their homes yet. For those that choose to do so in the future, property owners can learn from other towns where the

construction of new, elevated homes has outgrown the streetscape and the height can pose a hindrance and hazard for disabled and elderly persons, as well as emergency services attempting to access persons in the house. For most physically impaired persons, the design guidelines and height requirements limit access almost entirely. Elevators from the ground floor to the first elevated floor, in addition to stairs, are ideal, although restrictive for many due to the high cost. Ramps are also ideal, but sometimes impractical for most houses that are being lifted to the maximum height, due to the yard space that they require. Depending on the size of the lot and the density of the building pattern in the neighborhood, the solutions to the challenge of providing access varies from a straight run of stairs to a progression of porches or landings that allow for resting spots.

The desirability of requiring such design standards as concealing exposed piles with framing or skirting, avoiding straight run stairs without a landing every so many steps will need to be balanced with the eligible costs of elevating homes covered under the various disaster relief programs so that they do not become a financial burden on property owners. If such aesthetic improvements are not covered by insurance or relief funding, the Borough would need to seek other grant assistance to supplement the costs.

Figure 220: Images above portray examples of architectural design treatments to visually integrate elevated buildings to the ground plane

Historic buildings are also addressed by the National Flood Insurance Program (NFIP) to retrofit them to abide by the flood insurance standards, while also maintaining historic character. The elevation of an historic

structure does not have to impair the aesthetics of the structure or the district. Rather than unsightly pilings that are often used, the structure can be elevated onto pilings or foundation walls and the covered with an architectural façade that is pleasing and appropriate to the character, with consistent materials. The foundation or piling area can also be camouflaged with landscaping.

Figure 221: Example of elevated historic homes in Mandeville, Louisiana[127]

"The NFIP floodplain management requirements contain two provisions that are intended to provide relief for "historic structures" located in Special Flood Hazard Areas:

1) The definition of "substantial improvement" at 44 CFR 59.1 includes the following exclusion for historic structures, "Any alteration of a "historic structure", provided that the alteration will not preclude the structure's continued designation as an "historic structure". The same exemption also applies to "historic structures" that have been "substantially damaged". This provision exempts historic structures from the substantial improvement and substantial damage requirements of the NFIP.
2) The other provision of the NFIP floodplain management regulations that provides relief for "historic structures" is the variance criteria at 44 CFR 60.6(a). This provision states: "Variances may be issued for the repair or rehabilitation of historic structures upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure and the variance is the minimum necessary to preserve the historic character and design of the structure."

Under the variance criteria, communities can place conditions to make the building more flood resistant and minimize flood damages, but such conditions should not affect the historic character and design of the building. See the section on Minimizing the Impacts of Flooding on Historic Structures for ideas on conditions that could be established to make the building more flood resistant and to minimize flood damages."[128]

Sometimes elevating an historic structure to above the BFE may not fit with character of the community or surrounding buildings, or there may simply not be enough space. However there are other creative design solutions that can be used and property owners can undertake a variety of interior and exterior improvements to protect against hazards. Improvements may include:

- Placing HVAC ductwork at ceiling level and returns above the BFE.

[127] Floodplain Management Bulletin: Historic Structures, FEMA P-467-2. National Flood Insurance Program (NFIP). May 2008. http://www.nj.gov/dep/hpo/Index_HomePage_images_links/FEMA/FEMA%20historic_structures.pdf
[128] Ibid.

- Placing electrical, telephone, and computer outlets above the BFE, with no splices or connections below the BFE.
- Installing interior decorative wainscoating to the BFE, consisting of water-resistant material and able to be removed to dry after a flood event.
- Designing interior structural elements so that a continuous load path is created to minimize weak links in the building's structural system.
- Replacing a building's [deteriorated] original foundation of unreinforced masonry brick with a new foundation consisting of concrete footings with steel ties. This new system allows new timbers members to be bolted to the foundation, protecting against the twisting movements and other movements caused by seismic and wind forces.
- Filling in basements or wet floodproofing basements.
- Creating positive drainage, where the grade allows water to drain away from the building.
- Using flood damage-resistant materials.
- Installing small floodwalls to protect openings such as window wells.[129]

GREEN ROOFS

Green roofs are another way to remove stormwater that would otherwise be on the streets and become runoff into nearby waterbodies. Green roofs use several layers of substrate that slowly percolate through various layers, but must be able to properly drain from the roofs. Green roofs may be incredibly heavy, especially with soil, vegetation, reinforcement, and the added rainwater and, therefore, must be held on a very structurally sound roof and able to get rid of any excess weight.

Many of the homes in the Walnut-Oak Neighborhood may not be able to use green roofs due to their age, structure, and sloping roofs, unless there are areas of flat roof that can be retrofitted and strengthened. Green roofs may be used on new construction, such as a redevelopment project, or on a reinforced roof of the Aeromarine industrial complex, or even on bus shelters, as shown below. Although the impact that a bus shelter may have would be minute, it is an additional step towards cleaner streets and waterways, like a rain garden, but also provides an example to residents that is eye-catching. On a larger scale, green roofs can save thousands of gallons of water a year by collecting it and using it as graywater to clean or water lawns, etc. They also provide insulation, create a habitat for wildlife, help to lower air temperatures by mitigating the urban heat island effect,, may provide a pleasing landscape and additional open space for people, and potentially arable land, if made accessible.

[129] Design Considerations in Floodproofing. Section 2.1.3. P-936_sec2_508. FEMA. https://www.fema.gov/media-library-data/643d07bceee8ade17eef8e11cf7a2abb/P-936_sec2_508.pdf

Figure 222: Green Roof Bus Shelter[130]

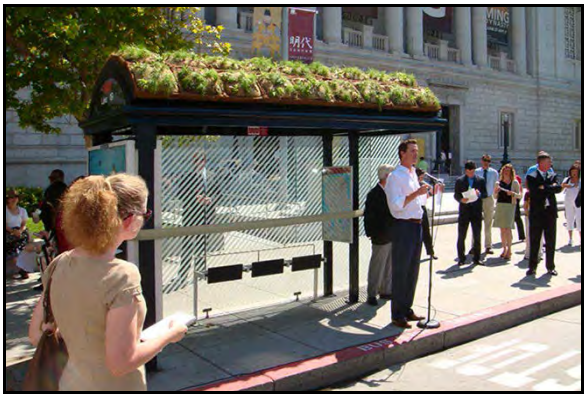


Figure 223: Green Roof Bus Shelter[131]

Figure 224: Green rooftop with garden[132]

[130] "Green Roof Bus Shelter". Philadelphia Water. 2016. http://www.phillywatersheds.org/green-roof-bus-shelter

[131] 450 Architects. San Francisco, California, 2008. Accessed November 11, 2016. http://450architects.com/advocacy/green_roof_bus_shelter#/images/advocacy/02/1-green-roof-bus-shelter.jpg

Figure 225: Illustrative cross-section with typical layers of green roofs[133]

LANDSCAPING

Fencing around the front yards of properties should be discouraged, but where it is used, should be of cast iron, wood, or hedges, rather than chainlink, in keeping with the historic character of the Neighborhood.

Figure 226: Iron cast fencing is more characteristic of the Neighborhood (Google Streetview)

Another approach to softening the visual impact of newly elevated buildings is to mask the exposed areas around the piles with landscaping. However, the present conditions caused by the elevation of housing and smaller setbacks will require that the installed landscaping not only be able to survive within the northern, coastal environment, but may need to be compact and columnar in nature when used with narrow lot configurations. This may restrict the plant palette that can be used.

It is also recommended that local plant species and xeriscaping techniques (landscaping that reduces or eliminates the need for supplemental water) be used to reduce water and fertilizer needs. Plant beds should be tolerant to the wind, sea salt, water, and overall variable conditions of the Barnegat Bay and estuaries, while also being able to aid in absorption of additional rain or flood waters.

The following are some selections that may work well, but any planting directly in line of prevailing winds will struggle.

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[132] Gromicko, Nick. "Green Roof Inspection." International Association of Certified Home Inspectors. https://www.nachi.org/green-roof-inspection.htm

[133] Ibid.

Table 11: Plant Species for Waterfront Neighborhoods

Plant Type	Species
Small Trees	Red Maple (Acer Rubrum)
	Allegheny service-berry (Amelanchier laevis)
	Pawpaw (Asimina triloba)
	Black Cherry (Prunus serotina)
	American mountain ash (Sorbus americana)
Large Shrubs	Indigo bush (Amorpha fruticosa)
	Coastal sweet pepperbush (Clethra alnifolia)
	Bigleaf Hydrangea (Hydrangea macrophylla)
	Northern bayberry (Morella pensylvanica)
	Beach Plum (Prunus maritima)
Evergreens (for screening)	Atlantic White Cedar (Chamaecyparis thyoides)
	American Holly (Ilex opaca)
	Eastern Red Cedar (Juniperus virginiana)
Perennials (for decorative filler planting)	Yarrow (Achillea)
	Coreopsis
	Daylily (Hemerocallis)
	Lavender (Lavandula)
	Foxglove (Digitalis)
	Summer Phlox (Phlox paniculata)
	Stonecrop (Sedum spurium)
Ornamental Grasses (for filler and accent)	Fescue Grass (Festuca)
	Pannicum (Switch Grass)
	Pennisetum (Fountain Grass)

The Borough should use in its public spaces and encourage residents in the Neighborhood to use a landscaping technique called xeriscaping. Xeriscaping is defined as "quality landscaping that conserves water and protects the environment."[134] This generally means that only plants which are drought-tolerant (require little to no watering) will be used, as well as other non-living materials, such as stone or mulch. Xeriscaping takes into account the regional and microclimatic conditions of the site, as well as topography, existing vegetation, and zoning of plant materials. There are also seven principles associated with Xeriscape landscapes, which are:

1. Planning and Design
2. Soil Improvement
3. Appropriate Plant Selection
4. Practical Turf Areas
5. Efficient Irrigation
6. Use of Mulches
7. Appropriate Maintenance[135]

[134] http://xeriscape.sustainablesources.com/#DEFINITION
[135] Ibid.

Figure 227: Xeriscaping (*Source: www.cleanairlandscaping.ca*)[136]

In addition to conserving water, landscapes should also balance the need to absorb water so that floodwater may be removed from hard surfaces, such as streets and stored naturally in the ground, and preventing nonpoint source pollution runoff into the Chingarora Creek or into the Raritan Bay. More information about local rain gardens and how to install them may be found through the Rutgers University Water Resources Program in the "Rain Garden Manual of New Jersey[137]".

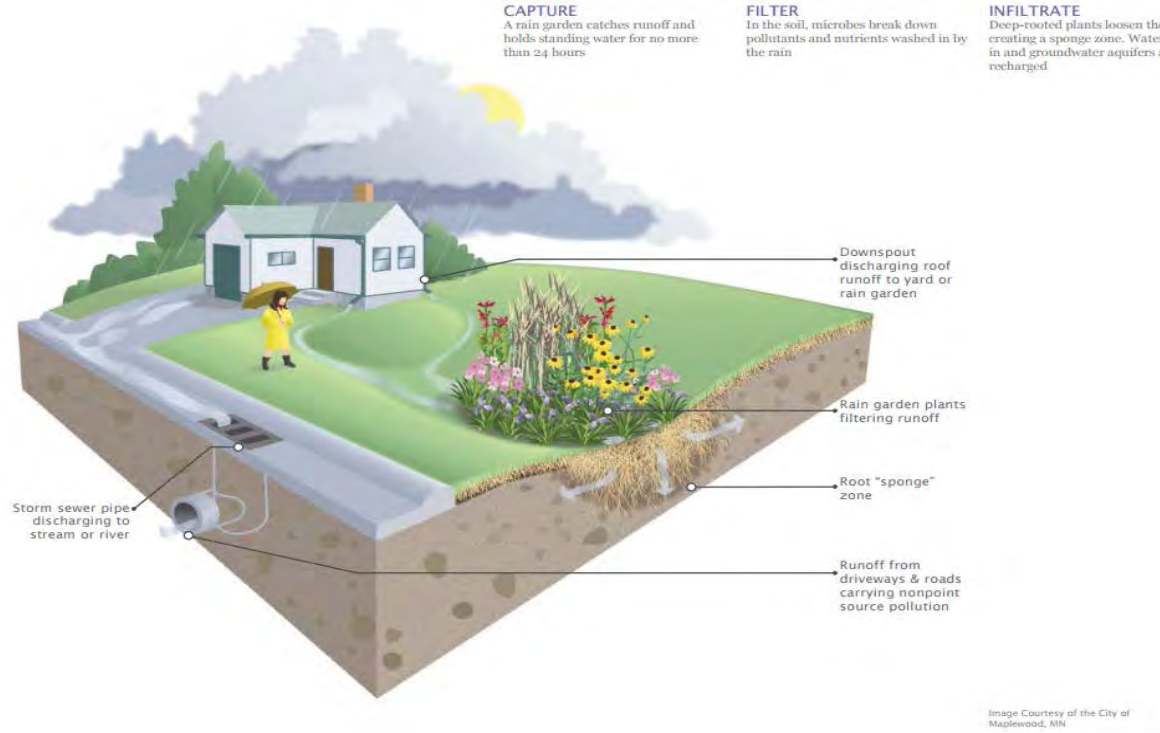


Figure 228: Diagram of how a rain garden functions versus runoff into storm sewers[138]

[136] New Jersey Water Savers. Rutgers University. Accessed November 16, 2016. http://njwatersavers.rutgers.edu/MunicipalGuideTurfManagement/ForMunicipalities_GuideTurfMgmt_7Difficult.html

[137] "Rain Garden Manual of New Jersey." Rutgers University. New Jersey Agricultural Experiment Station. Water Resources Program. http://www.water.rutgers.edu/Rain_Gardens/RGWebsite/RainGardenManualofNJ.html

[138] Ibid. Introduction. P.9. *Image courtesy of the City of Maplewood, MN.*

Plant species that are not only drought-tolerant and water-absorbent, but also native to the coastal Bayshore area of New Jersey should be utilized primarily in order to prevent invasive species and such that they are tolerant to the conditions of the climate. See Appendix VII for a list of New Jersey coastal plant species.

PUBLIC SPACES

All parks, open spaces, and conservation lands within the Walnut-Oak Neighborhood should be considered for their dual-role as wetlands to manage stormwater and to provide public amenities and recreation opportunities.

To the extent possible, pervious surfaces and vegetation or plant beds should be used to allow for the absorption of stormwater or floodwater. Due to its low-lying location between the Bay and the wetlands of the Chingarora Creek, without adequate elevation of buildings and roads, the Neighborhood is very prone to flooding. Asphalt and concrete should be avoided where pervious pavers, gravel, or grass could be used.

The Borough should work with property owners to act on opportunities to provide new open public spaces and areas for stormwater management within the Neighborhood, particularly targeting waterfront properties of the Chingarora Creek. If a group of properties have been abandoned or deeded to the Borough that have little to no historic value, such lots could be restored to a more natural state or active or passive recreation facilities could be installed for public use. If located along the waterfront, properties should include new wetlands, if feasible, or other ecological stabilization methods. Such facilities should permit and encourage use by Neighborhood residents. Where open space is not practical, other public services could be placed.

It is recommended that the Borough develop a comprehensive connectivity plan for sidewalks, crosswalks, and bicycle lanes in the Neighborhood, while strategizing how to best move people to various destinations, including public parks and opens spaces. A Connectivity Map should be posted on throughout the Borough and on the Borough's website, while being visually represented through wayfinding signage.

The plant materials recommended above can also be used in plantings within public spaces such as road medians, tree lawns (the space between the curb and sidewalk or between the sidewalk and a parking lot or front property line), passive park spaces, and similar spaces that are identified as often being overgrown with weeds and unsightly in appearance.

Bioswales are a good design option that can be used in public spaces, especially along streets. Bioswales function similarly to a rain garden, as described above, which absorb water from heavy rains and flooding, while also removing pollution and silt from surface runoff water, providing a buffer from the street, and enhancing the streetscape visually. Bioswales are built with gently sloping sides that are concave toward an area of drainage and gravel and the slopes are vegetated with flood-tolerant plants.

The use of the softer palette of plantings such as ornamental grasses and perennials, combined with the use of stone groundcover can help to enhance the coastal theme for these spaces throughout the Neighborhood and could be relatively easily maintained by a neighborhood association, Adopt-a-Street program, or by the Borough. Private properties could also be encouraged to use similar groundcover, rather than traditional grass lawns. The images that follow are representations of various designs using these plant materials.

Figure 229: Grasses and perennials used with gravel to provide color and definition to public spaces.

Figure 230: Example of a streetside bioswale (www.kwalliance.org)

STREETSCAPE

A streetscape is one of the most important aspects of a community, visually, and is often a major factor in attracting people to that area. A streetscape includes the relationship of buildings to one another and to the street, vistas, design of sidewalks, road widths, vegetation, accent features, amenities, the degree to which the uses from a defined area can spill out into the street, and the ability for people to interact with one another and to move between places. Streetscapes, broadly defined, should be attractive and inviting, maintaining a pedestrian-scale experience. Below are some of the ways in which streetscapes in Walnut-Oak may be improved or enhanced.

APPEARANCE OF ELEVATED STRUCTURES FROM STREET

Within the residential blocks, every effort should be made to provide designs for the newly elevated homes that will work within the context of the existing lot lines and setbacks to enhance the overall character of the neighborhood. A number of visual ideas are provided below to act as representative examples of what can be done. There have been some examples constructed within the neighborhood as part of the Sandy recovery which embody these ideas.

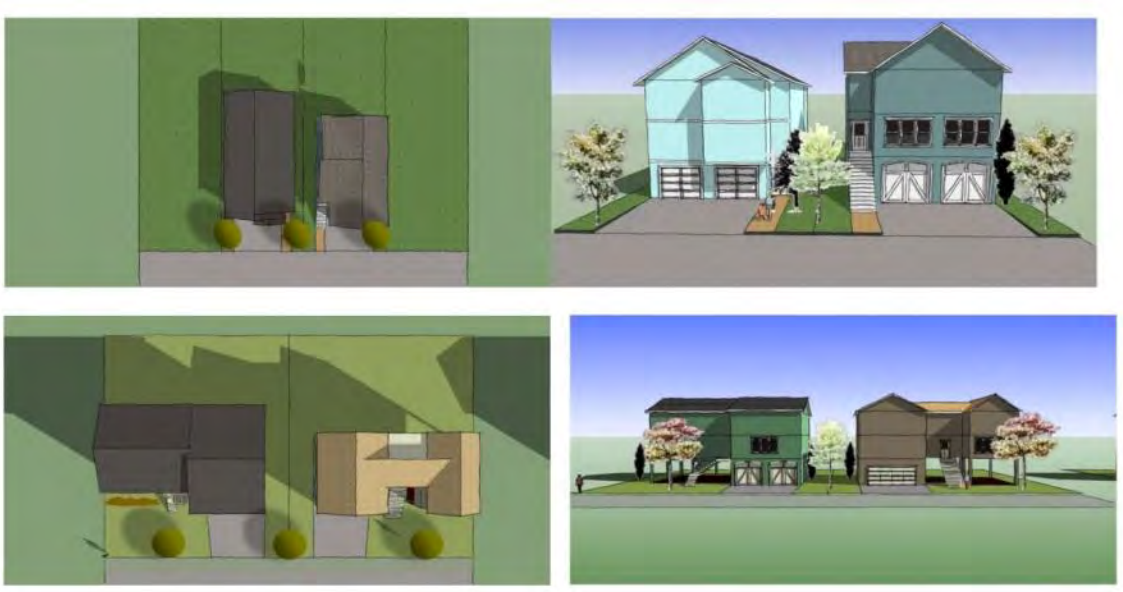


Figure 231: Upper set of illustrations shows potential streetscape treatment of narrow and deep lots using trees with vase shaped or columnar habit, while lower pair shows wider lots with street trees of spreading habit in larger spaces and narrower habit in more confined spaces between houses. Homes are shown as representative for the size of lots as elevated for flood resiliency.

Residents often worry that properties on small lots will look overcrowded and unappealing. Simultaneously, many small homes on small lots may be directly adjacent to new homes nearly double their size. The Borough should look at various models that work well in other municipalities and provide guidelines that are appropriate for each neighborhood or street, if necessary. Allowing for some variations in the designs for proper entrances and yard space, but maintaining some setbacks and some of the current bulk standards should prevent overcrowding while providing the necessary space to adapt to new regulations.

GREEN STREETS

"Green Street" is a term for a street that has limited pervious surfaces, uses native vegetation and substrate to absorb stormwater, recognizes various uses for the space, and that is aesthetically pleasing. It is recommended that the Borough pursue various ways to make the streets in the Walnut-Oak Neighborhood and the rest of the Borough "green", as space permits and as opportunities arise. See Public Spaces under Design Guidelines for additional recommendations for green streets.

Green Streets are designed to:

- Mimic local hydrology prior to development
- Provide multiple benefits along the street right of way including:
- Integrated system of stormwater management within the right of way
- Volume reductions in stormwater which reduce the volume of water discharged via pipe into receiving streams, rivers and larger bodies of water
- Key linking component in community efforts to develop local green infrastructure networks
- Aesthetic enhancement of the transit right of way
- Improves local air quality by providing interception of airborne particulates and shade for cooling
- Enhanced economic development along the transit corridor
- Improved pedestrian experience along the street right of way.

Numerous approaches are available for creating Green Streets including:

- Alternative Street Designs (Narrower Street Widths)
- Swales
- Bioretention Curb Extensions and Sidewalk Planters
- Permeable Pavement
- Sidewalk Trees and Tree Boxes[139]

In order to identify the most appropriate methods and where to utilize them, an analysis should be conducted to calculate the total impervious surfaces by type, including buildings, streets, right-of-ways parking, etc. This should be coordinated with a study of traffic patterns and the effect of new streetscapes and a drainage study to show how stormwater and runoff drains with existing infrastructure and proposed infrastructure. A green street might look very similar to the following image and "anatomy", although any improvements to reduce runoff and to the environment are beneficial.

[139] "Green Streets." Beachapedia. July 11, 2016. Accessed November 10, 2016. http://www.beachapedia.org/Green_Streets

Figure 232: Street Trees and Curb Bulb Outs with Bioretention (Source: Low Impact Development Center)[140]

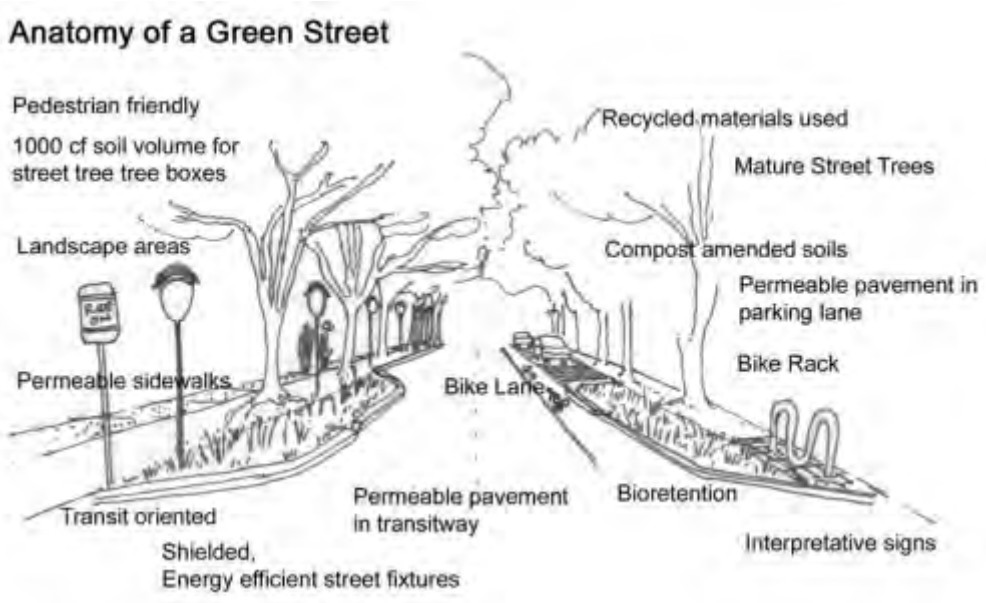


Figure 233: Green Street Concept (Source: Low Impact Development Center)[141]

As described in the 'Landscaping' and 'Public Spaces' sections, bioswales and rain gardens may be used to remove excess water from the streets that may otherwise flood adjacent properties or run into nearby waterbodies. Minor curb cuts, as shown in the illustration below, allow water flowing down a street to be diverted into the garden at the higher elevation. Generally, water will only need to enter the garden and can be absorbed without having to exit the garden; however, an additional curb cut may be placed at the lower

[140] Ibid.
[141] Ibid.

elevation to do so. Depending on the length of the street, there may be several bioswales in the right-of-way with curb cuts that can remove stormwater. This is a complimentary method to stormwater drainage systems, but is a good alternative where piping and drains do not exist on older streets and where water is regularly directed down a street. Streets that have a narrow right-of-way without existing vegetation, such as Oak Street, can be retrofitted with a bulb-out in the center that incorporates a bioswales, doubly serving as traffic calming on the one-way street.

Figure 234: Right-of-Way Bioswale[142]

Street trees are also an important element of green streets for a variety of reasons. Not only are trees attractive, but they also help to absorb carbon dioxide and emit oxygen, able to absorb a significant amount of water, and reduce the urban heat island effect of hot asphalt.

More trees should be planted in the right-of-ways along some of the larger streets and where the right-of-way is not large enough, might be expanded. Some streets might be able to be narrowed slightly to provide a few extra feet for sidewalks and vegetation, while slowing traffic slightly without impacting congestion. As a fairly quiet Neighborhood of residential streets, narrowing the roads to allow for more pedestrian space and trees will benefit the community without causing hardship. If trees cannot be planted in the right-of-way or maintained by the Borough or County, depending on ownership, property owners should be encouraged to plant local, but varying species of trees or other interesting vegetation in their front yards, if the microclimate allows their growth without excessive watering.

Specifically, trees should be added along Walnut Street to frame view of Harbor and provide definition to the street and shade. Street trees are also needed along the north end of First Street near Stone Road and Walnut Street to provide a frame and shade, where it is currently open to direct sunlight and uninviting. Pine Street and Second Street might also be wide enough to have street trees and can first be planted on municipal or County property.

[142] Zimmer, Lori. "2,000 Stormwater-Absorbing Sidewalk Gardens Planned for Queens, Brooklyn, and the Bronx." November 12, 2014. Accessed November 11, 2016. Image via NYC.gov. New York City Department of Environmental Protection. http://inhabitat.com/nyc/2000-stormwater-absorbing-sidewalk-gardens-planned-for-queens-brooklyn-and-the-bronx/

PARKING AND PARKING LOTS

In the same vein as green streets, parking and parking lots should also be addressed. On-street parking and lots devoted to parking should be minimized; however, where parking is necessary, such as parks, or where sufficient off-street parking is not available for residences, lots and on-street parking may be permitted. On-street parking on Spring Street, Snyder Lane, and Walnut Terrace could be removed, as they are exceptionally narrow and off-street parking is provided on individual lots. A permit could be issued for those that may not have sufficient existing off-street parking.

The Borough should also consider using permeable pavers for parking lots within the Neighborhood, such as the municipal parking lot at Cedar Street Park. This should also be encouraged for private development, particularly in flood zones. Within large parking areas, such as the municipal lot on Pine Street, or that might be provided in a redevelopment site, pedestrian crossings should be provided to allow people to safely navigate the lots to the adjacent sidewalks. Rain gardens should also be placed in medians or parking islands in the lot to absorb runoff before pollutants enter the water stream.

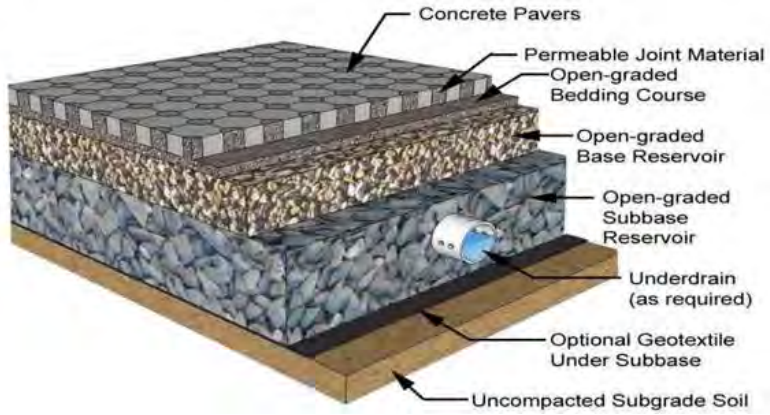


Figure 235: Typical Cross-section/detail of permeable pavement and drainage (*Source: Smith, 2009*)[143]

Figure 236: Example of water draining through permeable pavement[144]

[143] Virginia DEQ Stormwater Design Specification No.7. Permeable Pavement. Version 1.8. March 1, 2011. Accessed November 17, 2016. http://www.vwrrc.vt.edu/swc/NonPBMPSpecsMarch11/VASWMBMPSpec7PERMEABLEPAVEMENT.html

[144] Permeable Pavement System – Its Construction Details, Importance and Uses. The Constructor. http://theconstructor.org/transportation/permeable-pavement-system-construction/13246/

Figure 237: Illustration of "green" parking lot concept with micro-retention plantings and permeable paving (*Rendering: A. McGovern-Abbey Associates Landscape Architects)*[145]

Parking lots should be shared between uses, such as parks and businesses. When development occurs, it is suggested that parking be shared between single-family residential lots by allowing driveways across the lot line through a cross-access easement. Both property owners must be willing to provide access along the lot line in order to place the driveway at the edge of the property, otherwise property owners shall follow the existing requirements. Cross-access easements may the reduce the amount of curb cuts that put pedestrians at risk, although the size of the curb cut should also be limited to a width for two vehicles at most and prevent excessive curb cuts. Although most driveways throughout the Neighborhood have sidewalks that cross the driveway at a level elevation, there are some areas that have excessively large driveway areas that allow a vehicle to cross at any point.

Figure 238: Block 138, Lot 14 on Walnut Street with large driveway and curb cut (Google Streetview, October 2015)

LIGHTING

Lighting is important along both lightly and heavily travelled streets, in order to provide a sense of safety for pedestrians to see where they are going. Light fixtures should also be designed to fit the character of the

[145] Abbey, Buck, ASLA. "Green Parking II: Putting Parking Lots to Work." LandscapeOnline.com. http://landscapeonline.com/research/article.php/14730

Neighborhood, rather than lights that are intended for highways, such as COBRA, but are often used on residential streets.

Lights should also have a long-lasting lifespan and provide a sufficient amount of light to the sidewalks and streets without being too bright such that a glare is excessive for nearby residents. Solar-powered lights are ideal for a small neighborhood that receives enough sunlight to power them.

Figure 239: Roadway lighting on a boulevard that fits a theme[146]

BRANDING

Residents of the Walnut-Oak may identify strongly with their Neighborhood; however the identity for most outsiders focuses on the mostly defunct Aeromarine site and landfill. The good characteristics of the Neighborhood should be used in a way that can foster a greater sense of community, as well as to "brand" or distinguish it from other neighborhoods, both for residents and visitors.

Recognizing the history of the Walnut-Oak Neighborhood, the Borough should consider a specialized rebranding of the Neighborhood that will highlight its significance and distinct character. Giving the area a unique and memorable name that is relevant is the first step to rebranding. "Walnut-Oak" is descriptive of the streets in the Neighborhood, but might not be effective, unless it is well-known or if a certain imagery is associated with it. The name "Lockport" is unique and also repurposes the historic name of the Neighborhood, harkening back to its industrial past.

Branding can also include giving the Neighborhood a certain "theme" that can be used throughout various aspects of design. Sometimes this is an architectural style, such as Victorian, Colonial, Contemporary, etc. or related to a natural feature or landscape, such as a body of water, mountains, etc.

[146] Ibid. Image: Lagenwey, Peter.

Figure 240: Example of a recognizable symbol that could be used for branding (Aeromarine water tower)

SIGNAGE

In order to effectively portray a new image and make the Neighborhood name recognizable, the use of new signage around the Neighborhood is encouraged. A Neighborhood sign should also be unique to that area, while incorporating elements of the Borough signage or other designs, to make the relationship evident. A symbol that is relevant to the Neighborhood and recognizable should also be used whenever possible, to make the name and the image go together. Symbols are often used on signage.

Signage can be in the form of a gateway entrance sign, wayfinding, street signs, and banners and should be placed in visible areas, such as main streets, bridges, parks, and the waterfront. A design competition among residents or children of the area may be a fun way to engage citizens in the rebranding of their Neighborhood. However, signs should also appear professional and follow the Borough ordinances, as far as it is appropriate. The font that is used should also be eye-catching and consistent. Below are some examples of typical signage that the Neighborhood could use.

GATEWAY SIGNAGE

Gateway signage should demarcate the areas of the Neighborhood at each major entrance. In Walnut-Oak, these areas would include Stone Road from the Township of Hazlet, northbound; First Street from the Borough of Union Beach, westbound; First Street at Waverly Street eastbound; and Fulton Street at the Henry Hudson Trail, northbound. Gateway signage should be large enough to be visible to vehicles, but not over-sized and should generally be smaller or more understated than the entrance signs for the Borough.

Figure 241: Classic and understated design for historic area may also work as a neighborhood entrance sign[147]

Figure 242: Neighborhood welcome sign[148]

Figure 243: A pedestrian-scale neighborhood sign that uses a more creative design[149]

[147] http://www.historickenwood.org/neighborhood-arts
[148] http://edgemontassociation.typepad.com/news/thank-yous/

Figure 244: Example of a "Lockport" Neighborhood branded gateway sign

WAYFINDING SIGNAGE

Wayfinding signage includes directional signs and street signs that help people identify their location and how to get to various destinations. Coordinated street signs throughout the Neighborhood, using a distinct symbol or style, such as that shown below, helps to show people that they are still in the Neighborhood, as well as the street or area.

Figure 245: Example of neighborhood-stylized street signs[150]

A system of pedestrian-scale wayfinding signage should be coordinated with the gateway signage referenced above to foster cohesiveness of the community, as well as to help residents, visitors, and customers find the existing and future services. Signs may be placed at key locations to show directions to existing services or destinations using arrows. Examples are provided below. The following points of interest should be linked by wayfinding signage:

[149] City of Bloomington, Indiana. "Past Neighborhood Improvement Grant Projects." https://bloomington.in.gov/documents/viewDocument.php?document_id=3227
[150] Ibid.

- Parks
- Beaches
- Business Districts
- Marinas
- Trail Heads
- Other Neighborhoods

Figure 246: (Left) Wayfinding signage used in downtown Toms River to direct motorists to primary destinations. (Right) Nantucket, MA (June 2015) shows a system of wayfinding using plaques purchased by businesses mounted into slots on a standard that matches the antique style of the pedestrian lighting on Main Street and points in the direction of the business

INFORMATIONAL AND LANDMARK SIGNAGE

Informational signage provides a description or context to something that may be of interest to the public. These signs may include maps and photos, in addition to descriptive text. Informational signs are often placed at a landmark or historical site, where there may also be a landmark sign, but are also used at various places to provide a history of an entire neighborhood, information on natural landscapes or seascapes, and to point out a variety of landmarks that one may see from a given vantage point.

In addition to standalone signs, a kiosk, bulletin board, or other type of post may be a valuable way for community members to display posters or public notice. This is also a valuable feature to relay information and foster public engagement.

Figure 247: Example of informational signage about industry in the neighborhood[151]

Figure 248: Example of a freestanding, covered public bulletin board to display public information[152]

Landmark signage includes signs that identify a landmark, important site, or landscape at that specific location. Areas that might use landmark signage include parks or historic sites and buildings, such as Aeromarine or "Century Homes" identified by the Keyport Historical Society (KHS). Landmark signs may also be informational, in that they identify a specific landmark, but then also provide the background information on the same sign, such as in the examples shown below. "Century Homes" in the Borough of Keyport, which have been identified by the KHS, have plaques on the buildings to show that it is 100 years old or more. The Borough and KHS should continue in a partnership with property owners to ensure that all historic properties are identified and marked as appropriate, and as willed by the property owner. Increased identification of historic properties may allow for additional types of grant funding and protection from the State of New Jersey or federal government. Signage or plaques make the historic significance relevant to the public.

[151] Ibid.
[152] Ibid.

Figure 249: Example of a landmark sign identifying an important landscape in a neighborhood[153]

Figure 250: Example of a landmark sign that also provides background information[154]

Figure 251: Keyport Century Home plaque located by front door displays the year the structure was built (August 18, 2016)

MOBILITY AND CONNECTIVITY

This subsection is broken down by type and mode of mobility and connectivity, which include streets, and mobility for pedestrians, cyclists, and public transportation.

[153] Ibid.
[154] Ibid.

STREETS

Streets, or roadways, are the veins of the Neighborhood that allow people to pass, whether by walking, biking, or driving, from one place to another. In this section, "streets" and "roads" will refer to the cartway, or where vehicles drive. This is also specifically referring to private vehicles; whereas, the section on Public Transportation below focuses on the role of buses on the roads. This section deals with the safety and speed control of motorists, but also the connectivity of streets, parking areas for vehicles, materials, and elevation and evacuation routes as they relate to access during flood events.

Although private vehicles will continue to be the primary user of streets in this Neighborhood, the Borough should plan everything relating to vehicles around the advancement of pedestrian and bicyclist safety and accessibility more so than vehicles, as they are the most vulnerable users. Therefore, motorists and other users of the roadways should not only be aware of and obey traffic laws, but the design of the streets in the Neighborhood should be such that it facilitates and encourages proper and safe use. The speed limit should be posted on all thru-streets and slowed down at intersections.

It is recommended that if there is to be a new or revised redevelopment plan for the Aeromarine site, or in cooperation with the existing ownership, that a new publicly-accessible neighborhood road be placed along the existing paper street adjacent to the industrial building between Locust Street and Walnut Terrace. This will allow better circulation for these two streets that are currently dead-ends. Walnut Terrace could thence be converted into a one-way street, preferably running north, to avoid congestion on the exceptionally narrow street; whereas, it currently functions as a two-way street sans outlet or cul-de-sac.

Additionally, in order to allow smooth flow of traffic and prevent congestion in neighborhood streets, a traffic study should be conducted to confirm whether a new access point is needed into the site, given a an increase of intensity of use. If such a road is necessary, it should be placed through the property off of Walnut Street near the intersection with First Street and cut behind the existing homes to meet with the paper street described above, and follow the bend of the Chingarora Creek until it can wrap around a parking area and meet an extended Locust Street. The road around the Creek should be raised above the creek bed, forming a levee to protect the homes behind it from flooding during storms and heavy rainfall. The road will need to direct runoff into nearby bioswales so that it doesn't go into nearby lots. As much as possible, the bank of the Creek should remain vegetated enough to be able to absorb overflow of the Chingarora Creek or runoff from the road.

Figure 252: Existing map of Aeromarine site (top); rendering of access road from Walnut Street and parking on Aeromarine site (*Aerial image from Google Maps; Rendering by Maser Consulting, P.A.*)

ELEVATED ROADS

The Borough of Keyport will need to work with the Monmouth County Department of Transportation, as well as the Borough of Union Beach and the Township of Hazlet to elevate the main roads in the Walnut-Oak Neighborhood. First Street and Stone Road are both County Roads, which cross into the adjacent municipalities.

First Street from the Borough of Union Beach municipal boundary to Stone Road and Stone Road from the Borough of Union Beach/Township of Hazlet municipal boundaries to First Street must be elevated to allow passage of vehicles during flood events. The elevation of roads and bridges over the Chingarora Creek will also allow sediment and water to flow more freely downstream and storm surge to move up the Creek and wetlands, minimizing overflow into the Neighborhood and surrounding communities.

Some of the floodwater from the elevated streets could be directed into and absorbed in the triangle between Walnut Street, First Street, and Stone Road through a largescale bioswales, in order to prevent flooding of adjacent properties and runoff into the Creek.

PEDESTRIAN

Although there is a fairly comprehensive network of sidewalks throughout the Walnut-Oak Neighborhood and into the downtown area of Keyport, the Borough could make several improvements to a few key areas in and around the Neighborhood. As a walkable and dense Neighborhood near to many types of amenities, including those that children may use and access by foot or bicycle, the Neighborhood should continue to be designed with the accessibility of children, elderly, and handicapped, in particular.

Figure 253: Example of accessible sidewalks and ramps at intersection[155]

[155] "Sidewalks". Safe Routes to School. Image: Burden, Dan. http://guide.saferoutesinfo.org/engineering/sidewalks.cfm

Figure 254: Two-foot deep tactile strip on curb ramp with contrasting color[156]

Within Walnut-Oak, the network of sidewalks could be expanded along First Street, Second Street, and Stone Road, in particular. Crosswalks should be implemented in strategic areas, such as intersections along First Street, Fulton Street, Stone Road, and Walnut Street. Sidewalk and crosswalk styles should be standardized throughout the Neighborhood and align with the rest of the Borough, although they could have a specialized design. All sidewalks and crosswalks should be designed to meet ADA accessibility standards and regularly maintained. Concrete, as well as other materials such as stamped concrete, brick, or inlaid stone, may also be acceptable, but may require more maintenance.

Figure 255: Different sidewalk materials: concrete (left) and brick (right)[157]

[156] Ibid. Image: Lagenwey, Peter.
[157] Ibid.

Figure 256: Limestone sidewalk and other styles give the streetscape a unique style[158]

"Bulb-outs" are a method of slowing down traffic at intersections, while allowing safe crossing for pedestrians by shortening the amount of time spent in the street in the way of vehicular traffic.

Figure 257: Example of the use of bulb-outs at intersections[159]

Pedestrian recommendations including the Aeromarine and landfill site, as shown on the map below, would only be implemented with cooperation by the current owners and/or through a redevelopment plan for the property. A pre-existing 2005 Redevelopment Plan for Aeromarine included walking trails on the site. It is recommended that any future redevelopment plan consider including trails around the waterfront and perimeter of the site that are accessible to the public. Any other waterfront properties that might be acquired by the Borough or County through Blue Acres or Green Acres, by a willing seller, should be considered for their potential to complete thru-access or trails for pedestrians in the future. This is especially relevant to connect between waterfront parks that provide open space and recreational opportunities for the public. If a new street with sidewalks cannot be connected between Walnut Street and the Aeromarine site along the

[158] City of Bloomington, Indiana. "Past Neighborhood Improvement Grant Projects." https://bloomington.in.gov/documents/viewDocument.php?document_id=3227

[159] The San Jose/Guerrero Neighborhood. http://www.sanjoseguerrero.com/Planning/DraftPlan/Bulbouts.php

Chingarora Creek, a trail might be a good way to increase access to open space that does not add impervious surfaces, as shown on the map below.

Figure 258: Planted buffer between sidewalk and street[160]

Some areas of First Street and Walnut Street have buffers between the sidewalk and street. According to Safe Routes to School (SRTS), "the space between the sidewalk and closest lane of moving vehicles is the sidewalk buffer. In general there are four types of sidewalk buffers including;

- Planting strip of grass and trees: This is the preferred buffer as it provides a more pleasant, shaded environment to walk.
- Bicycle lane: If a planting strip is not possible, a bicycle lane can provide an acceptable buffer between pedestrians and motor vehicles.
- Parked cars: Parked cars can provide a buffer between pedestrians and motor vehicles, but can also create a visual screen for pedestrians as they cross at midblock.
- Street furniture including benches, newspaper boxes, street lighting and public art."[161]

Some type of buffer should be provided along streets, especially more highly traveled streets or those with parks, open space, or other amenities. A buffer provides a sense of and actual safety for pedestrians, while also removing them from the "splash zone" where water from the street splashed from moving vehicles. Planted buffers also provide an opportunity to absorb stormwater and runoff, which is discussed more under Green Infrastructure in this section, and street trees can be planted here to provide shade; whereas, asphalt and pavement add to the urban heat island effect.

Where a buffer does not or cannot exist, a wider sidewalk should be provided. Guidelines for sidewalk buffers are available in the FWHA's "Designing Sidewalks and Trails for Access" Section 4.1.2. and AASHTO's Guide for Planning, Design, and Operation of Pedestrian Facilities (Section 3.2.4.).

[160] "Sidewalks". Safe Routes to School. Image: Lagenwey, Peter. http://guide.saferoutesinfo.org/engineering/sidewalks.cfm
[161] "Sidewalks". Safe Routes to School. http://guide.saferoutesinfo.org/engineering/sidewalks.cfm

Map 69: Recommended Pedestrian Facilities (sidewalks, crosswalks, and trails) in Walnut-Oak

BICYCLE

Bicycle infrastructure may be less of a concern in the Walnut-Oak Neighborhood due to the adjacency of the Henry Hudson Trail, which allows leisure cyclists to move regionally. However, all modes of transportation should be considered for their connectivity and safety. There may be some cyclists for whom it is necessary to use the roadway, whether for leisure or commute.

As of now, there is no designated parking area for the Henry Hudson Trail in the Neighborhood. This may be a consideration; however, for most visitors from Walnut-Oak, it would be acceptable to walk or bike to the trail. Therefore, the distance between them, albeit short, should be protected or considered for their safety. Commuters may be more likely to travel down more congested roads with higher speed limits, such as Stone Road or First Street. For those two streets, the Borough should consider working with Monmouth County Department of Transportation to place 'sharrows' in the roadway.

Figure 259: Bicycle 'sharrow' to symbolize a shared street with bicycles and vehicles[162]

The sharrow is a roadway symbol that shows a bicycle and chevron above it and is intended to signal to motorists and cyclists that the road is shared. They will typically be used in more congested areas, narrower roadways where there is less space to divide the uses, such as the use of a bike lane, and where safety is a concern, as well as where bicyclists are moving closer to the speed of vehicles.

PUBLIC TRANSPORTATION

A bus shelter should be provided at the existing bus stops for New Jersey Transit and any future stops. New Jersey Transit recently invested $1.627 million in bus shelters throughout the State in 2015 for two years[163]; however, none exist within the Walnut-Oak Neighborhood. A shelter should be used in order to protect transit users from the elements and provide them with seating and bus times, as well as provide visibility to the bus stop, and to encourage people to use public transit that already exists. NJ Transit will install bus shelters in locations based on requests from municipalities and from bus riders. According to Jennifer Nelson, a

[162] Geeky Swedes. "Bike 'sharrows' added to Fremont Ave.' Fremont Universe. November 10, 2008. http://www.fremontuniverse.com/2008/11/10/bike-sharrows-added-to-fremont-ave/

[163] Higgs, Larry. NJ Advance Media for NJ.com. July 5, 2015. Accessed November 11, 2016. http://www.nj.com/traffic/index.ssf/2015/07/need_a_bus_shelter_nj_transit_has_175_new_ones_com.html

spokeswoman at NJ Transit, "There are two conditions – that a site is big enough to accommodate a shelter and that the municipality agrees to maintain the shelter."[164]

Figure 260: Typical NJ Transit Bus Shelter (Union City, NJ, July 2015)[165]

The Borough should consider space for a bus shelter in the design of First Street. The bus shelter can be simple, such as the one provided by NJ Transit, but the Borough may be able to work with the agency to design a shelter for residents that is not only practical and functional, but visually stimulating. The concept of green roofs for stormwater mitigation and absorption, as well as being aesthetically pleasing, can also be designed for bus shelters. See "Green Roofs" in the Recommendations of this Neighborhood Plan for more information.

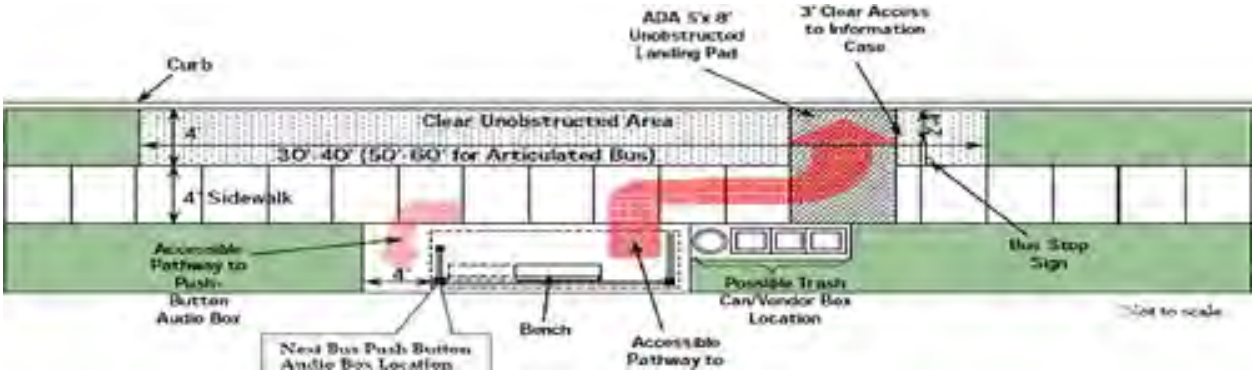


Figure 261: Example of a Bus Stop Plan with unobstructed area for bus loading[166]

Bus shelters should be placed on either side of the road where there are bus stops in that direction; in this case, at the corner of First Street at Fulton Street and First Street at Cedar Street. These bus stops could potentially be used for school bus stops, as well, if agreed upon with the school system. An unobstructed area of at least thirty (30') to forty (40') in length and four (4') in width, with consultation by NJ Transit, should be designated for buses to stop and load/unload passengers, with appropriate ADA landing pad and pathway.

Although First Street is somewhat narrow, a separate bus loading/unloading area will keep traffic moving and create a safer place for loading. There is approximately thirty (30') feet of cartway on First Street. With four (4') to five (5') feet designated for the bus one side, there would still be approximately twelve (12') feet per

[164] Ibid.
[165] Ibid.
[166] Alpert, David. "New bus stop design taking shape." Greater Greater Washington. November 18, 2009. Accessed November 11, 2016. http://greatergreaterwashington.org/post/4101/new-bus-stop-design-taking-shape/

lane. On-street parking would not be permitted in the bus loading area; however, site visits confirm that there is plenty of on- and off-street parking available. The bus stop would need to avoid driveways.

FUTURE STORM AND DISASTER PREPAREDNESS

There has been a theme among many coastal communities severely impacted by Hurricane Sandy of there being a lack of proper communication channels throughout all stages of Sandy's destruction – before, during, and in the wake of the storm. In addition to a well-designed built environment that can mitigate the effects of storms and provide physical connections for people, powered and effective communication services are critical to disaster preparedness and relief. Many times, a lack of or poor communication can lead to even more serious and costly consequences than the storm itself.

In addition to measures found in the County Hazard Mitigation Plan, we recommend that the Borough continue to take measures to inform all residents of potential storms and disasters that may affect them, as well to inform them of what steps to take beforehand, and what to do during emergencies. This will require some, if not all, of the following steps, if not done already:

1. Maintain a database of resident and property owner contact information for reverse emergency warnings. Provide a means for all, including visitors to the extent possible, to give their contact information voluntarily in order to stay informed.
2. Coordinate with all neighborhood associations, as well as fire, police, and ambulatory services, to establish and inform residents of the best safety practices, evacuation routes, and emergency care and lodging centers.
3. Obtain funding for backup generators and improvements for all communication outlets in case of disaster to prevent power failures.
4. Ensure that neighborhoods are not cut off and that there are central emergency locations that are well-stocked with supplies for all residents, preferably within less than a half-mile.

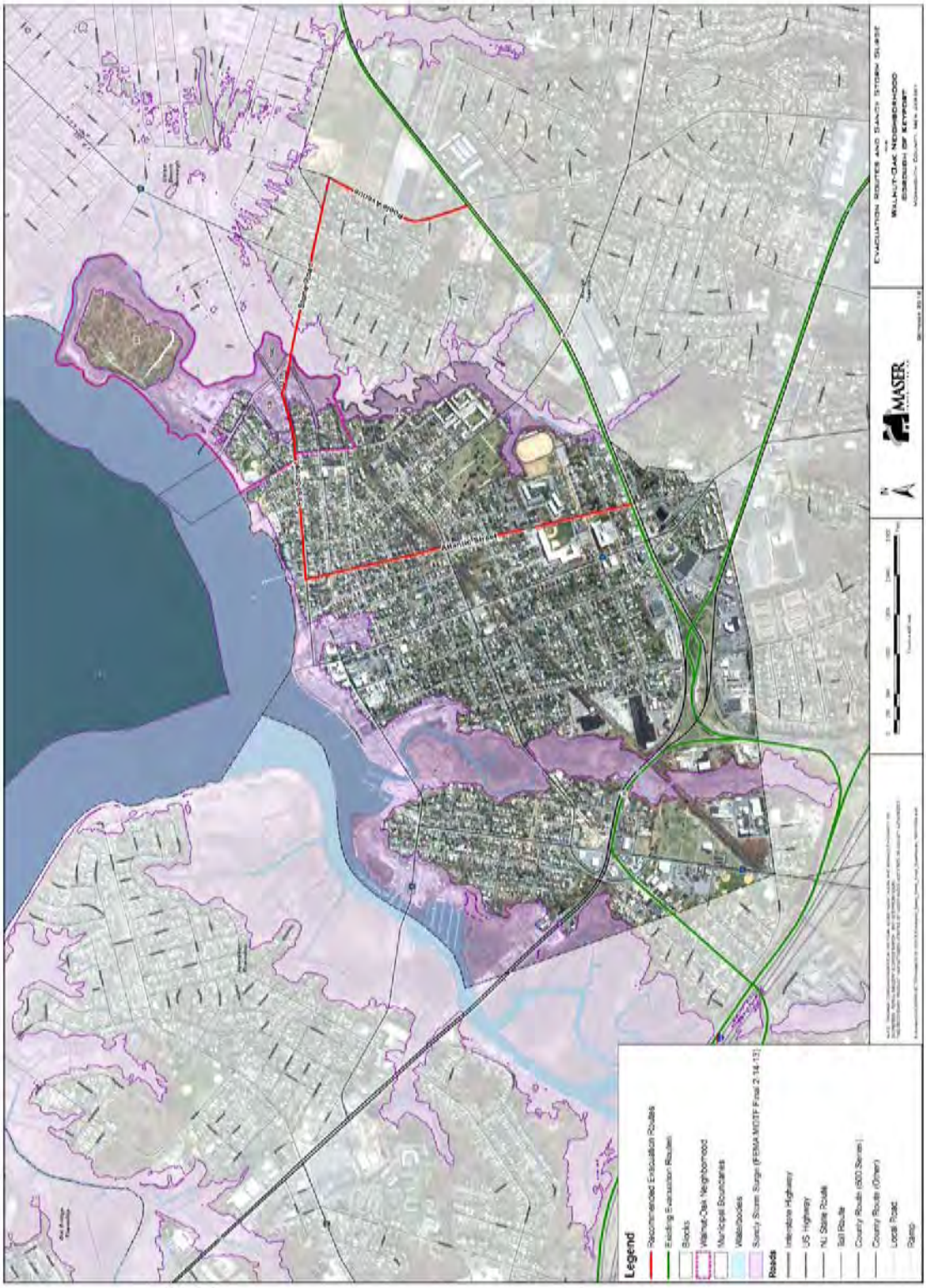
The Borough should also find ways in which to coordinate efforts with adjacent communities, such as the Township of Hazlet and Borough of Union Beach, in order to provide essential services and aid to those in need during disasters. Preparedness Plans and strategies for protecting properties and utilities could also be shared among municipalities.

EVACUATION ROUTES

The Borough of Keyport should consider working with Monmouth County with recommendation from the Office of Emergency Management to designate local evacuation routes. Along with the elevation of the Stone Road Bridge, Stone Road and Poole Avenue, which meets Route 36 to the south, should be a designated neighborhood evacuation route. Additionally, First Street from Stone Road to Atlantic Street and Atlantic Street to Route 36 should be considered as an evacuation route for the Walnut-Oak Neighborhood. Atlantic Street should be used as the best alternative to Stone Road as it does not pass through an area with streams or storm surge (relative to Hurricane Sandy).

These routes should be re-evaluated in the future for effectiveness and efficiency, as well as how they may be impacted by sea level rise.

Map 70: Recommended Local Priority Evacuation Routes from Walnut-Oak



SUSTAINABLE RECOVERY: LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN

Leadership in Energy and Environmental Design ("LEED") is a recognized green building certification rating system. LEED provides third-party verification that a new or renovated building was designed and built using strategies and materials to lower a building's carbon footprint. LEED was developed by the U.S. Green Building Council and is a "voluntary rating system that encourages buildings to do better, but does not add significant cost".[167] LEED has five rating systems for multiple project types that want to achieve LEED certification. The rating systems are:

- Building Design and Construction
- Interior Design and Construction
- Buildings Operations and Maintenance
- Neighborhood Development
- Homes

Within each rating systems there are eight main credit categories:

- Location and transportation
- Sustainable sites
- Water efficiency
- Energy and atmosphere
- Materials and resources
- Indoor environmental quality
- Innovation
- Regional priority

LEED "provides building owners and operators with a framework for identifying and implementing practical and measurable green building design, construction, operations and maintenance solutions".168 Furthermore, LEED has been constantly improving its manuals and guidelines to keep up with technology and trends. Presently, there are four levels of LEED certification – certified, silver, gold and platinum.

This Neighborhood Plan focuses on two of the rating systems that could apply – LEED for Homes (LEED-Homes) and LEED for Neighborhood Development (LEED-ND).

LEED FOR HOMES

LEED for Homes is the certification program for single-family home design and construction. LEED-designed homes provide clean indoor air and use less energy and water, which translates to lower utility bills. Homeowners looking to rehabilitate or redevelop their damaged home can use the LEED for Homes credit system to make smart choices when it comes to water efficiency, energy usage, material selection, air quality and even rainwater management. LEED for Homes is an excellent resource for homeowners, even if they are not seeking LEED Certification.

[167] http://www.usgbc.org/articles/leed-facts
[168] http://www.usgbc.org/articles/about-leed

Credits that are worth noting, and that which could be utilized by the residents of the Borough of Keyport Walnut-Oak Neighborhood during rehabilitation and new home construction include:

- Rainwater management
  - Certain sections flood after a hard rain storm, let alone a hurricane. Reducing rainwater runoff is imperative.
  - LEED for Homes recommends the following actions to manage rainwater:
    - Planting areas with native or adapted plant material (e.g. trees shrubs)
    - Installing a vegetated roof
    - Using permeable paving
    - Installing permanent infiltration or collection features (e.g., vegetated swale, rain garden, rainwater cistern or rain barrels to capture roof runoff)
- Low-emitting materials
  - The intent of this LEED credit is to reduce concentrations of chemical contaminants that can impact air quality.
  - The requirement includes the use of low volatile organic compound ("VOC") paints, floor materials and insulation.
- Quality views
  - Part of the appeal of the Walnut-Oak Neighborhood is that it is surrounded by waterfront views of both Raritan Bay/Keyport Harbor and the Chingarora Creek. The purpose of this LEED credit is to give building occupants a connection to the natural outdoor environment providing quality views.
  - The requirement is to achieve a direct line of sight to the outdoors with glazing (e.g. windows and doors) for 75% of the regularly occupied floor area of the home.
- Green power and carbon offsets
  - LEED for Homes encourages homeowner to reduce their greenhouse gas emissions through the use of grid-source, renewable energy technologies.
  - In order to qualify for the credits, a homeowner must engage in a contract for a minimum of five years, which provides between 50% and 100% of the home's energy from green power or renewable energy certificates.
- Renewable energy production
  - In order to offset the rising costs of homeownership, this LEED credit relies on the sun to power homes. The Walnut-Oak Neighborhood offers opportunities for both solar and wind generated energy, as the developed area of the Neighborhood is quite small, but does have a street grid that runs from the northeast to the southwest and prevailing lot dimensions that cause buildings to have one of their longest facades either facing southwest or southeast for optimum solar orientation. Optimal solar orientation for temperate climate zones is 17.5 degrees east of due south.[169] LEED-ND Credit 10 under Green Infrastructure and Building (GIB C-10) provides for credit when the long side of the street block is 15 degrees or less east or west of due south, or if the long axis of three-quarters or more of the buildings are 15 degrees or less east or west of due south. The Walnut- Oak street grid would provide opportunities to meet the LEED-ND standard.

[169] Design With Climate, by Victor Olgyay, Princeton University Press, 1973, page 61.

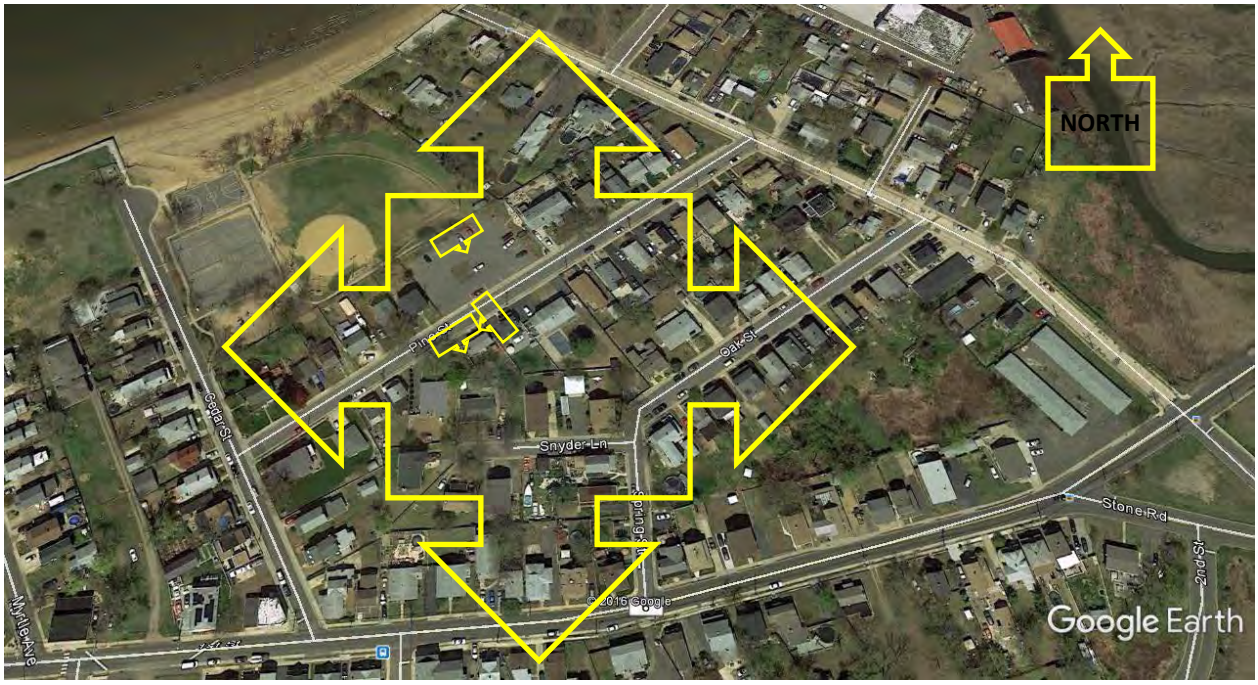


Figure 262: The figure above illustrates how the orientation of the street network in the Oak-Walnut neighborhood enables favorable solar orientation to either the southeast or southwest, depending on the orientation of the longest building facade.

- Areas with annual average wind speeds around 6.5 meters per second and greater at an 80-m height are generally considered to have a wind resource suitable for wind development, while wind speeds of 6.4 to 7.0 meters per second (14.3 to 15.7 mph) at a 50 meter height is considered to have "fair" potential for wind energy generation (see Figure 2). The Wind Speed Maps in Figure 2 indicate that the neighborhood is between 5.5 and 6.0 meters per second at 80 meters and between 6.4 and 7.0 meters per second at 50 meters. This would suggest that there is favorable, but not optimal potential for wind generated renewable energy in the neighborhood.
- This credit is offered to homeowners if they meet the parameters for solar energy.

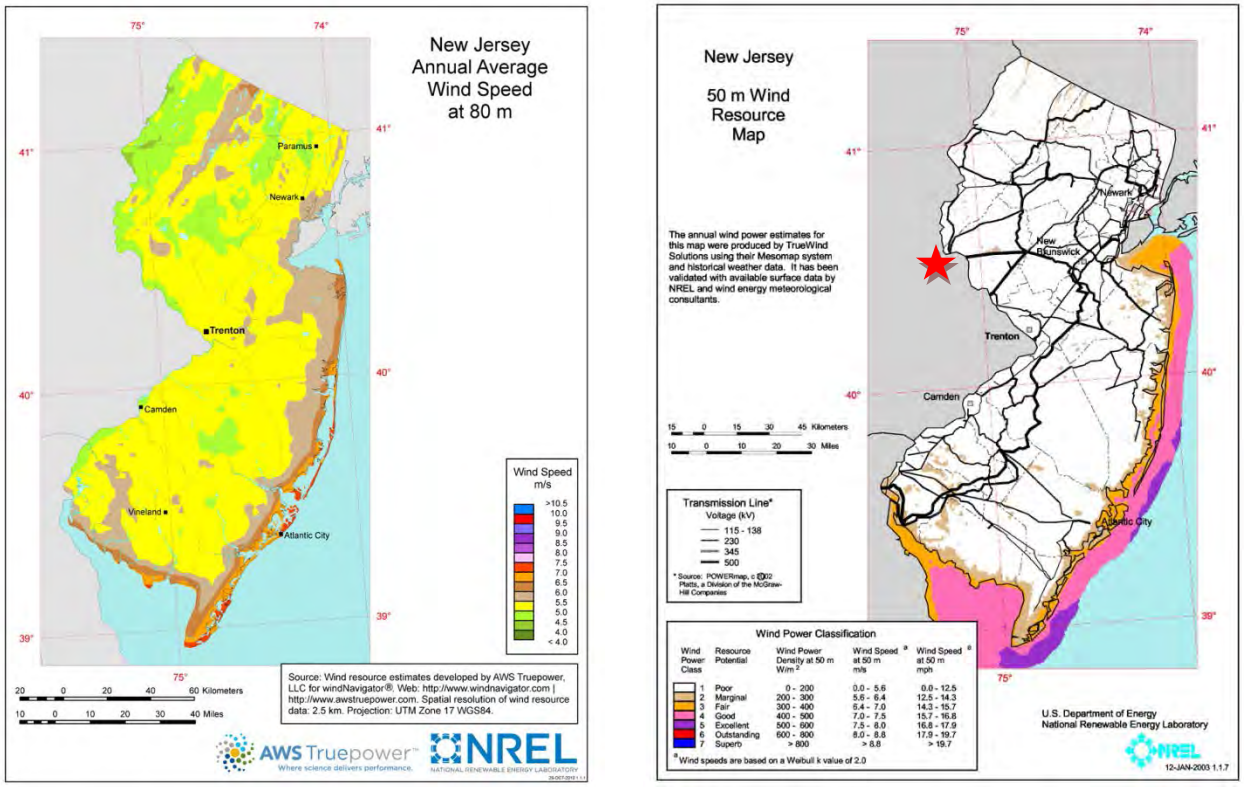


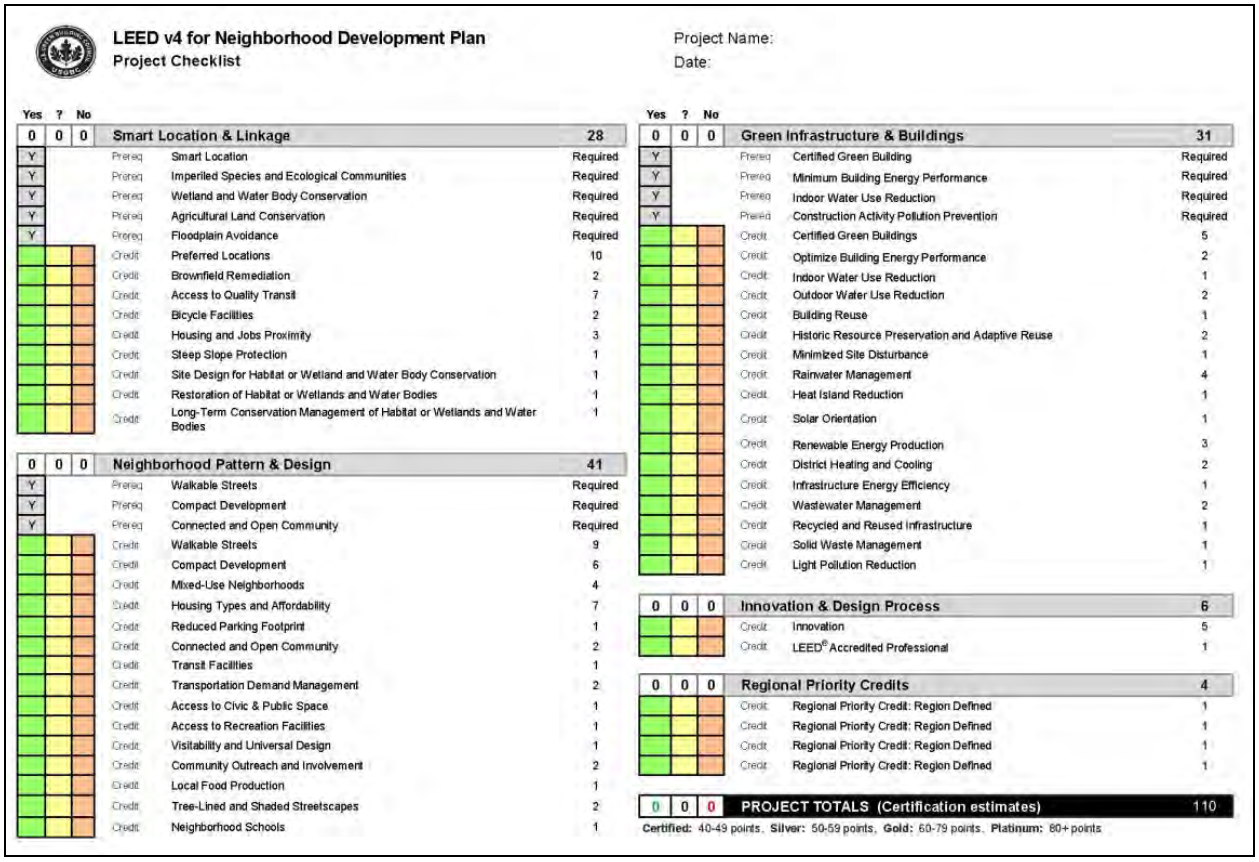
Figure 263: Comparison of wind generated energy potential at 80 meters and 50 meters for Keyport.

- Indoor water use reduction
  - The intent of this LEED credit is to reduce indoor water consumption.
  - Homeowners can receive up to six points for this line item depending on how much they reduce their water usage.
- Daylight
  - Daylighting is important in connecting building occupants to the outdoors, reinforcing circadian rhythms and reducing the use of electrical lighting.
  - The requirement is to achieve at least 55% daylighting for the regularly occupied floor area of the home.
- Outdoor water use reduction
  - The intent of this LEED credit is to reduce outdoor water consumption.
  - Homeowners receive credit if they reduce exterior irrigation between 50% and 100% by installing plants that require no irrigation (e.g. native species) or an efficient irrigation system with a water sense feature.

LEED for Neighborhood Development or LEED-ND is a certification system for a neighborhood-scale project, such as the entire Walnut-Oak area. LEED-ND incorporates the principles of smart growth, urbanism and green building into a system for neighborhood design, which can be applied to entire neighborhoods, portions of neighborhoods or multiple neighborhoods.

There are five credit categories for LEED-ND:

1. Smart location and linkage
2. Neighborhood pattern and design
3. Green infrastructure and buildings
4. Innovation and design process
5. Regional priority credit



LEED v4 for Neighborhood Development Plan
Project Checklist

Project Name:
Date:

Yes	?	No	Smart Location & Linkage		28
Y			Prereq	Smart Location	Required
Y			Prereq	Imperiled Species and Ecological Communities	Required
Y			Prereq	Wetland and Water Body Conservation	Required
Y			Prereq	Agricultural Land Conservation	Required
Y			Prereq	Floodplain Avoidance	Required
			Credit	Preferred Locations	10
			Credit	Brownfield Remediation	2
			Credit	Access to Quality Transit	7
			Credit	Bicycle Facilities	2
			Credit	Housing and Jobs Proximity	3
			Credit	Steep Slope Protection	1
			Credit	Site Design for Habitat or Wetland and Water Body Conservation	1
			Credit	Restoration of Habitat or Wetlands and Water Bodies	1
			Credit	Long-Term Conservation Management of Habitat or Wetlands and Water Bodies	1

Yes	?	No	Neighborhood Pattern & Design		41
Y			Prereq	Walkable Streets	Required
Y			Prereq	Compact Development	Required
Y			Prereq	Connected and Open Community	Required
			Credit	Walkable Streets	9
			Credit	Compact Development	6
			Credit	Mixed-Use Neighborhoods	4
			Credit	Housing Types and Affordability	7
			Credit	Reduced Parking Footprint	1
			Credit	Connected and Open Community	2
			Credit	Transit Facilities	1
			Credit	Transportation Demand Management	2
			Credit	Access to Civic & Public Space	1
			Credit	Access to Recreation Facilities	1
			Credit	Visitability and Universal Design	1
			Credit	Community Outreach and Involvement	2
			Credit	Local Food Production	1
			Credit	Tree-Lined and Shaded Streetscapes	2
			Credit	Neighborhood Schools	1

Yes	?	No	Green Infrastructure & Buildings		31
Y			Prereq	Certified Green Building	Required
Y			Prereq	Minimum Building Energy Performance	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Construction Activity Pollution Prevention	Required
			Credit	Certified Green Buildings	5
			Credit	Optimize Building Energy Performance	2
			Credit	Indoor Water Use Reduction	1
			Credit	Outdoor Water Use Reduction	2
			Credit	Building Reuse	1
			Credit	Historic Resource Preservation and Adaptive Reuse	2
			Credit	Minimized Site Disturbance	1
			Credit	Rainwater Management	4
			Credit	Heat Island Reduction	1
			Credit	Solar Orientation	1
			Credit	Renewable Energy Production	3
			Credit	District Heating and Cooling	2
			Credit	Infrastructure Energy Efficiency	1
			Credit	Wastewater Management	2
			Credit	Recycled and Reused Infrastructure	1
			Credit	Solid Waste Management	1
			Credit	Light Pollution Reduction	1

			Innovation & Design Process		6
			Credit	Innovation	5
			Credit	LEED® Accredited Professional	1

			Regional Priority Credits		4
			Credit	Regional Priority Credit: Region Defined	1
			Credit	Regional Priority Credit: Region Defined	1
			Credit	Regional Priority Credit: Region Defined	1
			Credit	Regional Priority Credit: Region Defined	1

			PROJECT TOTALS (Certification estimates)	110

Certified: 40-49 points, Silver: 50-59 points, Gold: 60-79 points, Platinum: 80+ points

Figure 264: LEED-ND Checklist Chart

Within the categories there are a total of 12 prerequisites that are required to gain certification. The Walnut-Oak Neighborhood potentially meets some of these requirements, but would likely need to improve in several areas, such as "smart location and linkage", transportation, and a central business area.

While the Walnut-Oak Neighborhood is predominantly residential in land use and contains housing types of several densities, there are also some business uses in the Aeromarine site, although they do not provide any

essential services to the residents or workforce. Rather, most retail and service businesses are located in downtown Keyport or the downtown of the Borough of Union Beach.

A New Jersey Transit public bus does currently service the Walnut-Oak Neighborhood along First Street, the center of the Neighborhood, but there is the potential for additional or more frequent bus service into or nearby Walnut-Oak from other surrounding boroughs and nearby cities, such as Perth Amboy and Middletown or Red Bank. The Borough should focus on ways to make the neighborhood more "compact", "connected", and "complete", particularly with any redevelopment that may occur on the Aeromarine site that will increase traffic or population nearby.

These sustainability principles can also be combined with efforts to make the Neighborhood more resilient to storm and flood events in the future by elevating buildings and selected streets, as well as investigating longer term solutions to flood mitigation through the use of stormwater management practices. Using the adjacent salt marshes and open space as potential for managed wetlands for stormwater management is consistent with LEED-ND.

Version 4.0 (v4) of the LEED-ND Rating System has recently been released by the USGBC. The Regional Priority Credits (RPC), which represent emphasis on sustainable neighborhood objectives based on geographic location, shows the following RPCs for Keyport (these would be applicable to other Keyport neighborhoods as well):

- **Stormwater management**
  Green Infrastructure & Building credit 8 | Up to 4 points
  Required Point Threshold: 2
- **Mixed-income diverse communities**
  Neighborhood Pattern & Design credit 4 | Up to 7 points
  Required Point Threshold: 4
- **Street network**
  Neighborhood Pattern & Design credit 6 | Up to 2 points
  Required Point Threshold: 1
- **Transportation demand management**
  Neighborhood Pattern & Design credit 8 | Up to 2 points
  Required Point Threshold: 1
- **Brownfields redevelopment**
  Site Location & Linkage credit 2 | Up to 2 points
  Required Point Threshold: 1
- **Housing and jobs proximity**
  Site Location & Linkage credit 5 | Up to 3 points
  Required Point Threshold: 2

These RPCs provide a framework for making the Oak-Walnut Neighborhood more sustainable by focusing on stormwater management, housing affordability, improving linkages to transit, redeveloping the Aeromarine site and retaining close proximity between employment and housing.

In addition to the overall consistency with LEED-ND, homeowners can also advance the principles of LEED-ND by:

- Improving home energy performance by 5% for new homes or 3% for major building renovations.
- Reduce indoor water usage by 20% with water efficient toilets, faucets and showerheads.

- Reduce outdoor water use through the installation of native plants or smart irrigation systems.
- Reduce rainwater runoff.
- Design and orient new homes for maximum solar orientation.
- Utilize solar power, such as solar panels.

For more information on LEED-ND, go to http://www.usgbc.org/articles/getting-started-nd.

ACTION PLAN

There are a number of relatively low cost actions that can be undertaken through a partnership between private property owners, the Borough of Keyport, and Monmouth County, and coordinated with the State of New Jersey Department of Transportation (NJDOT), Department of Environmental Protection (NJDEP), Department of Emergency Management (NJOEM), Federal Emergency Management Agency (FEMA), and other public agencies and public organizations. The identified actions are also prioritized into high, moderate, and low. The Borough should plan to address all high priority projects first, followed by those that are lowest cost and easiest to implement. They are summarized in the table below, grouped by recommendation type. Costs are estimated as low, moderate ("mod"), or high, but actual costs may vary greatly.

Table 12: Walnut-Oak Neighborhood Plan – Action Plan

	Project	Responsible Entity	Begin	Estimated Cost			Priority		
				Low	Mod	High	Low	Mod	High
	Flood Mitigation & Management								
1.	Private & public landscape treatments, including water retention areas (bioswales)	Borough; Monmouth County Parks & Rec.; Private property owners	Immediate to 1 year		X			X	
2.	Develop and implement an Impervious Surface Ordinance	Borough Planning Board	Within 1 year	X			X		
3.	Elevate roads and bridges for emergency access, evacuation, and to allow to flow (First Street & Stone Rd)	Borough; Monmouth County DOT; FEMA	Within 2 years			X			X
4.	Complete additional analysis of necessary shoreline treatments for marshes & beachfront	Borough; NJDEP; private property owners	Within 2 years	X					X
5.	Walnut Street bulkhead & ecological revetment	Borough; private property owners	Within 3 years			X			X
6.	Implement living shorelines in strategic areas	Borough; NJDEP; local organizations	Within 3 years		X			X	
7.	Elevate residential buildings and impacted by predicted flooding	Borough; FEMA	Within 2 years			X			X
8.	Harden and elevate pump stations	Borough; FEMA	Within 2 years			X			X
9.	Access road and levee along Chingarora Creek to Aeromarine site (access road conditional on redevelopment)	Borough of Keyport; Borough of Union Beach; FEMA; Army Corps of Engineers; NJDEP	Within 5 years			X		X	
10.	Capital Improvements to stormwater management infrastructure	Borough; FEMA	Within 5 years			X			X
	Land Use, Development & Zoning								
11.	Update bulk standards and zoning regulations to allow elevated development	Borough Zoning Board	Immediate to 1 year	X				X	
12.	Strategic Plan for acquisition or sale of abandoned properties	Borough; NJDEP	Within 2 years	X					X
13.	Conversion of identified strategic abandoned or vacant properties to	Borough; Monmouth County Parks & Rec.	Within 3 years			X			X

	natural & public space and water retention areas	NJDEP; FEMA; private property owners							
14.	Expand/Enhance public space and public access opportunities and continue to update the Municipal Public Access Plan	Borough; Monmouth County Parks & Rec; & NJDEP	Within 2 years		X			X	
15.	Redevelopment Plan and Improvements to Aeromarine site	Borough Planning Board; Zoning Board; Property owner/developer; NJDEP	Within 5 years			X			X
	Neighborhood Character								
16.	Create Design Guidelines handbook for Neighborhood and/or Borough	Borough	Within 1 year	X			X		
17.	Implement 'Green Streets' – pervious pavement, curb cuts, bioswales, reduced parking/street widths, street trees, etc.	Borough; Monmouth County DOT; NJDEP	Immediate to 1 year		X			X	
18.	Gateway Signage	Borough; Monmouth County DOT	Immediate to 1 year	X			X		
19.	Wayfinding Signage	Borough; Monmouth County DOT	Within 2 years	X				X	
	Mobility & Connectivity								
20.	Add bus shelters at existing NJ Transit bus stops	Borough; NJ Transit	Within 2 years		X		X		
21.	Extension of sidewalk network & pedestrian improvements, including crosswalks, bulb-outs, signalization, pathways, etc.	Borough; Monmouth County DOT; NJDOT; Safe Routes to School	Within 3 years		X			X	
22.	Bike Path network (Lane markings and/or signage) to link First Street & Stone Road to Henry Hudson Trail	Borough; Monmouth County Parks & Rec; Monmouth County DOT; NJDOT	Within 2 years	X			X		
23.	New access road and circulation plan for Aeromarine site and Neighborhood (conditional on redevelopment)	Borough; Monmouth County DOT	Within 5 years			X			X
	Future Storm & Disaster Preparedness								
24.	Plan, designate, and educate residents about new evacuation routes	Borough; Monmouth County DOT; NJDOT; Borough & NJ OEM	Within 1 year	X					X
	LEED Sustainable Recovery								
25.	Use LEED-ND Checklist and apply for certification by meeting qualifications	Borough; USGBC - LEED	Within 2 years	X				X	

APPENDIX I – RESULTS FROM PUBLIC COMMENT SHEETS – JUNE 30, 2016

Public Open House – June 30, 2016

Walnut-Oak Neighborhood

Borough of Keyport, New Jersey

The Walnut-Oak Neighborhood consists is located in the northeastern portion of Keyport. The neighborhood is surrounded by Keyport Harbor/Raritan Bay to the north and Chingarora Creek to the south and east, as well as the municipalities of Union Beach and Hazlet. The Borough is in the process of creating concept plan for the Neighborhood that includes capital improvement projects to reduce Walnut-Oak's vulnerability to storm surge and flooding, as well as to enhance the Neighborhood character. The final plan will include infrastructure projects and design standards.

The Walnut-Oak Neighborhood is important to Keyport. Thank you for taking time out of your busy schedule to complete this survey. We appreciate your input.

Where do you live? (Check one)	
Walnut-Oak Neighborhood	X
Other Neighborhood in Keyport	
Adjacent Town (Union Beach, Hazlet, Matawan)	
Elsewhere in Monmouth County	
Elsewhere in New Jersey	

Where do you work?	
Walnut-Oak Neighborhood	
Other Neighborhood in Keyport	
Adjacent Town (Union Beach, Hazlet)	
Elsewhere in Monmouth County	X
Elsewhere in New Jersey	

Board #1 identifies some potential or existing physical and environmental threats to the neighborhood. Out of those shown on the board, which do you think are the most important to address?

- [X] Flooding of Chingarora Creek
- [X] Brownfields along waterways
- [X] Storm surge from the Atlantic Ocean/Raritan Bay
- [X] Effects of Union Beach Army Corps Project
- [X] Beach erosion and loss of wetlands
- [X] Height and condition of bulkheads
- [X] Clogged and collapsed outfall pipes

The Pearl of the Bayshore℠
Keyport
NEW JERSEY

- [X] Evacuation routes
- [X] Traffic intersections
- [X] Street & Sidewalk conditions
- [X] Neighborhood Character
- [ ] Other (please specify) _____

Board #2 shows various street scenes from the Walnut-Oak Neighborhood and other municipalities. Out of the nine images (labeled 1-9), which do you prefer? 4, 7, 9

Board #3 shows a variety of parks, open spaces, and recreation facilities within the Walnut-Oak Neighborhood and in Keyport Borough. Out of the nine images (labeled 1-9), which do you prefer? 1 THRU 9

What types of open/recreational spaces do you use in Walnut-Oak and how often?					
	Daily	**Weekly**	**Monthly**	**Rarely**	**Never**
Baseball field and/or Tennis/Basketball courts					X
Playground					X
Beach					X
Keyport Harbor/Raritan Bay					X
Chingarora Creek or wetlands					X
Street-ends with water views					X
Private yard	X				
Other (Please specify)		X			

TRACK CAR AT WATERFRONT

The Pearl of the Bayshore℠
Keyport
NEW JERSEY

What types of activities do you do in these open spaces?

- [x] Walk/Run
- [ ] Ball sports
- [ ] Fishing
- [ ] Boating
- [ ] Picnicking
- [x] Enjoying the scenery
- [ ] Spend time with family/kids
- [ ] Other (Please specify)

_____

Board #4 shows the Aeromarine Redevelopment Site with potential uses. If the site were to be redeveloped for residential, what types of residential development would be appropriate for the site? Select all that apply.

- [ ] Single-family detached homes
- [ ] Duplexes (two-family homes)
- [ ] Apartments above ground floor non-residential uses
- [ ] Townhomes
- [ ] Luxury apartment or condominium buildings
- [x] No residential development
- [ ] Other (please specify)

_____

Board #5 shows some potential flood control and stormwater management strategies that could be implemented around the neighborhood. Out of these, which do you think are most appropriate?

- [ ] Living Shorelines
- [ ] Submerged Aquatic Plants
- [x] Wetlands Restoration/Enhancement
- [x] Building Retrofits (Elevating homes)
- [x] Bioswales and permeable paving
- [x] Using existing parks and open spaces for stormwater detention
- [x] Improved drainage systems & pump stations
- [x] Bulkheads
- [ ] Other (Please specify)

_____

Determining the physical scale of the neighborhood is a part of the project process. How many stories should new buildings be between in the Neighborhood area? Select all that apply.

- [ ] 1 story
- [x] 2 stories
- [ ] 3 stories
- [ ] 4 stories
- [ ] 5+ stories

For the following questions, please rate the statement on a scale of 1 to 5 for how important it is to you (1 = "Very Important"; 3 = "Neutral"; 5 = "Not At All Important")

1. How important is it to you to protect the views of the water (marshes, creek, or harbor)? 1

2. How important is protecting the Walnut-Oak Neighborhood from future flooding and/or storm surge? – 1

3. How important is a streetscape with pedestrian amenities (i.e. benches, street lights, sidewalks, crosswalks, etc.) throughout Walnut-Oak? (i.e. First Street, Second Street, Walnut Street, Oak Street, Pine Street, Cedar Street) And potentially to connect to the Aeromarine site if it contains residential, mixed-use, or recreational facilities? – 1

4. How important is it to redevelop the Aeromarine/landfill site on Locust Street? – 5

5. How important is bikeability (safety and accessibility for bicycles) in the Walnut-Oak Neighborhood? – 1

6. How important is a multi-use recreation/walking path (a.k.a. green circuit) in the Walnut-Oak Neighborhood that could take advantage of the scenic views surrounding the community? – 1

7. How important is it that the Walnut-Oak Neighborhood have commercial businesses (i.e. specialty shops, delis, convenience, handcrafts, etc.) – 5

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Keyport
NEW JERSEY

Public Open House – June 30, 2016

Walnut-Oak Neighborhood

Borough of Keyport, New Jersey

The Walnut-Oak Neighborhood consists is located in the northeastern portion of Keyport. The neighborhood is surrounded by Keyport Harbor/Raritan Bay to the north and Chingarora Creek to the south and east, as well as the municipalities of Union Beach and Hazlet. The Borough is in the process of creating concept plan for the Neighborhood that includes capital improvement projects to reduce Walnut-Oak's vulnerability to storm surge and flooding, as well as to enhance the Neighborhood character. The final plan will include infrastructure projects and design standards.

The Walnut-Oak Neighborhood is important to Keyport. Thank you for taking time out of your busy schedule to complete this survey. We appreciate your input.

Where do you live? (Check one)	
Walnut-Oak Neighborhood	X
Other Neighborhood in Keyport	
Adjacent Town (Union Beach, Hazlet, Matawan)	
Elsewhere in Monmouth County	
Elsewhere in New Jersey	

Where do you work?	
Walnut-Oak Neighborhood	
Other Neighborhood in Keyport	
Adjacent Town (Union Beach, Hazlet)	
Elsewhere in Monmouth County	
Elsewhere in New Jersey	

Board #1 identifies some potential or existing physical and environmental threats to the neighborhood. Out of those shown on the board, which do you think are the most important to address?

- [x] Flooding of Chingarora Creek
- [x] Brownfields along waterways
- [x] Storm surge from the Atlantic Ocean/Raritan Bay
- [x] Effects of Union Beach Army Corps Project
- [ ] Beach erosion and loss of wetlands
- [x] Height and condition of bulkheads
- [x] Clogged and collapsed outfall pipes

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What types of activities do you do in these open spaces?

- [ ] Walk/Run
- [ ] Ball sports
- [x] Fishing
- [ ] Boating
- [x] Picnicking
- [x] Enjoying the scenery
- [x] Spend time with family/kids
- [ ] Other (Please specify)

_____

Board #4 shows the Aeromarine Redevelopment Site with potential uses. If the site were to be redeveloped for residential, what types of residential development would be appropriate for the site? Select all that apply.

- [x] Single-family detached homes
- [ ] Duplexes (two-family homes)
- [ ] Apartments above ground floor non-residential uses
- [ ] Townhomes
- [ ] Luxury apartment or condominium buildings
- [x] No residential development
- [ ] Other (please specify)

_____

Board #5 shows some potential flood control and stormwater management strategies that could be implemented around the neighborhood. Out of these, which do you think are most appropriate?

- [x] Living Shorelines
- [ ] Submerged Aquatic Plants
- [x] Wetlands Restoration/Enhancement
- [ ] Building Retrofits (Elevating homes)
- [ ] Bioswales and permeable paving
- [ ] Using existing parks and open spaces for stormwater detention
- [ ] Improved drainage systems & pump stations
- [ ] Bulkheads
- [ ] Other (Please specify)

_____

Determining the physical scale of the neighborhood is a part of the project process. How many stories should new buildings be between in the Neighborhood area? Select all that apply.

- [ ] 1 story
- [ ] 2 stories
- [ ] 3 stories
- [ ] 4 stories
- [ ] 5+ stories

Public Open House – June 30, 2016

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The Walnut-Oak Neighborhood is important to Keyport. Thank you for taking time out of your busy schedule to complete this survey. We appreciate your input.

Where do you live? (Check one)	
Walnut-Oak Neighborhood	
Other Neighborhood in Keyport	✓
Adjacent Town (Union Beach, Hazlet, Matawan)	
Elsewhere in Monmouth County	
Elsewhere in New Jersey	

Where do you work?	
Walnut-Oak Neighborhood	
Other Neighborhood in Keyport	✓
Adjacent Town (Union Beach, Hazlet)	
Elsewhere in Monmouth County	
Elsewhere in New Jersey	

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- ☑ Flooding of Chingarora Creek
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- ☑ Storm surge from the Atlantic Ocean/Raritan Bay
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- ☑ Beach erosion and loss of wetlands
- ☑ Height and condition of bulkheads
- ☑ Clogged and collapsed outfall pipes

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What types of activities do you do in these open spaces?

- [x] Walk/Run
- [x] Ball sports
- [x] Fishing
- [x] Boating
- [x] Picnicking
- [x] Enjoying the scenery
- [x] Spend time with family/kids
- [ ] Other (Please specify)

_____

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- [ ] Single-family detached homes
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- [ ] Apartments above ground floor non-residential uses
- [ ] Townhomes
- [ ] Luxury apartment or condominium buildings
- [ ] No residential development
- [x] Other (please specify)

NONE -

Board #5 shows some potential flood control and stormwater management strategies that could be implemented around the neighborhood. Out of these, which do you think are most appropriate?

- [x] Living Shorelines
- [x] Submerged Aquatic Plants
- [x] Wetlands Restoration/Enhancement
- [ ] Building Retrofits (Elevating homes)
- [x] Bioswales and permeable paving
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- [x] Improved drainage systems & pump stations
- [x] Bulkheads
- [ ] Other (Please specify)

_____

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- [ ] 1 story
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- [ ] 3 stories
- [ ] 4 stories
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The Walnut-Oak Neighborhood is important to Keyport. Thank you for taking time out of your busy schedule to complete this survey. We appreciate your input.

Where do you live? (Check one)	
Walnut-Oak Neighborhood	
Other Neighborhood in Keyport	✓
Adjacent Town (Union Beach, Hazlet, Matawan)	
Elsewhere in Monmouth County	
Elsewhere in New Jersey	

Where do you work?	
Walnut-Oak Neighborhood	
Other Neighborhood in Keyport	
Adjacent Town (Union Beach, Hazlet)	
Elsewhere in Monmouth County	
Elsewhere in New Jersey	✓

Board #1 identifies some potential or existing physical and environmental threats to the neighborhood. Out of those shown on the board, which do you think are the most important to address?

- ☐ Flooding of Chingarora Creek
- ☐ Brownfields along waterways
- ☒ Storm surge from the Atlantic Ocean/Raritan Bay
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- ☐ Beach erosion and loss of wetlands
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- ☐ Clogged and collapsed outfall pipes

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What types of activities do you do in these open spaces?

- [x] Walk/Run
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- [ ] Other (Please specify)

Dog walk

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- [x] Bulkheads
- [x] Other (Please specify)

WAVE ATTENUATION
S/O Break waters

Determining the physical scale of the neighborhood is a part of the project process. How many stories should new buildings be between in the Neighborhood area? Select all that apply.

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Where do you live? (Check one)	
Walnut-Oak Neighborhood	
Other Neighborhood in Keyport	Y
Adjacent Town (Union Beach, Hazlet, Matawan)	
Elsewhere in Monmouth County	
Elsewhere in New Jersey	

Where do you work?	
Walnut-Oak Neighborhood	
Other Neighborhood in Keyport	
Adjacent Town (Union Beach, Hazlet)	
Elsewhere in Monmouth County	
Elsewhere in New Jersey	

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- [x] Evacuation routes
- [ ] Traffic intersections
- [ ] Street & Sidewalk conditions
- [x] Neighborhood Character
- [ ] Other (please specify) _____

Board #2 shows various street scenes from the Walnut-Oak Neighborhood and other municipalities. Out of the nine images (labeled 1-9), which do you prefer?

Board #3 shows a variety of parks, open spaces, and recreation facilities within the Walnut-Oak Neighborhood and in Keyport Borough. Out of the nine images (labeled 1-9), which do you prefer?

What types of open/recreational spaces do you use in Walnut-Oak and how often?

	Daily	Weekly	Monthly	Rarely	Never
Baseball field and/or Tennis/Basketball courts			X		
Playground				X	
Beach			X		
Keyport Harbor/Raritan Bay		X			
Chingarora Creek or wetlands				X	
Street-ends with water views		X			
Private yard					X
Other (Please specify)					

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What types of activities do you do in these open spaces?

- [x] Walk/Run
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- [x] Fishing
- [ ] Boating
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_____

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_____

Board #5 shows some potential flood control and stormwater management strategies that could be implemented around the neighborhood. Out of these, which do you think are most appropriate?

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- [ ] Building Retrofits (Elevating homes)
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- [ ] Bulkheads
- [ ] Other (Please specify)

_____

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For the following questions, please rate the statement on a scale of 1 to 5 for how important it is to you (1 = "Very Important"; 3 = "Neutral"; 5 = "Not At All Important")

1. How important is it to you to protect the views of the water (marshes, creek, or harbor)?

   1

2. How important is protecting the Walnut-Oak Neighborhood from future flooding and/or storm surge?

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3. How important is a streetscape with pedestrian amenities (i.e. benches, street lights, sidewalks, crosswalks, etc.) throughout Walnut-Oak? (i.e. First Street, Second Street, Walnut Street, Oak Street, Pine Street, Cedar Street) And potentially to connect to the Aeromarine site if it contains residential, mixed-use, or recreational facilities?

   3

4. How important is it to redevelop the Aeromarine/landfill site on Locust Street?

   3

5. How important is bikeability (safety and accessibility for bicycles) in the Walnut-Oak Neighborhood?

   5

6. How important is a multi-use recreation/walking path (a.k.a. green circuit) in the Walnut-Oak Neighborhood that could take advantage of the scenic views surrounding the community?

   5

7. How important is it that the Walnut-Oak Neighborhood have commercial businesses (i.e. specialty shops, delis, convenience, handcrafts, etc.)

   3

APPENDIX II – KEYPORT HISTORICAL SOCIETY CENTURY HOMES

Keyport Century Homes & Properties

#	Street	Circa	Block	Lot	Source
43	Atlantic	1860	96	3	KHS
52	Atlantic	1850	92	7	KHS
70	Atlantic	1850	91	3	KHS
409	Atlantic	1867	107	7	KHS
	Atlantic & First	1847	94	17, 19, 20, 21, 23, 20.01	KHS
21	Beers	1862	39	26	KHS
111	Beers	1887	37	9	KHS
169	Beers	1846	46	16	KHS
237	Beers	1859	49	1.03	KHS
132	Broad	1850	60	13	KHS
157	Broad	1855	64	3	KHS
161	Broad	1870	64	4	KHS
19	Broadway	1856	21	5	KHS
30	Broadway	1846	19	4	KHS
36	Broadway	1846	19	5	KHS
64	Broadway	1825	18	7	KHS
69	Broadway	1847	22	7	KHS
104	Broadway	1840	17	8	KHS
114	Broadway	1882	17	11.01	KHS
122	Broadway	1772	17	13	KHS
181	Broadway	1868	26	10	KHS
28	Cedar	1845	127	7	KHS
41	Cedar	1866	136	1	KHS
42	Cedar	1871	137	1	SHPO

3	Chingarora	1889/1897	24	2	KHS
44	Church	1850	81	16	KHS
56	Church	1855	81	13	KHS
67	Church	1855	92	9	KHS
123	Church	1855	90	1	KHS
145	Church	1872	89	1	KHS
90	Division	1867	64	9	KHS
	Division & Warren	1862	77	1	KHS
10	E. Front	1878	62	3	KHS
14	Elizabeth	1850	59	13	KHS
47	Elizabeth	1871	44	2	KHS
75	Elizabeth	1868	42	3.01	KHS
95	Elizabeth	1874	42	5	KHS
37	First	1855	94	5	KHS
42	First	1840	94	6	KHS
72	First	1840	93	2	KHS
74	First	1838	93	3	KHS
75	First	1870	94	12	KHS
86	First	1872	93	4	KHS
107	First	1852	94	22	KHS
112	First	1838	95	2	KHS
119	First	1846	94	24	KHS
134	First	1852	95	8	KHS
140	First	1837	95	10	KHS
160	First	1850	125	3	KHS
170	First	1845	125	4	KHS
179	First	1834	94	40	KHS
213	First	1852	126	6	KHS
216	First	1868	125	15	KHS

252	First	1854	128	8	KHS
277	First	1889	136	33	SHPO
289	First	1873-1889	138	1	SHPO
302	First	1845	135	9	KHS
35	Fulton	1855	134	3	KHS
55	Fulton	1835	134	31	KHS
15	Green Grove	1880	123	3	KHS
21	Green Grove	1868	122	1	KHS
6	Kearney	1861	39	23	KHS
36	Kearney	1850	39	11	KHS
50	Kearney	1780	39	6	KHS
58	Kearney	1832	39	2	KHS
34	Main	1836	39	44	KHS
54	Main	1854	40	13.01	KHS
56	Main	1872	40	14	KHS
74	Main	1850	40	18	KHS
80	Main	1854	40	3	KHS
84	Main	1850	40	19	KHS
88	Main	1887	40	20	KHS
100	Main	1841	41	6.01	KHS
102	Main	1848	41	5	KHS
120	Main	1854	41	3	KHS
126	Main	1887	44	3	KHS
130	Main	1872	44	4	KHS
141	Main	1850	58	13	KHS
205	Main	1852	55	38.06	KHS
327	Main	1845/1855	54	8	KHS
83	Maple	1903	43	12	KHS
23	Myrtle	1856	127	14	KHS

25	Myrtle	1861	127	15	KHS
29	Myrtle	1880	127	17	KHS
38	Oak	1858	136	23	KHS
40	Oak	1856	136	22	KHS
41	Osborn	1870	81	9	KHS
81	Osborn	1890	82	16	KHS
12	Pine	1909	137	2	SHPO
14	Pine	1878	137	3	KHS
56	Second	1854	96	8	KHS
78	Second	1867	124	3	KHS
82	Second	1889	124	4	KHS
83	Second	1854	125	33	KHS
89	Second	1884	125	32	KHS
141	Second	1860	128	1	KHS
185	Second	1849/1888	135	31	KHS
210	Second	1909	134	12	SHPO
2	Snyder	1925	136	28	KHS
89	Third	1860	97	18	KHS
240	Van Dorn	1867	107	22	KHS
290	Van Dorn	1856	107	16	KHS
77	W. Front	1852	21.01	28	KHS
80	W. Front	1860	39	32	KHS
92	W. Front	1857	39	30	KHS
96	W. Front	1838	39	29	KHS
168	W. Front	1854	21	11.01	KHS
20	Walnut	1854	136	18.01	KHS
60	Walnut	1850	137	14	KHS
16	Warren	1859	59	3	KHS
31	Washington	1870	19	10	KHS

28-26	Washington	1850		20	10	KHS
First St. Historic District - both sides #51 through #309						SHPO
Front St. Historic District - front between Beers & Church						SHPO

Key:

KHS = Keyport Historical Society;

SHPO = New Jersey Department of Enviromental Protection State Historic Preservation Office

APPENDIX III – REPORTED DAMAGES TO RESIDENTIAL PROPERTIES FROM HURRICANE SANDY

Damaged residential properties reported through insurance claims, gathered by the Borough of Keyport. The list below is taken from the Borough of Keyport Strategic Recovery Plan, prepared by Maser Consulting, P.A. in March 2014 with a grant from the New Jersey Department of Community Affairs Post Sandy Recovery Planning Assistance Program.

Damaged Homes					
Site No.	**Block**	**Lot**	**Address**	**Owner**	**Damage**
1	39	24	23 Beers	Masia, Angelo	Water
2	49	30	259 Beers	Miele, Eileen C	Siding
3	39	12	45 Beers	Alaric Properties	6' Water (15 Units)
4	39	20	25 Beers St	Chillemi, Delores	Water
5	39	21	27 Beers St	Ackerman, Deborah A & Hal K	Water
6	94	4	30 First St	Corbett, Robert J & Linda M	Garage Destroyed, Basement Flooded
7	94	5	37 First	Mangione, Vincent	Water- Rear Wall Collapse
8	94	6	42 First	Reedy, Michael & Ann Marie	Water
9	138	19	39 Oak	Poling, Robert M. & Gail E.	Water
10	138	20	37 Oak Street	Tormay, D & G Morris%J Hagman	Water
11	138	21	35 Oak	Topoleski, Theodore	Water
12	138	23	25 Oak	Terhune, William R Iii & Carrie	Water
13	137	14	60 Walnut	Seckinger, Rowland S & Marjorie L	Bulkhead Damage
14	108	6	Broad St.	Bethany Manor	Brick Veneer Collapse
15	79	8	26 Osborn	Brinkley, Diane	Water
16	138	3	299 First	Morris, Richard H & Ginlia P	Water, Foundation Damage, Boiler

Damaged Homes					
Site No.	**Block**	**Lot**	**Address**	**Owner**	**Damage**
17	138	4	305 First	Harbison, Francis J. & Elizabeth	Basement Flooded Hwh, Furnace
18	138	5	309 First	Garcia, Fangio & Ana Milena	Water, Boilers, Hwh, Siding
19	138	6	313 First	Albertson, Kelly	Water
20	138	7	319 First	Dressler, John	5' Water, Boiler, Hwh, Wiring
21	138	8	325 First	Stonerock, Lawrence C & Wendy C	Water
22	138	10	329 First St	Ziegenbalg, Jacqueline	Water
23	138	11	333 First & Walnut	Atkinson, Carl R & Ruth E	4' Water (10 Units)
24	138	12	10 Walnut	Doughty, Thompson & Freda	5' Water- Foundation
25	138	13	12 Walnut	Jones, Edward F & Laura J	4' Water- Basement, 1st Fl
26	138	14	14-16 Walnut St	Kutschman, Andrew, Sr.	Water
27	138	15	47 Oak	Lafata, Teresa P	Water
28	138	16	45 Oak St	Snyder, Gloria & Squier, Gerald M	Water- Vacant
29	138	17	43 Oak	Morgan, Raymond & Brunelli Barbara	Water
30	137	12	46 Walnut	Grabowski, Thomas & Carole L.	Bulkhead Damage, Erosion
31	21	7	7 Broadway	Zuback, Ronald & Jane	Erosion
32	22	32	Beers	Keyport Legion Apt. Inc.	4' Water Generator Room
33	22.07	5	4 Oyster Creek	Larko, Michael	Collapse Chimney
34	22.02	11	11 Gull Way	Mahoney, Janet	Water
35	22.02	12	12 Gull Way	Inguaggiato, Jos & Campbell,Heather	Water
36	94	15	89 First	Ruiz, Brenda J	Water, Bulkhead Destoyed
37	22.03	16	16 Gull Way	Gregg, Jeannette M & Jennifer A M	Water
38	22.03	17	17 Gull Way	Hilt, Irene	Water
39	22.03	18	18 Gull Way	Meade, Lori	Water
40	22.03	19	19 Gull Way	Knoblauch, Celia	Water
41	22.03	20	20 Gull Way	Foulks, Kenneth R.	Water
42	22.03	13	13 Gull Way	Williams, Barbara	Water
43	22.03	14	14 Gull Way	Jacovino, Deborah	Water
44	22.03	15	15 Gull Way	Hand, Mary Margaret	Water
45	134	15.01	224 Second	Lovallo, Anne	Water

Damaged Homes					
Site No.	**Block**	**Lot**	**Address**	**Owner**	**Damage**
46	134	15.02	236 Second	Smith, John B	Water
47	135	16	334 First	Sarath, Alan & Joan & Bruce Deys	East Side Foundation Wall
48	135	17	336 First	Keeran, Paul S & Diedre Ann	Structural Damage- Rear Wall
49	134	7	186 Second	Plump, Michael	Porch Supports
50	135	22	227 Second Street	Brown Cristopher & Felicia	Water
51	135	21.01	233 Second Street	Tamburello, Joseph	Water
52	136	22	40 Oak	Rausch, Claire V	Water
53	136	31	2 Spring St	Lear, David	5' Water, Boiler, Hwh, Wiring
54	94	8	51 First St	Lane, Michael S	Water
55	94	9	53 First St	Zieman, William H Jr	Water & bulkhead ,damage
56	94	10	55 First St	Dounelis, Athas	Water, Bulkhead & retaining wall destroyed
57	94	11	69 First St	Florentine, Barbara	Water & Bulkhead destroyed
58	94	12	75 First St	75 First St LLC	Water & hill erosion
59	94	13	79 First St	Schafer, Carol H	Hill erosions
60	94	14	85 First St	Azzolino, Agnes	Hill erosions & damaged deck
61	94	18	93 First St	Kosobucki, Lynne C.	Retaining wall destroyed & hill erosion

APPENDIX IV – TRAFFIC DATA

New Jersey Department of Transportation

Daily Volume from 01/29/2013 through 01/31/2013

Site Name: 121314, , FIRST ST- 8, 130000064_, Union Beach Boro
County: MONMOUTH
Funct. Class: Urban Collector
Location: BET WALNUT ST JOHNSON AVE

Seasonal Factor Group: RG4_FC17
Daily Factor Group: RG4_FC17
Axle Factor Group: RG4_FC17
Growth Factor Group:

	Sun 01/27/2013			Mon 01/28/2013			Tue 01/29/2013			Wed 01/30/2013			Thu 01/31/2013			Fri 02/01/2013			Sat 02/02/2013		
	ROAD	W	E	ROAD	W	E	ROAD	W	E	ROAD	W	E	ROAD	W	E	ROAD	W	E	ROAD	W	E
00:00										16	12	4	15	8	7						
01:00										8	3	5	17	8	9						
02:00										12	7	5	7	6	1						
03:00										9	5	4	5	4	1						
04:00										4	0	4	5	2	3						
05:00										23	7	16	26	8	18						
06:00										85	27	58	71	19	52						
07:00										125	54	71	119	48	71						
08:00										131	64	67	122	57	65						
09:00										99	58	41	112	52	60						
10:00										129	66	63	115	59	56						
11:00										150	80	70	135	67	68						
12:00							151	78	73	146	88	58									
13:00							179	100	79	135	79	56									
14:00							248	107	141	187	109	78									
15:00							229	130	99	173	102	71									
16:00							227	132	95	221	137	84									
17:00							161	100	61	221	124	97									
18:00							126	83	43	135	83	52									
19:00							107	61	46	98	60	38									
20:00							74	47	27	79	48	31									
21:00							65	43	22	67	44	23									
22:00							49	31	18	38	23	15									
23:00							29	17	12	21	13	8									
Volume							1,645	929	716	2,312	1,293	1,019	749	338	411						
AM Peak Vol										150	80	78	144	68	80						
AM Peak Fct										0.71	0.61	0.95	0.77	0.90	0.83						
AM Peak Hr										11:00	10:00	7:15	7:30	10:15	7:30						
PM Peak Vol							253	137	141	231	150	97									
PM Peak Fct							0.88	0.84	0.82	0.92	0.96	0.81									
PM Peak Hr							13:45	16:15	14:00	16:30	16:30	17:00									
Seasonal Fct							1.184	1.184	1.184	1.184	1.184	1.184	1.184	1.184	1.184						
Daily Fct							1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000						
Axle Fct							0.488	0.488	0.488	0.488	0.488	0.488	0.488	0.488	0.488						
Pulse Fct							2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000						

Collected by: NJDOT
Created: 04/04/2013 2:56:47PM

ROAD AADT 2,719 W AADT 1,479 E AADT 1,240

DV03: Page 1 of 1

The Pearl of the Bayshore℠

Keyport

NEW JERSEY

817

issued 10/3/16

BUS Perth Amboy ↔ Campbell's Junction

To Perth Amboy

Saturdays

MIDDLETOWN-Campbell's Junction Garfield Ave. at Leonardville Rd.	PORT MONMOUTH NJ 36 at Main St.	KEANSBURG Carr Ave. at Center Ave.	UNION BEACH Front St. at Pine St.	KEYPORT Broad St. at Front St.	CLIFFWOOD NJ 35 at Cliffwood Ave.	OLD BRIDGE TWP. (Laurence Harbor) RT-35 at Laurence Pkwy.	MORGAN Pine Ave at Parker St./Armstrong St.	SOUTH AMBOY Broadway at Augusta St.	PERTH AMBOY Hector St. at Washington St.
MAP REFERENCE									
10	9	8	7	6	5	4	3	2	1
530	532	543	557	603	608	613	616	622	646
630	632	645	657	703	708	713	716	722	746
730	732	745	757	803	808	813	816	822	846
830	832	845	857	903	908	913	916	922	946
930	932	943	957	1003	1008	1013	1016	1022	1046
1030	1032	1045	1057	1103	1108	1113	1116	1122	1146
1130	1132	1145	1157	1203	1208	1213	1216	1223	1246
1230	1232	1245	1257	103	108	113	116	122	146
130	132	145	157	203	208	213	216	222	246
230	232	245	257	303	308	313	316	322	346
330	332	343	357	403	408	413	416	422	446
430	432	443	457	503	508	513	516	522	546
535	537	550	602	606	613	618	621	627	651
635	637	650	702	708	713	718	721	727	751

A.M. - Light face type

MIDDLETOWN-Campbell's Junction Garfield Ave. at Leonardville Rd.	PORT MONMOUTH NJ 36 at Main St.	KEANSBURG Carr Ave. at Center Ave.	UNION BEACH Front St. at Pine St.	KEYPORT Broad St. at Front St.	CLIFFWOOD NJ 35 at Cliffwood Ave.	OLD BRIDGE TWP. (Laurence Harbor) RT-35 at Laurence Pkwy.	MORGAN Pine Ave at Parker St./Armstrong St.	SOUTH AMBOY Broadway at Augusta St.	PERTH AMBOY Hector St. at Washington St.
MAP REFERENCE									
10	9	8	7	6	5	4	3	2	1
630	633	645	657	703	708	713	716	721	744
730	733	745	757	803	808	813	816	821	844
830	833	845	857	903	908	913	916	921	944
930	933	945	957	1003	1008	1013	1016	1021	1044
1030	1033	1045	1057	1103	1108	1113	1116	1121	1144
1130	1133	1145	1157	1203	1208	1213	1216	1221	1244
1230	1233	1245	1257	103	108	113	116	121	144
130	133	145	157	203	208	213	216	221	244
230	233	245	257	303	308	313	316	321	344
330	333	345	357	403	408	413	416	421	444
430	433	445	457	503	508	513	516	521	544
535	538	550	602	608	613	618	621	626	649
635	638	650	702	708	713	718	721	726	749

P.M. - Bold face type

Holiday Service Guide

Holiday	Schedule in Effect
New Year's Day - Jan. 1**	No Service
Martin Luther King Jr. Day	Weekday
Presidents' Day	Weekday
Good Friday	Weekday
Easter	No Service
Memorial Day	No Service
Independence Day - July 4**	No Service
Labor Day	No Service
Columbus Day	Weekday
Veterans Day	Regular service
Wednesday Before Thanksgiving	See website for details
Thanksgiving Day	No Service
Friday After Thanksgiving	Weekday
Christmas Eve	See website for details
Christmas Day - Dec. 25**	No Service
New Year's Eve	See website for details

**Observed Holidays - When this holiday falls on a weekend, a special schedule will be operated on the observed holiday. Please check our website at www.njtransit.com to confirm the schedule to effect on holidays.

NJTRANSIT.COM

with service to

- PERTH AMBOY
- SOUTH AMBOY
- OLD BRIDGE
  - *Laurence Harbor*
- ABERDEEN
  - *Cliffwood Beach*
- KEYPORT
- UNION BEACH
- KEANSBURG
- MIDDLETOWN
  - *Port Monmouth*
  - *Campbell's Junction*

TRANSIT The way to go.

Fare Information

This is an exact fare line. Passengers are required to have exact fare when boarding buses on this line. One dollar bills and most U.S. coins are accepted. Drivers do not carry money and cannot make change.
Customers departing from the Port Authority Bus Terminal in New York MUST have a ticket or pass to board a bus.

How to determine your fare

Your fare is based on the number of zones you travel through. Check the map on this schedule to see how many zones you travel. Each time you cross a zone boundary, you must pay for another zone.

Cash Fares

Zone	1	2	3	4	Transfer
Adult	$1.60	$2.55	$3.15	$3.80	$0.75
Children (5-11) & Sr. Citizens (62 & Older)	$0.75	$1.10	$1.40	$1.75	$0.35

Transfers must be purchased when boarding bus.
For additional information about the NJ TRANSIT bus fares and ticket options, please consult the NJ TRANSIT Bus Rider Guide or our website, www.njtransit.com

take note

Important Changes what's new for riders

A new weekday schedule is in effect due to the suspension of service to the Northern Monmouth Higher Education Center. All weekday trips will operate the regular route between Perth Amboy and Campbell's Junction.

MyTix, a feature of the NJ TRANSIT Mobile App, offers monthly bus passes for this route. Download the free app from the App Store℠ and Google Play™. More tickets available soon.

Contact Us
we're here to help

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Commendations/Complaints
Schedules, Fares and Lost & Found
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Service on this line is operated by Academy Express under contract with NJ TRANSIT.

T0817 - 10/16

To Campbell's Junction

Weekdays

PERTH AMBOY Hector St. at Washington St.	SOUTH AMBOY Broadway at Augusta St.	MORGAN Pine Ave at Parker St./Armstrong St.	OLD BRIDGE TWP. (Laurence Harbor) RT-35 at Laurence Pkwy.	CLIFFWOOD NJ 35 at Cliffwood Ave.	KEYPORT Broad St. at Front St.	UNION BEACH Front St. at Pine St.	KEANSBURG Carr Ave. at Center Ave.	PORT MONMOUTH NJ 36 at Main St.	MIDDLETOWN-Campbell's Junction Garfield Ave. at Leonardville Rd.
MAP REFERENCE									
1	2	3	4	5	6	7	8	9	10
507	529	534	537	542	548	553	606	618	620
554	619	624	627	632	638	643	656	708	710
654	719	724	727	732	738	743	756	808	810
754	819	824	827	832	838	843	856	908	910
854	919	924	927	932	938	943	956	1008	1010
954	1019	1024	1027	1032	1038	1043	1056	1108	1110
1054	1119	1124	1127	1132	1138	1143	1156	1208	1210
1154	1219	1224	1227	1232	1238	1243	1256	108	110
1254	119	124	127	132	138	143	156	208	210
154	219	224	227	232	238	243	256	308	310
254	319	324	327	332	338	343	356	408	410
354	419	424	427	432	438	443	456	508	510
454	519	524	527	532	538	543	556	608	610
554	619	624	627	632	638	643	656	708	710

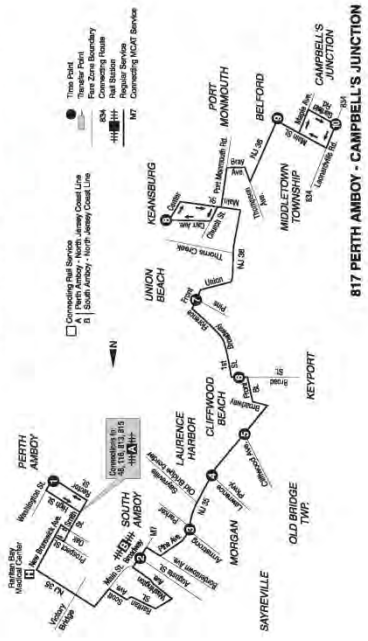
A.M. - Light face type

Saturdays

PERTH AMBOY Hector St. at Washington St.	SOUTH AMBOY Broadway at Augusta St.	MORGAN Pine Ave at Parker St./Armstrong St.	OLD BRIDGE TWP. (Laurence Harbor) RT-35 at Laurence Pkwy.	CLIFFWOOD NJ 35 at Cliffwood Ave.	KEYPORT Broad St. at Front St.	UNION BEACH Front St. at Pine St.	KEANSBURG Carr Ave. at Center Ave.	PORT MONMOUTH NJ 36 at Main St.	MIDDLETOWN-Campbell's Junction Garfield Ave. at Leonardville Rd.
MAP REFERENCE									
1	2	3	4	5	6	7	8	9	10
556	619	624	627	632	638	643	655	708	710
656	719	724	727	732	738	743	755	808	810
756	819	824	827	832	838	843	855	908	910
854	919	924	927	932	938	943	955	1008	1010
954	1019	1024	1027	1032	1038	1043	1055	1108	1110
1054	1119	1124	1127	1132	1138	1143	1155	1208	1210
1154	1219	1224	1227	1232	1238	1243	1255	108	110
1254	119	124	127	132	138	143	155	208	210
154	219	224	227	232	238	243	255	308	310
254	319	324	327	332	338	343	355	408	410
354	419	424	427	432	438	443	455	508	510
454	519	524	527	532	538	543	555	608	610

P.M. - Bold face type

All trips are operated with lift-equipped buses. NOTE: when traveling into or out of the Port Authority Bus Terminal or George Washington Bridge Bus Station, please call 1 (973) 275-5555 in advance for the location of an accessible boarding gate.



BOROUGH OF KEYPORT CODE
SECTION 25:1-16
ZONING SCHEDULE

District	Minimum Lot Requirements		Minimum Required Yard Depth						Maximum Percent of Lot Coverage by Buildings Inclusive of Accessory Buildings	Maximum Height		Maximum Percent Coverage		Maximum Percent of Lot Coverage by all Buildings and Impervious Surfaces
			Principal Building			Accessory Building								
	Area (square feet)	Lot Width (feet)	Front Yard (feet)	Minimum One Side Yard (feet)	Both Side Yards (feet)	Rear Yard (feet)	Side Yard (feet)	Rear Yard (feet)		Stories	Feet	Principal Building	Accessory Building	
RA and RA (PRD)	7,500	75[3] For Single Family, same as RA;	20	6	16 For Planned Residential Development - see section	15	3	3	40	2.5	30	30	10	60
RB														
1 family	7,500	75	20	6	16	15	3	15	40	2.5	30	30	10	60
2 family	7,500	75	20	6	16	20	3	15	40	2.5	30	30	10	60
RC														
1 family	7,500	75	20	6	16	15	3	15	40	2.5	30	30	10	60
2 family	7,500	75	20	6	16	20	3	15	40	2.5	30	30	10	60
NC	7,500	75	5	N/A	10	25	3	15	75	2	25	75	15	90
GC	N/A	N/A	N/A	N/A	N/A	N/A		N/A	85	3	35	85	15	90
GMC	10,000	100	20	6	16	20	6	16	35	3	35	35	15	90
HC	10,000	100	50	6	16	20	6	16	35	3.5	40	35	15	90
LI	12,500	100	15	6	16	25	6	16	50	3	40	50	10	90
I	15,000	100	15	6	16	25	10	10	50	3	40	50	10	90

N/A - Not Applicable

Note 1: Sections 25:1-14, 25:1-15 set forth general regulations which also govern the development of land and uses.

Note 2: No accessory structure shall be permitted in the required front yard area.

Note 3: This shall not apply to lots containing a 50' lot width and a minimum lot requirement of 5,000 square feet, as same were conforming prior to the adoption of Ordinance Nos. 22-03 ad 1-07. This shall also be deemed to apply to any such lot that may have been rendered nonconforming exclusively by the adoption of Ordinance No. 22-03.

(Ord. #13-90, §25:1-16; Ord. #22-03, §2; Ord. #4-05, §§1. 2, Ord. #1-07, §1)

Relative Salt Tolerance of Coastal Species

Plant Name	Salt Spray[1]	Salt Water[2]	Flooding[3]
SHRUBS and VINES			
Amorpha fruticosa-FACW **(Indigobush)**		X	*
Arctostaphyllos uva-ursi – NI **(Bearberry)**	*	*	*
Aronia arbutifolia-FACW **(Red chokeberry)**		*	*
Aronia melanocarpa-FAC **(Black chokeberry)**		*	*
Baccharis halimifolia-FACW **(Groundsel bush)**	X	X	X
Cephalanthus occidentalis-OBL **(Buttonbush)**		*	*
Clethra alnifolia-FAC+ **(Sweet pepperbush)**	*	*	*
Ilex glabra-FACW- **(Inkberry)**	*	*	X
Ilex decidua-FACW **(Possumhaw)**		*	*
Iva frutescens-FACW+ **(Marsh elder)**	X	X	X
Juniperus conferta-NI **(Seashore juniper)**	X	*	X
Lindera benzoin-FACW- **(Spicebush)**		*	*
Magnolia virginica-FACW+ **(Sweetbay)**		*	*

Plant Name	Salt Spray[1]	Salt Water[2]	Flooding[3]
Morella pensylvanica - FAC **(Bayberry)**	X	*	*
Myrica cerifera-FAC **(Wax myrtle)**	X	*	X
Parthenocissus quinquefolia-FACU **(Virgina creeper)**	*	*	*
Prunus maritima – NI **(Beach plum)**	X	*	X
Rosa carolina-NI **(Pasture Rose)**	*	*	X
Rosa rugosa – FACU- **(Rugosa rose)**	X	*	X
Rosa virginiana- FAC **(Virginia rose)**	*	*	*
Rhus copallina – NI **(Winged/Dwarf sumac)**	*	*	*
Salix discolor-FACW **(Pussy willow)**		*	*
Sambucus canadensis-FACW- **(Elderberry)**		*	*
Vaccinium corymbosum-FACW- **(Highbush blueberry)**	*		*
Viburnum dentatum-FAC **(Southern arrowwood)**	*		*
TREES			
Alnus serrulata-OBL **(Smooth alder)**			*

Plant Name	Salt Spray\1	Salt Water\2	Flooding\3
Amelanchier canadensis-FAC **(Serviceberry/Shadbush)**	*	*	*
Celtis occidentalis-FACU **(Hackberry)**	X		*
Juniperus virginiana-FACU **(Eastern Red Cedar)**	X	*	*
Ilex opaca- FACU+ **(American Holly)**	X	*	*
Populus deltoides – FAC **(Eastern cottonwood)**	*	*	*
GRASSES/GRASSLIKES			
Ammophila breviligulata-FACU- **(American beachgrass)**	X	X	X
Distichlis spicata-FACW+ **(Saltgrass)**	X	X	X
Juncus gerardii/roemarianus **(Blackgrass/Needlerush)**	X	X	X
Panicum virgatum-FAC **(Switchgrass)**	*	*	X
Panicum amarum-FACU- **(Bitter panicgrass)**	X	X	X
Panicum amarulum-FAC **(Coastal panicgrass)**	X	*	X
Schizachyrium scoparium var. littoralis-NI **(Seacoast bluestem)**	X	X	X
Scirpus tabernaemontanii-OBL **(Hardstem bulrush)**	*	*	*

Plant Name	Salt Spray[1]	Salt Water[2]	Flooding[3]
Scirpus americanus - OBL **(Three square)**	*	*	*
Scirpus robustus - OBL **(Saltmeadow bulrush)**	*	X	X
Spartina alterniflora-OBL **(Smooth cordgrass)**	X	X	X
Spartina cynosuroides-OBL **(Giant Cordgrass)**	*	*	*
Spartina pectinata-OBL **(Prairie cordgrass)**		*	*
Spartina patens-FACW+ **(Saltmeadow cordgrass)**	X	X	X
Tripsacum dactyloides-FACW **(Eastern Gamagrass)**	*	*	*
Typha angustifolia-OBL **(Narrow-leaf cattail)**	*	*	*
FORBS			
Hibiscus moscheutos- OBL **(Marsh hibiscus)**		*	*
Kosteletzkya virginica- OBL **(Seashore mallow)**		*	*
Lathyrus maritimus-FACU- **(Beach pea)**	X	*	*
Solidago sempervirens-FACW **(Seaside goldenrod)**	X	X	X

Notes:

\1. Salt Spray
X = tolerance to direct salt spray
* = tolerance to indirect/infrequent salt spray

\2. Salt Water (soil saturated)
X = strong tolerance (up to 25-35 ppt sodium chloride concentration)
***** = low/medium tolerance (up to 10-15 ppt sodium chloride concentration)

\3. Flooding tolerance = tolerance to infrequent flooding of brackish water.
X = strong tolerance (up to 25-35 ppt sodium chloride concentration)
* = low/medium tolerance (up to 10-15 ppt sodium chloride concentration)