Environmental Resource Inventory

City of Long Branch

Monmouth County, New Jersey

FEBRUARY 2023

PURPOSE & ACKNOWLEDGEMENTS

PURPOSE

"The Environmental Resource Inventory (ERI), or Index of Natural Resources, is a compilation of text, tables, maps and other visual information about the natural resource characteristics and environmentally significant features of an area. Traditionally called "Natural Resources Inventory," the title "Environmental Resources Inventory" is now commonly used, reflecting the addition of manmade features to the inventory, such as historic sites, brownfields and contaminated sites.

An ERI provides baseline documentation for measuring and evaluating resource protection issues. It is an objective index and description of features and their functions, rather than an interpretation or recommendation. Identifying significant environmental resources is the first step in their protection and preservation and in assuring that future development or redevelopment protects public health, safety, and welfare.

The ERI is an important tool for governing bodies, environmental commissions, open space committees, planning boards and zoning boards of adjustment. The planning board should adopt the ERI as part of the municipal master plan, either as an appendix or as a part of a master plan conservation element. As part of the master plan, the ERI can provide the foundation and documentation for master plan updates, ordinances, legal defense, open space or agricultural protection plans, protection of water resources, and many other municipal functions.

The ERI is a dynamic document, not cast in concrete. Like the municipal master plan, the ERI should be revised and re-adopted periodically to reflect new data and changed conditions. To inform this process, the environmental commission can maintain a running list of conditions and information that have changed for consideration during the next ERI update." – ***Reprinted with permission from ASSOCIATION OF NEW JERSEY ENVIRONMENTAL COMMISSIONS (ANJEC), RESOURCE PAPER from the MIMI UPMEYER COLLECTION 2013 - The Environmental Resource Inventory: ERI; https://anjec.org/wp-content/uploads/2019/07/ERI-2013.pdf***

ACKNOWLEDGEMENTS

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INTRODUCTION

An Environmental Resource Inventory (ERI) is a compilation of all of the environmental features and characteristics in a municipality. It integrates a variety of data from multiple sources to give the most complete description of natural and cultural resources, critical areas, and other environmental features. A detailed natural resources inventory serves to inform the planning process by providing a factual basis for land use decision-making. The mapping and description of sensitive areas facilitates their proper use and protection, the appropriate development of the few remaining vacant, privately-owned land parcels and the redevelopment of developed lands. It can serve in the refinement of zoning regulations and land use ordinances. The identification and understanding of natural systems and their inherent and regulatory limitations enhances effective management. The inventory can identify possibilities for regional partnerships and planning activities that can improve environmental conditions and quality of life in the City of Long Branch.

In June 2021, the City of Long Branch Long Branch Green Team (LBGT) was awarded a Smart Growth Planning Grant from the Association of New Jersey Environmental Commissions (ANJEC) to update its ERI. The City of Long Branch (City) partnered with ANJEC to fund the initial ERI.

The benefits of preparing an ERI include, but are not limited to:

- The ERI can be adopted as part of the City Master Plan offering justification for the implementation of ordinances pertaining to resource protection, conservation, and preservation.
- Another added benefit of the development of the ERI, particular to the City, has to do with Plan Endorsement. The City has remained engaged in Plan Endorsement since June 2007 and continued to retain its Regional Center designation which has an expiration date indicated on the state's website of 10/17/22 and may therefore require the City to re-apply to maintain this designation. An ERI is required as part of the Plan Endorsement process and upon completion, the ERI will be submitted to the State as part of the City's Petition.
- Submission to Sustainable Jersey for certification points and continued Silver Certification.
- Various sub-studies can be identified and performed in support of an overall ERI and environmental stewardship program. The list below indicates a series of City potential sub-study efforts, including some that have already been performed to some degree:
    - Takanassee Lake Water Quality.
    - Jackson Woods Invasive Species Control.
    - Manahassett Creek and Troutman's Creek Shoreline Stabilization.
    - Urban Forest Plan
    - Shade Tree Inventory
    - Dune & Beach Management Plan
    - Mosquito Habitat Evaluation(s)
    - Floodplain Management & Resiliency Plan
- The Resources identified will support existing City GREEN ORDINANCES & POLICIES (City of Long Branch, 2022).

The primary source of information for the ERI is the City's current 2009 Master Plan and 2020 Reexamination Report, research conducted under this assignment, and ERI guidance from ANJEC.

The ERI mapping is contained in **Appendix A**.

BACKGROUND

New Jersey's coastline is a rich and diverse fabric of natural wonders and economic engines that improve our quality of life and enrich our economy. Businesses, tourists, and residents are drawn to New Jersey's coast for its many economic and recreational opportunities. The Coastal economy contributes enormously to New Jersey's overall gross domestic product (GDP) – approximately $461 billion – according to NOAA Office for Coastal Management (NOAA Office for Coastal Management, 2022). Coastal land provides crucial habitat for a wealth of wildlife, including migrating birds, commercially valuable fish and shellfish, and sporting and recreational species.

Yet the State's coastline is under threat from human activities. Hasty, uncoordinated development along the New Jersey shore has already had an impact on this fragile ecosystem. Regulations are necessary to prevent pollution, destruction of vital wildlife habitat, increases in rainwater runoff, and destruction of the natural beauty that attracts visitors. Regulation of coastal activities is also necessary in some cases to prevent loss of life and property from coastal storms, erosion, and flooding.

The State of New Jersey has established several areas, and designated certain natural resources, within the State for extra protection. These sensitive environmental areas are managed through both 1.) Statutes or Laws; primarily known as NJ Statutes Annotated (NJSA) and 2.) Regulations; primarily known as NJ Administrative Code (NJAC). Rules and regulations, as well as other enforceable policies and documents have been adopted and established by the State to regulate development in sensitive environmental areas. A number of these areas and resources occur within the City of Long Branch and are therefore subject to certain Statutes and Regulations:

- New Jersey's Coastal Management Program (NJCMP)
- Coastal Wetlands
- Freshwater Wetlands & Transitional Areas from Uplands
- Tidelands
- Streams & associated Riparian Corridors
- Stormwater Management
- Pollutant Discharges

The various sensitive areas noted are administered through specific programs, of which many are Federal-State partnerships devoted to the sensible management across state lines with federal oversight. In New Jersey, statutes are implemented through rules that are codified in the New Jersey Administrative Code (the Code) (other states and the Federal government generally refer to their rules as "regulations"). The rules that are utilized by the Department of Environmental Protection and other environmental agencies are codified at Title 7 of the Code. Upcoming rule proposals, hearings, adoptions, and other information concerning amendments to the rules can be found by following the appropriate links on the NJDEP Rules & Regulations home page (https://www.state.nj.us/dep/rules/nj_env_law.html). There are many environmentally related subsections of New Jersey's rules that affect the City of Long Branch and may have bearing upon the overall environmental health of the community. However, while NJ Rules covers all aspects (for example) of environmental spills, this ERI is not necessarily focused on the details of how a spill occurred nor how to contain or clean-up a spill, but rather an inventory of the various environmental resources and/or hazards as it pertains to what is present within the community.

Notwithstanding, there are a few key sensitive environmental area programs that are noted here given the importance each lends to the overall environmental health of the community:

As noted earlier, the ERI consists of many other environmentally related aspects throughout the remainder of this ERI and, in many cases, include the backing of multiple programs, of which many are Federal-State partnerships devoted to the sensible management across state lines with federal oversight. It is not the intent of this report to reproduce all the statutory or rule-based requirements at the Local, State and/or Federal-levels but, rather draw attention to the environmental processes, the resources that are associated with certain natural processes and establish an inventory of environmental resources.

COMMUNITY INPUT

The ERI Plan Update for 2022 included the opportunity for public input via a web mapping utility. T&M Associates developed a simple point data layer and hosted an instructional session along with documentation on how the public could add various items related to the ERI. T&M hosted the community input website through ESRI ArcGIS Online as shown below in Figure 1. The community inputs were compiled into **Map 2** which identifies Key Areas within the City by ERI category.

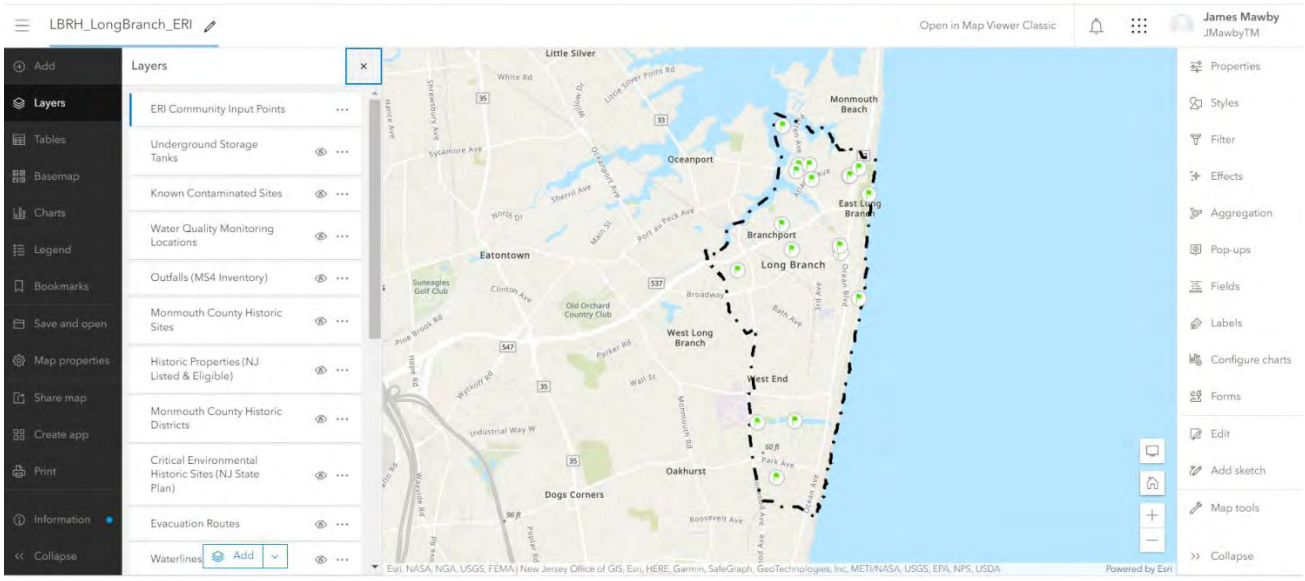

Figure 1- ArcGIS Online Community Input Webmap.

The public were able to specify point locations in which they could choose 1.) The ERI subject category or simply use an unidentified other category and 2.) A free-form text box to explain any information about the point being placed. T&M then utilized these inputs to create **Map 2** and also leverage the point locations on other maps in the series of maps created or updated from the previous plan. A total of fifteen (15) points were collected as follows:

Table 1- Community Input Points or Key Areas

ITEM	Category	Comments	More Comments
1	7a-Flooding-Stormwater Drainage	This area floods often	Even Streets appear wet in ortho image
2	6-Water-GENERAL	We've been concerned with the water quality	Green slime in warmer months
3	13-OTHER	Phragmites	Surrounds pond - wondering if negative impacts
4	7-Flooding-GENERAL	Flooding often	Often covering half the street
5	7-Flooding-GENERAL	Siltation causing flooding throughout watershed	Maybe green infrastructure along shoreline would help
6	11b-Transportation-Bike & Pedestrian	Sidewalk	Would be beneficial to have sidewalk between this point & Park Ave.
7	7-Flooding-GENERAL	Marine Place floods regularly during storms	Recent road repaving and drainage work improved the situation, but it still floods during big storms
8	11b-Transportation-Bike & Pedestrian	Parked cars on this section of Patten Ave make it extremely risky when riding your bike in this area	Traffic always speeds in this area, and the street is narrow, so cyclists need to ride in traffic and hope for the best
9	11b-Transportation-Bike & Pedestrian	No light and no crosswalk to go across Patten Ave or Florence Ave	Very tricky to make a left off Patten Ave onto Florence on your bike -- traffic comes over the bridge too fast. Biggest problem is in the summer, which of course is when cycling is most useful.
10	7-Flooding-GENERAL	The marshy area to the northeast of this road floods regularly during storms and standing water tears up the pavement	Although generally a quiet street, local resident street parking along with road curves make it treacherous to walk or cycle when there are cars traveling on it. I blew out a tire in a pothole avoiding one last year.
11	11b-Transportation-Bike & Pedestrian	Traffic light for crossing Ocean Ave. is unsafe. Takes too long to turn green so people often cross against the light. Traffic too fast through intersection, needs traffic slowing devices.	
12	11b-Transportation-Bike & Pedestrian	Atalntic avenue eastern end needs bike lane, parking needs to only be allowed on one side of street.	
13	5a-Natural Resources-Wetlands		
14	7-Flooding-GENERAL	This site is at the far end of the 7th Avenue Community Garden. After a natural gas pipeline was installed, the flooding on Lippincott Avenue right where the gas line is buried, got much worse.	
15	No information provided by user.	No information provided by user.	No information provided by user.

GEOGRAPHY

Regional Setting

The regional setting of a city is important because it establishes context. It is important to understand the regional physiography, geography, climate and geography, which are driving forces behind the localized formation of soils, plant and animal communities. These factors, in turn, affect the human context of land development and its regulation. Long Branch has its earliest colonial inhabitations dating back to the mid-1600's with a rich history of pre-colonial inhabitation by Native Americans from the Lenni Lenape of the Delawares having utilized the area as summer fishing grounds. The proximity of Long Branch along the Atlantic Ocean and situated near the Raritan Bay as well as the tidal Shrewsbury and Navesink Rivers. It is bordered to the south by Deal; to the west by the Township of Ocean, the Borough of West Long Branch, and the Borough of Oceanport; to the north by the Borough of Monmouth Beach; and to the east by the Atlantic Ocean (**Map 1**). Regional access to the City is gained by Highways 36 and 71 and via the New Jersey Transit North Jersey Coast Line.

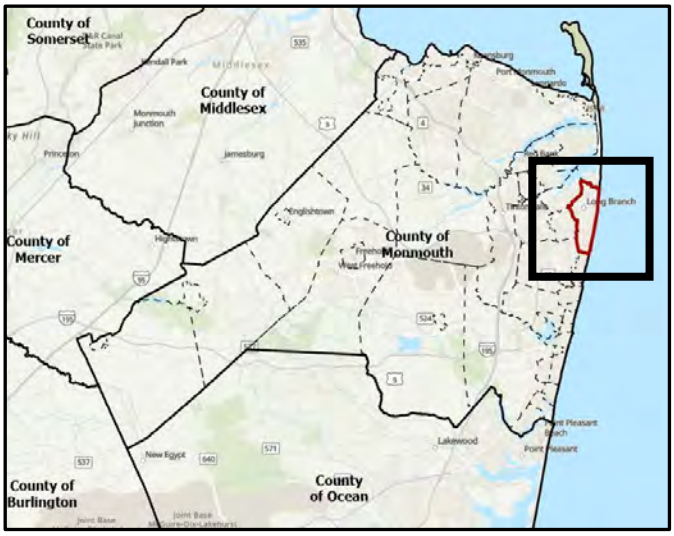

Figure 2 - Long Branch City in Monmouth County, NJ

Long Branch is well-known for its rich history of being a popular summer vacation spot along the New Jersey Atlantic Ocean coastline. At the turn of the 19th-century Long Branch hosted vacationing US Presidents which is the namesake of the county park – Seven Presidents County Park. The rich historical roots of this NJ Shore destination saw a popular rise due to the

various US Presidents vacationing and the City also experienced a decline after the Garden State Parkway opened and increased opportunities for visitors to explore other NJ Atlantic Coast destinations. In recent years, the City of Long Branch has been focused on restoring its reputation as a popular NJ Shore destination. To this end, there has been a series of redevelopment zones established along the Atlantic Ocean coastline. With the established success of the oceanfront redevelopment, attention is now also turning inland, and focus is also being applied to the more densely populated areas of the City center and peripheral mixed-use commercial/residential zones in an effort to be equitable and inclusive of people from all walks of life

City of Long Branch Location

The City of Long Branch is located in the northeastern portion of both the statewide Coastal Plain and also situated on the eastern coastline of Monmouth County, NJ. The NJ Coastal Plain is divided into multiple sub-regions or areas defined as inner/middle/ and outer neritic marine, marginal marine, and nonmarine environments. Long Branch is predominantly associated with the Inner Coastal Plain of New Jersey and being neritic in nature (i.e., shallow portions of the ocean landward of the continental shelf).

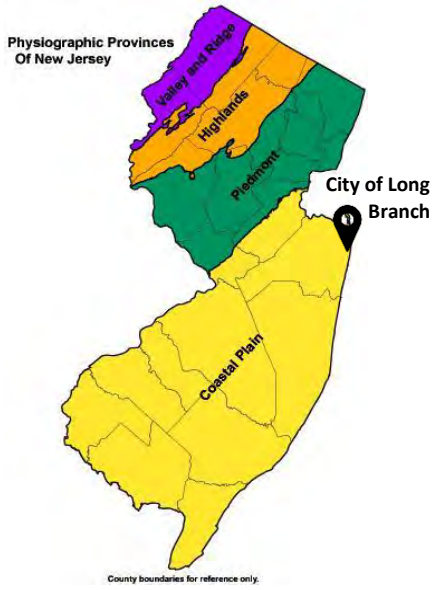

Figure 3 - New Jersey Physiographic Regions (NJDEP 2002)

Areas that have similar rock types, geologic structures, landforms, and geologic histories are organized into regions called physiographic provinces. New Jersey has five Physiographic Provinces, which make it a complex State for its small size. From northwest to southeast across the State, the provinces are known by the descriptive terms: (1) the Valley and Ridge, (2) Highlands, (3) Piedmont, (4) Inner Coastal Plain, and (5) Outer Coastal Plain. Each name refers to the rock belt that underlies the area. The City of Long Branch is located within the Inner Coastal Plain Province.

The Coastal Plain is characterized by unconsolidated sand, gravel, silt, and clay thickening seaward from a featheredge at the Fall Line to more than 6,500 feet (ft) thick in southern Cape May County (Gill and Farlekas 1976). The Coastal Plain Physiographic Province extends along the entire Atlantic Coast from Maine to the Gulf of Mexico. Differences in the amount and type of erosion, coupled with variability in underlying rock composition, influence the nature of sediments throughout the Coastal Plain. In general, the Atlantic Coastal Plain, including Long Branch, is flat and slopes gently seaward.

The City of Long Branch is located in the coastal portion of the Inner Coastal Plain Province of New Jersey, which begins with rolling hills at the Piedmont Fall Line gradually leveling off into its boundary with the Outer Coastal Plain. The Inner Coastal Plain is underlain by unconsolidated Cretaceous and lower Tertiary deposits. The fertile, loamy soil of the Inner Coastal Plain makes the land ideal for agriculture and is responsible for New Jersey's nickname, the "Garden State". The deposits of Greensand marl from the rich sediments contain potash, which was used since colonial days by farmers to fertilize their fields.

DEMOGRAPHY

The US Census Bureau defines demographics as the quantitative or statistical study of human populations. The relationship between populations and the movement of persons in- or out- of a geographic area can be tied to primary factors to include economics (jobs/income), state and/or local laws, the availability of housing, and crisis-driven movement due to natural or man-made disasters. Population vulnerabilities may also be tied to any one of these factors and therefore, as factors relating to environment are considered it is important to understand if trends in population are being driven by- or reacting to- any core factors. Population vulnerabilities are typically defined as a sub-category of core factors and may include limiting factors such as mobility which may be a function of age; for example, the inability of children, disabled or elderly persons to move. Other factors being considered in recent years also include the vulnerability associated with potentially disadvantaged persons and/or communities; for example, the current Presidential Justice40 Initiative and also efforts of the NJDEP Office of Environmental Justice. Please note that this ERI effort is not intended to examine all factors or details believed to categorize or define social vulnerabilities. Notwithstanding, the ERI does seek to identify information that may be related to an inventory of environmental resources.

According to the 2020 US Census, Long Branch has a Total population of 31,667 (**Map 3A**). The US Census Quick Facts reports an estimated total population of 32,383 for 2021 which indicates an increase of 2.3% over the 2020 Census. Additionally, population density (persons per square mile) increased from the 2010 Census from 5,824 to 6,180 per the 2020 Census. Interim and estimated population reports immediately preceding the 2020 Census indicated that the total population may be trending down (e.g., such as the American Community Survey 2018 vs 2019 indicated a slight population decrease of 0.31%), however it appears as though over the long-term total population is on the rise and is likely linked to both redevelopment efforts coupled with recent influx of persons relocating from adjacent metropolitan areas such as New York City. US Census Quick Facts reports median income at $62,027 for 2021, which is an increase over the 2019 ACS of $59,892.

Primary ethnic groups in Long Branch per the 2010 and 2020 US Census include White (Non-Hispanic) (52% increased to 55.7%), Hispanic or Latino (28.1% decreased to 27.7%), Black or African American (12.8% increased to 13.7%), Asian (2.1% decreased to 1.8%) and Native American (0.2% decreased to 0.0%). Generally, Long Branch indicates increases overall to persons of Black or African American descent. Ethnic groups have been mapped by Percent of Total population (**Map 3B**) where it can be seen that the majority of ethnic minorities are primarily concentrated in the vicinity between State Highway 36 in the north extending southward to Broadway between 6th Avenue and Ocean Boulevard along with other pockets of minority concentrations to the north, west and south – but not to the east (i.e., ocean side of Ocean Boulevard).

Table 2 - US Census QuickFacts (2021) – City of Long Branch Population Percent by Race and Hispanic Origin

Race and Hispanic Origin	**Percent**
White alone, percent	68.10%
Black or African American alone, percent	13.70%
American Indian and Alaska Native alone, percent	0.00%
Asian alone, percent	1.80%
Native Hawaiian and Other Pacific Islander alone, percent	0.00%
Two or More Races, percent	5.20%
Hispanic or Latino, percent	27.70%
White alone, not Hispanic or Latino, percent	55.70%

NOTES: *The statistics are not necessarily intended to add up to 100% given that the percentages listed are notated by the US Census based on respondent feedback and also may include non-linear methodologies to generate estimates.*

(a) White. A person having origins in any of the original peoples of Europe, the Middle East, or North Africa. It includes people who indicate their race as "White" or report responses such as German, Irish, English, Italian, Lebanese, and Egyptian. The category also includes groups such as Polish, French, Iranian, Slavic, Cajun, Chaldean, etc. (https://www.census.gov/quickfacts/fact/table/longbranchcitynewjersey,US/PST045222)

(b) White alone, not Hispanic or Latino are individuals who responded "No, not Spanish/Hispanic/Latino" and who reported "White" as their only entry in the race question. (https://www.census.gov/quickfacts/fact/table/longbranchcitynewjersey,US/PST045222)

Age can be a limiting factor or vulnerability (**Map 3C**) when certain environmental issues are taken into consideration; for example, extreme flooding events or natural disasters such as Hurricane Sandy, which is a well-known recent disaster that made landfall in NJ. The mobility of persons can be restricted by age alone (e.g., children) as well as elderly persons and persons with disabilities. Age-related vulnerability is mapped as persons 16-years old and younger, combined with persons 65-years old and older – and expressed as a percentage of the total population. It is significant to note that the age-based vulnerability is far-more distributed throughout the City – for example as compared to the concentration of ethnic minorities. It is for these reasons that communities have registries for citizens, often through local emergency departments such as the Police Department or Office of Emergency Management. Citizens are encouraged to consider registering any disabilities, restrictions or known vulnerabilities in advance of emergencies.

Low-income is often tied to vulnerability. Similar to age vulnerability, income may be a key factor related to whether persons or households have the means to respond effectively or recover from environmental issues such as extreme flooding events or natural disasters. The HHS Poverty Guidelines for 2022 indicates that income less than $46,630 for households of 8 persons (or) $13,590 for a single person dictates a poverty circumstance. 2020 US Census data has been extrapolated to map population at Income Risk (**Map 3D**) by mapping the percent of households reportedly earning less than $50,000. It is important to note however that the number of persons per household are not factored in the mapping because US Census data does not provide detail at an individual parcel or building level. Therefore, the mapping (**Map 3D**) should be considered a general proxy for considering income risk. The mapping indicates certain clusters of greater potential for income risk to include the area that includes the greatest density of minority populations, however there are other pockets that could be at-risk per the proxy mapping. It is important to note that the mapping (**Map 3D**) indicates that income vulnerability may exist in areas along the waterfront (both Ocean and Shrewsbury River system) which may seem counter-intuitive to the notion that only wealthy people and households exist along waterfront property. However, it is also important to note that FEMA's National Risk Index (NRI), which also leverages US Census data includes 1.) A 'Social Vulnerabilty' weighting system and 2.) The mapping also indicates that vulnerability may exist along waterfront areas. Notably, the FEMA NRI only offers data granularity at the Census Tract-level which is less-

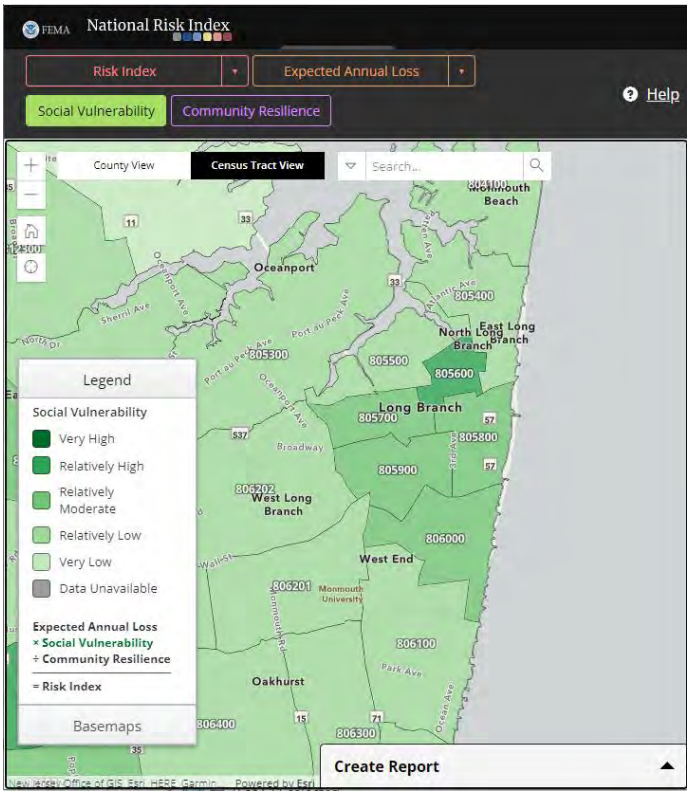

Figure 4 - FEMA National Risk Index - Social Vulnerability

detailed than what was utilized for the mapping of this report; this report utilized data at the Census Block-level. Further work in the future or in a separate effort may want to consider a more detailed methodology of seeking to distribute income data to parcels or building footprints which could be a means by which to incorporate persons per household.

HISTORY

The City of Long Branch has been able to retain a portion of its historical heritage, in part through the preservation of historic properties and districts. Properties that are listed or eligible for listing on the National and New Jersey Registers of Historic Places are identified (**Map 4**). The mapping reflects historic sites and districts by jurisdiction and is intended to provide the framework for considering environmental activities as they relate to planning the future of the City.

CULTURAL RESOURCE INVENTORY

Prehistoric Context
Before European settlers arrived, the Lenni-Lenape tribe occupied land adjacent to the Jersey shore, camping in woodlands referred to as the "Big Woods," during the winter and utilizing the abundant fisheries and shellfisheries resources along the shore in warmer seasons. Land encompassing the current City of Long Branch was purchased from the Lenni-Lenape for 20 shillings, or the equivalent of $170,000 (Hazard, 2010). No archaeological sites documenting this phase are listed in the New Jersey and National List of Historic Sites.

Historic Context
The historical times of the City of Long Branch are well-documented, in contrast to its prehistory. The first European settlers were associates of the Monmouth Patent. These settlers negotiated with the Lenni-Lenape to purchase lands including Long Branch and mainly took up farming the interior land, avoiding the coast at first. The name "Long Branch" comes from the municipality's location along the longest branch of the Shrewsbury River. In 1844, when the Jersey Coast was surveyed, the City of Long Branch perched on a 5-mile long and 20-foot-high bluff. Much earlier in the century, the City was already known as a premier seaside resort. In 1906, the rudimentary beginnings of a boardwalk were constructed along the ocean shore (Hazard, 2010). Due to its prominence as a premier seaside resort, the City of Long Branch attracted prominent people in business and the arts, including 7 Presidents of the United States, as seasonal and sometimes permanent residents. Because of this, the City of Long Branch has accumulated a wealth of historic architectural resources.

Historic resources in the City of Long Branch can be placed in at least three categories:

(1) Those listed on the New Jersey and National Registers of Historic Places;
(2) Properties eligible for listing as determined by the State Historic Preservation Office; and
(3) Locally identified historic resources.

Historic Preservation
Historic Resources must entertain regulations set forth by the State Historic Preservation Office (SHPO).

The National Register of Historic Places is the official list of the Nation's historic resources worthy of preservation, and the New Jersey Register is the official list of New Jersey's historic resources of local, state, and national interest. The New Jersey Register is maintained by the State Historic Preservation Office (SHPO) within the New Jersey Department of Environmental Protection (New Jersey Department of Environmental Protection, 2022). The sites listed in **Table 3** and located on the Historic Sites and Districts Map (**Map 4**) are listed on the State and/or National Registers of Historic Places; demolished sites are not listed.

Table 3 - State Historic Preservation Office (SHPO) Listed Properties as of 2022.

SHPO Listed Properties (T&M 2022)		
Site Name & Inventory Number	**Location**	**Designation**
"Chauncey Jerome" Shipwreck Site ID	Offshore of Seven Presidents Park	SR: 1/5/96 NR: 3/1/96 (Ref. # 96000205)
Church of the Presidents (St. James Church) ID #2006	1260-1266 Ocean Avenue	SR: 10/17/75 NR: 11/7/76 (Ref. # 76001169)
North Long Branch School (Primary No. 3; Church Street School) ID #48	469 Church Street	SR: 5/27/99 NR: 7/28/99 (Ref. # 99000906)
Long Branch Post Office ID #2008	60 Third Avenue	SR: 1/31/86
Gregory Primary School (ID#5245)	157 North 7th Avenue	SR: 8/23/2012 NR: 10/24/2012 (NR Reference #: 12000880)

Properties eligible for listing have been issued a SHPO Opinion, which is an opinion of eligibility issued by the State Historic Preservation Officer (SHPO). This opinion is in response to a federally funded activity, such as a road project, that will have an effect on historic properties not listed on the National Register (T&M 2022). There are eleven other eligible or "opinioned" historic sites in the City (**Table 4** & **Map 4**).

Table 4 - State Historic Preservation Office (SHPO) Eligible Properties as of 2022.

SHPO Eligible Properties (T&M 2022)		
Site Name & Inventory Number	**Location**	**Designation**
468 Ocean Avenue ID #2009	468 Ocean	SHPO Opinion: 12/27/76
Patten Point Yacht Club ID #4014	676 Patten	SHPO Opinion: 6/5/2002
St. Michael's R.C. Church ID #4647	796 Ocean	SHPO Opinion: 8/29/2006
Summer Cottage ID #43530	109 Park Avenue	SHPO Opinion: 8/20/2004
US Lifesaving Station #5 & Takanassee Beach Club Historic District ID #4646	805 Ocean Avenue & District	SHPO Opinion: 8/29/2006
Broadway School ID #3352	540 Broadway	SHPO Opinion: 1/3/1985
Adonis/Rusland Shipwreck Site (ID#5336)	Offshore	SHPO Opinion: 9/19/1990
44 Atlantic Avenue (ID#2002)	44 Atlantic	SHPO Opinion: 12/27/1976
58 Chelsea Avenue (ID#2005)	58 Chelsea	SHPO Opinion: 12/27/1976
New York and Long Branch Railroad Historic District (ID#4354)		SHPO Opinion: 8/20/2004
Ocean Avenue Bridge (ID#4326)	Ocean Avenue over Lake Takanassee	SHPO Opinion: 2/19/1997

Monmouth County keeps a "Monmouth County Historic Sites Inventory" (Monmouth County Park System GIS (MCPSGIS), 2022) which includes all properties considered to have historical significance, in addition to those recognized by the National and New Jersey Historic registers (NJ DEP - Historic Preservation Office, 2022). **Table 5**, below, provides a list of the inventoried properties that were still intact as of 7/15/2022. These sites can also be found on **Map 4**.

Table 5 - Monmouth County Historic Sites Inventory of Long Branch for 2022.

Monmouth County Historic Sites Inventory – Long Branch (T&M 2022)	
Site Name or Inventory Number	**Address**
Presley Garage	45 Atlantic Ave.
(1325-3)	573 Berdan Place
(1325-4)	99 Branchport Avenue
(1325-5)	207 Branchport Avenue
Slocum House (1325-6)	291 Branchport Avenue
Hotel Norwood (1325-7)	336 Branchport Avenue
Long Branch Record Building (1325-9-2)	192 Broadway
St. Luke's M.E. Church (1325-10)	NE cr. Broadway and Washington Street
Garfield Grant Hotel (1325-11)	275 Broadway
(1325-12)	290 Broadway
St. James Episcopal Church (1325-13)	300 Broadway
Long Branch Public Library (1325-14)	328 Broadway
(1325-15)	415 Broadway
(1325-16)	426 Broadway
(1325-17)	479 Broadway
Broadway School (Primary No. 1)	540 Broadway
First Reformed Church (1325-19)	646 Broadway
(1325-21)	143 Cedar Ave.
Star of the Sea Lyceum (1325-24)	NE cr. Chelsea Avenue and Third Avenue
(1325-25)	127 Chelsea Avenue
(1325-27)	163 Chelsea Avenue
Benjamin White House (1325-28)	464 Church Street
(1325-29)	25 Fifth Avenue
Elberon Hotel Cottage	2 Garfield Rd.
(1325-31)	77 Grand Avenue
(1325-32)	29 Jackson Avenue
(1325-33)	331 Liberty Street
Gerard House (1325-35)	55 Lincoln Avenue
Fraley House (1325-36)	100 Lincoln Avenue
Elberon Library (1325-37)	168 Lincoln Avenue
(1325-38)	389 Morris Avenue
The Reservation/ Navaho Lodge (1325-39)	NW of Seven Presidents Park, (40.316988, -73.978144)
Theodore Moss House	290 Ocean Ave.
(1325-41)	468 Ocean Ave.
(1325-42)	475 Ocean Ave.
St. Michael's Roman Catholic Church	796 Ocean Ave.
Benjamin Watson Leigh House	851 Ocean Ave.
Sea Cliff Villa/James M. Brown House (1325-46)	981 Ocean Avenue
(1325-47)	1035 Ocean Avenue
Saint James Chapel	1260 Ocean Ave.
Elberon Memorial Presbyterian Church (1325-50)	70 Park Avenue
Flinn House (1325-51)	67 Pearl Street

Site Name or Inventory Number	Address
(1325-53)	140 Second Avenue
Long Branch Post Office	60 3rd Ave.
First Presbyterian Church (1325-55)	SW cr. Third Avenue and Chelsea Avenue
Murray's Inn (1325-56)	103 West End Avenue
Hulick House (1325-57)	119 West End Avenue
Hulick House (1325-58)	123 West End Avenue
Windmill Restaurant (1325-59)	SW cr. West End Plaza & Montgomery Avenue
(1325-60)	692 Westwood Avenue
Asbury M.E. Church (1325-61)	61 Atlantic Avenue
Star of the Sea Church (1325-62) *Christ the King Parish*	101 Chelsea Avenue
North Long Branch School	469 Church St.
Simpson Memorial M.E. Church (1325-64)	206 Garfield Avenue
(1325-66)	337 Liberty Street

Scenic Resources & Vistas

Long Branch is a well-known coastal destination within the localized area of Monmouth County and has rich history of having been a vacation destination of past presidents. Given the coastal setting of the City, it likely goes without saying that a view along the ocean front would automatically be considered scenic in nature. Notwithstanding, a scenic vista typically indicates an elevated viewpoint in addition to natural scenery. Long Branch has a peak elevation of approximately 77-feet above sea level. Generally speaking, the City has two primary areas of high ground that could potentially be considered vista vantage points 1.) The vicinity north of Elberon Elementary School along the east and west sides of Van Court Avenue and 2.) The vicinity around Oakhill Apartments along the border with West Long Branch Borough. While these high points do not entirely provide expansive views, if properties become available for either historic preservation and/or for use as open space, the City may want to consider opportunities to acquire properties with higher elevations to provide more expansive views. Therefore, the existing inventory of open space and parks provides the core resource of scenic locations. Again, Long Branch being a coastal location, includes the natural benefit and scenery associated with the oceanfront and also includes back-estuary locations (Shrewsbury River system). Given the preceding discussion, **Map 5** has been created to demonstrate elevations via (NJ 10-Foot Digital Elevation Model), vacant properties and existing open space to indicate locations of both scenic resources (existing open space) and the potential for the addition of elevated scenic locations (vacant land).

LANDUSE

Zoning

The City's Zoning is depicted on **Map 6**. The City's 2020 Master Plan Reexamination Report should be considered regarding recent details pertaining to Zoning. However, the Proposed Additions to the Zoning Code are provided here as they offer background and context pertaining to the ERI. And specifically, it should be noted that the item pertaining to the ***tree inventory*** and ***landscaping requirements*** could be considered zoning improvements in support of environmental stewardship.

The following items shall be addressed to advance the goals and objectives of the 2020 Master Plan Reexamination.

- Front yard setbacks of a minimum of 5 feet and a maximum 15 feet should be established in zoning districts that allow for zero (0) foot front yard setbacks. The additional setback should be utilized for additional sidewalk widths, outdoor dining, landscaping and street furniture.
- Develop building and site design standards for future buildings & projects that create distinctive buildings and projects that promote the City's history and image as a world-class place to live and visit.
- Establish lighting standards to ensure there are not detrimental lighting spillover effects to surrounding properties and roadways with lighting installations.
- ***Establish a tree ordinance that promotes replanting after the removal of trees and the use of native species in tree plantings and landscaping.***
- ***Provide landscaping requirements for all zoning districts and redevelopment areas.***
- Provide standards for single-family and two-family through-lots to accommodate accessory uses such as sheds, garages and pools, without requiring homeowners to receive approval from the Zoning Board for accessory uses in the front yard.

Existing Land Use and Land Cover

The City's land area of approximately 5.2 square miles is intensively developed and can be considered close to a build-out scenario in terms of development coverage. Long Branch has a population density that is ranked within the top fifteen percent of the most densely populated municipalities of NJ; while this is much less than major cities such as Union, Hoboken, or Jersey City – it still indicates that Long Branch is relatively densely populated and developed location.

Existing Land Use (**Map 7**) displays the following distribution:

Table 6 - Existing Land Use By Parcel Property Class with Parcel Counts, Acreages & Percent of Total.

Existing Land Use (T&M 2022)			
Land Use Category (Parcel Property Class)	**Parcel**	**Parcel Acres**	**% of Total Acres**
Unknown (<Null>)	38	66.2	2%
Apartment	143	163.0	5%
Church and Charitable Property	74	63.9	2%
Class I Railroad Property	25	37.6	1%
Class II Railroad Property	5	4.4	0%
Commercial	422	207.9	6%
Industrial	4	7.8	0%
Other Exempt properties not included	200	185.3	5%
Other School Property	6	8.9	0%
Public Property	253	282.5	8%
Public School Property	33	95.3	3%
Residential (four families or less)	8612	1493.3	44%
Vacant Land	622	151.3	4%
Right of Way & Roads	N/A	604.6	18%
TOTAL	**10437**	**3372.0**	**100%**

The parcel-based land use was analyzed utilizing Property Class of the MOD-IV GIS data (New Jersey Office of GIS (NJ OGIS), 2022); These data show that 162 acres (5.9%) of the City's 2767.4 acres (excluding streets and public rights of way) are currently devoted to parks and open space located primarily on the oceanfront, including the beach and promenades (25.98 acres), and Seven Presidents Park & Skate Park (39 acres). Other significant waterfront open space areas include Takanassee Lake Park (17.15 acres), Ross Lake Park (4.54), and Manahassett Creek Park (20.9 acres). Most of these parks and public open space areas provide habitat (e.g., urban forest) and public access to the water bodies.

Table 6 above indicates that 151.3 acres of public and private vacant land exists in the City. The Existing Land Use Map (**Map 7**) shows that several of the private vacant parcels have ocean frontage and may be valuable as new scenic waterfront/ocean park opportunities (see also **Map 5**).

Proposed Land Use and Land Cover

The City's planned and future land use or land cover is managed by the City's Master Plan and falls under the Planning and Zoning Department for the daily management of applications for development/redevelopment. The City is fairly built-out and is considered an urbanized area; however, the City is also not as densely populated and developed as compared to New Jersey's major city landscapes. At its heart, the City of Long Branch is a NJ Shore Community; for example, Long Branch is listed as a New Jersey Beach Town by VISITNJ, a state-run promotional campaign run by the state (NJ Department of State, Division of Travel and Tourism, 1996-2022). Therefore, future development will be a function of guiding documents, vacant parcels, zoning and/or redevelopment zones and the various environmental resources noted within this ERI.

Users of this document are strongly encouraged to consult the City's Planning & Zoning Department for guiding documents such as the City's Master Plan and 2020 Reexamination. Specific to the Reexamination recommendations or conclusions which are listed here regarding Land Use; those items considered to be well-related to the ERI are emphasized:

- Provide the proper zoning and development mechanisms to promote the revitalization of areas off of the waterfronts.
- Create clear and concise zoning standards that limit the number of cross-references to other sections of the zoning ordinance.
- Improve the appearance of the gateway areas into the City, including Broadway, Joline Avenue, Ocean Avenue, Branchport Avenue and the Elberon and Long Branch Train Stations.
- Amend the existing redevelopment plans with commercial land use standards that do not fit the current economy.
- ***Establish a landscaping and tree planting/preservation ordinance.***
- Ensure that there is a sufficient affordable housing supply and affordable housing opportunities in the City.
- Create public art spaces and place-making throughout the city to promote the arts, culture, diversity and history of Long Branch.
- ***Continue to enforce the property maintenance codes to protect the quality of life in all neighborhoods.***

Proposed or future land use potential is captured through the themes noted above within **Map 8**; *Vacant Land* as an indicator of new development opportunities coupled with the *Primary Redevelopment Areas* currently defined.

Pedestrian & Bicycle Use

The ERI Plan Update Community Input points included a number of items related to both pedestrian and bicycle use as indicated in the list of items below:

ITEM	Category	Comments	More Comments
6	11b-Transportation-Bike & Pedestrian	Sidewalk	Would be beneficial to have sidewalk between this point & Park Ave.
8	11b-Transportation-Bike & Pedestrian	Parked cars on this section of Patten Ave make it extremely risky when riding your bike in this area	Traffic always speeds in this area, and the street is narrow, so cyclists need to ride in traffic and hope for the best
9	11b-Transportation-Bike & Pedestrian	No light and no crosswalk to go across Patten Ave or Florence Ave	Very tricky to make a left off Patten Ave onto Florence on your bike -- traffic comes over the bridge too fast. Biggest problem is in the summer, which of course is when cycling is most useful.
10	7-Flooding-GENERAL	The marshy area to the northeast of this road floods regularly during storms and standing water tears up the pavement	Although generally a quiet street, local resident street parking along with road curves make it treacherous to walk or cycle when there are cars traveling on it. I blew out a tire in a pothole avoiding one last year.
11	11b-Transportation-Bike & Pedestrian	Traffic light for crossing Ocean Ave. is unsafe. Takes too long to turn green so people often cross against the light. Traffic too fast through intersection, needs traffic slowing devices.	
12	11b-Transportation-Bike & Pedestrian	Atalntic avenue eastern end needs bike lane, parking needs to only be allowed on one side of street.	

Our recommendation for the specific inclusion of dedicated pedestrian and/or bicycle paths (e.g., via formal striping or dedicated lanes or dedicated paths) as they relate to land use and associated zoning setbacks is best approached by the City Administration through the goals and objectives of the City's Master Plan.

NATURAL RESOURCES

CLIMATE

New Jersey is located about halfway between the Equator and the North Pole, on the eastern coast of the United States. Its geographic location results in the State being influenced by wet, dry, hot, and cold airstreams, making for daily weather that is highly variable. The Garden State is 166 miles long from north to south, and its greatest width is about 65 miles. While this may not seem too large, there is a marked difference in climate between Cape May in the south and the Kittatinny Mountains of northwestern New Jersey.

Dominant atmospheric circulation over North America, to include New Jersey, includes a pattern of airflow from west to east across the middle latitudes. This airflow pattern can be described as a "prevailing westerly" which may fluctuate and shift north and south and vary in intensity during the year. Long Branch, being situated near the mid-line of the state and along the Atlantic Coast experiences average summertime high temperatures of 84 degrees in July and winter lowsin January of near 24 degrees. Long Branch typically experiences 48 inches of rain, on average, per year as compared to the US average of 38 inches of rain per year. Long Branch averages 25 inches of snow per year; slightly less than the US average of 28 inches per year due to the warming effects of the ocean on the lower atmosphere. On average, there are 213 sunny days per year in Long Branch versus the US average of 205 sunny days. And, Long Branch typically experiences precipitation, on average roughly 115 days per year.

The National Oceanic and Atmospheric Agency (NOAA) operated a climate monitoring station in Long Branch (Station #284987) from Jan. 1, 1874 - Jan. 4, 2007 (with a 19-year hiatus) for which data is available on the web sites of the (ONJSC) and the Natural Resources Conservation Service. All stations in New Jersey have registered temperature readings of 100 degrees Fahrenheit (F) or higher and have records of 0 degrees F or below. The average monthly temperatures range from 31.7 to 74.1 degrees F at this station. The monthly average daily minimum temperatures recorded at the Oakhurst-Long Branch monitoring site were 22.8 to 65.5 degrees F in January and June, respectively. The average monthly maximums range from 40.6 degrees F to 82.6 degrees. Average monthly temperatures, average daily minimum and maximum temperatures extending to the year 2000 are depicted in **Table 7**. The monthly temperatures above freezing constitute a growing season that extends from approximately March 25 to November 20 in the City of Long Branch (Robichaud, Collins & Anderson 1994).

Long Branch being situated in the NJ Coastal Climate Region, continental and oceanic influences battle for dominance on daily to weekly bases. In autumn and early winter, when the ocean is warmer than the land surface, the Coastal Zone will experience warmer temperatures than interior regions of the state. In the spring months, ocean breezes keep temperatures along the coast cooler. Being adjacent to the Atlantic Ocean, with its high heat capacity (compared to land), seasonal temperature fluctuations tend to be more gradual and less prone to extremes. Sea breezes play a major role in the coastal climate. When the land is warmed by the sun, heated air rises, allowing cooler air at the ocean surface to spread inland. Sea breezes often penetrate 5-10 miles inland, but under more favorable conditions, can affect locations 25-40 miles inland. They are most common in spring and summer. Coastal storms, often characterized as nor'easters, are most frequent between October and April. These storms track over the coastal plain or up to several hundred miles offshore, bringing strong winds and heavy rains. Rarely does a winter go by without at least one significant coastal storm and some years see

upwards of five to ten. Tropical storms and hurricanes are also a special concern along the coast. In some years, they contribute a significant amount to the precipitation totals of the region. Damage during times of high tide can be severe when tropical storms or nor'easters affect the region.

Table 7 - Combined Climate Normals for National Oceanic and Atmospheric Agency (NOAA) Oakhurst-Long Branch Climate Monitoring Site.

NJ Monthly/Annual Normals (ONJSC)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
Maximum Temperature (°F) Reported 2010 (Data 1971-2000)	40.6	42.4	49.5	58.6	67.9	77.1	82.6	81	75.1	64.7	55.4	45.7	61.7
Maximum Temperature (°F) Reported 2020 (Data 1991-2020)	41.8	43.1	49.2	58.9	68.3	77.8	83.5	81.8	76.2	65.5	55.6	46.9	62.4
Minimum Temperature (°F) Reported 2010 (Data 1971-2000)	22.8	24.4	32.1	40.1	50.2	60	65.5	64	56.9	45.4	36.7	28.3	43.9
Minimum Temperature (°F) Reported 2020 (Data 1991-2020)	24.8	25.9	32.3	41	50.8	60.9	66.8	65.4	58.9	46.9	37.3	30	45.1
Mean Temperature (°F) Reported 2010 (Data 1971-2000)	31.7	33.4	40.8	49.4	59.1	68.6	74.1	72.5	66	55.1	46.1	37	52.8
Mean Temperature (°F) Reported 2020 (Data 1991-2020)	33.3	34.5	40.8	50	59.5	69.3	75.1	73.6	67.6	56.2	46.4	38.4	53.7
Precipitation (inches) Reported 2010 (Data 1971-2000)	4.12	3.3	4.16	4.17	4.46	3.25	4.47	5.04	4.01	3.78	3.97	3.9	48.63
Precipitation (inches) Reported 2020 (Data 1991-2020)	4.2	3.31	4.33	3.91	4.13	4.34	4.4	6.27	4.33	4.71	3.82	4.78	52.53
Heating Degree Days (below 65°F) Reported 2010 (Data 1971-2000)	1032	885	750	469	200	26	0	2	50	317	569	868	5168
Heating Degree Days (below 65°F) Reported 2020 (Data 1991-2020)	982	854	752	456	200	31	1	1	45	285	557	823	4986
Cooling Degree Days (above 65°F) Reported 2010 (Data 1971-2000)	0	0	0	0	15	132	280	236	79	8	0	0	750
Cooling Degree Days (above 65°F) Reported 2020 (Data 1991-2020)	0	0	0	4	31	161	315	268	121	12	0	0	913

Heating & Cooling Degree Days

A useful measure connecting temperature and potential energy usage are degree days. A degree day is a quantitative index demonstrated to reflect demand for energy to heat or cool houses and businesses. This index is derived from daily temperature observations at nearly 200 major weather stations in the contiguous United States. The "heating year" during which heating degree days are accumulated extends from July 1st to June 30th and the "cooling year" during which cooling degree data are accumulated extends from January 1st to December 31st. A mean daily temperature (average of the daily maximum and minimum temperatures) of 65°F is the base for both heating and cooling degree day computations. Heating degree days are summations of negative differences between the mean daily temperature and the 65°F base; cooling degree days are summations of positive differences from the same base (NOAA. NWS 2005). The heating and cooling degree days for the Long Branch-Oakhurst Station are depicted in **Table 7 - Combined Climate Normals for National Oceanic and Atmospheric Agency (NOAA) Oakhurst-Long Branch Climate Monitoring Site.**

Precipitation

In the State of New Jersey, the average annual precipitation ranges from about 40 inches along the southeast coast to 51 inches in north-central parts of the State. Coastal storms, often called "nor'easters", frequently occur between October and April and can constitute a large proportion of the yearly precipitation amounts when they occur. These storms mainly impact coastal areas and may extend up to several hundred miles offshore, bringing strong winds and heavy rains. Typically, at least one significant coastal storm occurs each winter, although as many as ten storms can be experienced in a season some years. Tropical storms and hurricanes, with their strong winds and storm surges can be extremely damaging to the natural and built environments. **Table 7** shows the average monthly precipitation amounts recorded at the Long Branch-Oakhurst weather stations. Snowstorms in at the Long Branch- Oakhurst station produce an average of 22.3 inches of snowfall per year (ONJSC 2020).

Temperature

The monthly mean temperatures in coastal New Jersey, which includes portions of Atlantic, Cape May, Monmouth, and Ocean counties within 10 miles of the coast measured from 1895-2010 has been rising. Between 1895 and 1970 the mean of monthly temperatures was 53.0 degrees F, between 1971 and 2000 the mean was 54.1 degrees F, and between 2001 and 2009 the mean of monthly temperatures was 55.5 degrees F (ONJSC 2010). **Table 7** indicates that for the reporting years of record the trend upwards still holds that temperature appears to be rising approximately 1-degree over the life of the years reported.

AIR QUALITY

According to the NJ DEP, exposure to air toxics is a widespread problem that occurs throughout the entire state.

These pollutants come from a variety of sources, including traditional industrial and utility sources, smaller manufacturing and commercial sources, mobile sources (such as diesel trucks, cars and buses), construction equipment and residential

activities (such as oil burning for home heating or using gas-powered lawn equipment). Air pollutants can be broken down into two Categories: Criteria Pollutants and Air Toxics (NJDEP, 2023).

The US EPA monitors air quality and data via state, local or tribal monitoring agencies. Within New Jersey, the NJDEP monitors air quality through the DIVISION OF AIR QUALITY. There are six pollutants for which the USEPA has set National Ambient Air Quality Standards (NAAQS). These are known as Criteria pollutants. They are ozone, sulfur dioxide, carbon monoxide, nitrogen dioxide, particulate matter, and lead. For many years, they have been addressed throughout the country through a standard planning process, and the concentrations of these pollutants in the air have been extensively monitored and tracked for compliance with the air quality standards. The standards are established by the U.S. Environmental Protection Agency (USEPA), and monitoring is carried out by state, local and tribal governments to determine whether the standards are being met (NJDEP, 2023).

Both USEPA and NJDEP host data and air quality monitoring web sites that enable access to air quality status. For example, the following resources are available:

- USEPA AirNow (https://www.airnow.gov/)
- NJDEP DIVISION OF AIR QUALITY — AIR MONITORING (https://www.nj.gov/dep/airmon/)

The NJDEP operates 30 air monitoring stations throughout the state, keeping track of NJ air quality in support of state-level commitments to revitalize NJ communities and protect human health. The closest air quality monitoring station to the City of Long Branch is located at Monmouth University in West Long Branch Borough; however, this station ONLY monitors ozone.

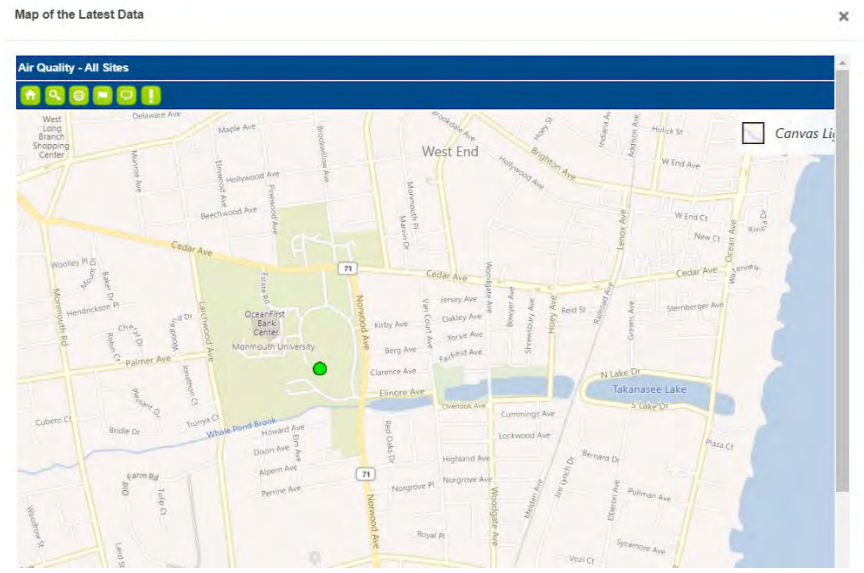

Figure 5 - NJDEP Ozone Air Quality Monitoring Station at Monmouth University (NJDEP 2023).

Notably, state-level monitoring data are considered final when the data are reviewed by the USEPA under its AirToxScreen program. The EPA then develops a series of air quality monitoring data, reports, graphs and trend charts for certain major cities and/or metropolitan geographies. While there is a monitoring station very close to Long Branch at Monmouth University, the prepared products from the USEPA are not produced for the Monmouth University station, rather air quality outputs are made available at the county-level for Monmouth County when and if approved data are available.

Of the 181 air toxics that USEPA included in its 2018 AirToxScreen, about one-third do not have toxicity values, or corresponding health benchmarks. For those that do, analysis of the state and county average air toxics concentrations indicates that 14 of the pollutants are "of concern" within New Jersey because they were predicted to exceed their health benchmarks in one or more counties. Predicted concentrations of these pollutants vary around the state, depending on the type of sources that emit them. The NJ DEP has mapped the spatial variation in modeled air concentrations (at the census-tract level) for the fourteen chemicals of concern within New Jersey. This report does not seek to reproduce the entirety of data available from the NJDEP Air Quality resources and therefore users of this document are encouraged to see NJDEP Division of Air Quality, Air Toxics at https://dep.nj.gov/airplanning/airtoxics/ (NJDEP, 2023).

NJDEP 2018 Air Toxics of Greatest Concern

2018 Chemicals of Concern in New Jersey

Pollutant	Number of Counties Above Health Benchmarks	Primary Source Category
Acetaldehyde	21	Secondary/Background
Arsenic	1	Mobile
Benzene	21	Mobile
1,3-Butadiene	6	Mobile
Cadmium Compounds	1	Nonpoint
Carbon Tetrachloride	21	Background
Chromium VI	4	Point
Diesel Particulate Matter	21	Mobile
Ethylene Oxide	8	Point
Formaldehyde	21	Secondary/Background
Hydrazine	1	Point
4-4' Methylene bis(2-chloroaniline)	1	Point
Naphthalene	16	Nonpoint
Nickel Compounds	1	Point

Figure 6 - NJDEP 2018 List of Air Quality Chemicals of Concern

The following includes NJDEP's breakdown of these toxics and their source types for Monmouth County:

Table 8 - Monmouth County AVG 2018 AirToxScreen Modeled Air Concentrations Compared to Health Benchmarks (NJDEP 2022)

Monmouth County Average 2018 AirToxScreen Modeled Air Concentrations Compared to Health Benchmarks								
Pollutant	Modeled Air Concentration ($\mu g/m^3$)	Health Benchmark ($\mu g/m^3$)	Risk Ratio	% Contribution by Source Category				
				Point Sources	Nonpoint Sources	Onroad Mobile	Nonroad Mobile	Background & Secondary
1,3-Butadiene	0.019	0.033	0.56	4	29	35	32	0
4-4' Methylene bis(2-chloroaniline)	--	0.0023	--	--	--	--	--	--
Acetaldehyde	0.68	0.45	**1.5**	0	6	3	2	89
Arsenic compounds	0.000079	0.00023	0.34	7	7	50	36	0
Benzene	0.34	0.13	**2.6**	2	37	32	29	0
Cadmium Compounds	0.000047	0.00024	0.19	50	26	0	24	0
Carbon tetrachloride	0.38	0.17	**2.2**	0	0	0	0	100
Chromium VI	0.000024	0.000083	0.29	67	25	5	3	0
Diesel Particulate Matter	0.25	0.0033	**77**	0	0	39	61	0
Ethylene oxide	0.000048	0.0002	0.24	94	6	0	0	0
Formaldehyde	0.98	0.077	**13**	1	6	2	3	88
Hydrazine	0.0000014	0.0002	0.0070	100	0	0	0	0
Naphthalene	0.029	0.029	**1.0**	4	71	14	11	0
Nickel compounds	0.00042	0.0021	0.20	26	12	12	50	0

- Chemicals with risk ratios greater than or equal to 1 are in **bold**.
- Risk ratios based on noncarcinogenic effects are in *italics*.
- The symbol $\mu g/m^3$ is micrograms per cubic meter, the amount (in micrograms) of a chemical in a cubic meter of air. This is also known as a concentration.
- For diesel particulate matter, onroad and nonroad concentrations include a model-estimated background concentration.

*Acetaldehyde and formaldehyde concentration estimates include secondary formation, which is the process by which chemicals in the air are transformed into other chemicals.

These data are mapped and available on a recurring basis at:

https://dep.nj.gov/airplanning/airtoxics/2018-risk-results-for-nj/#new-jersey-risk-maps

Ozone

The following offer a snapshot of recent 2022 ozone data year to date for Monmouth County:

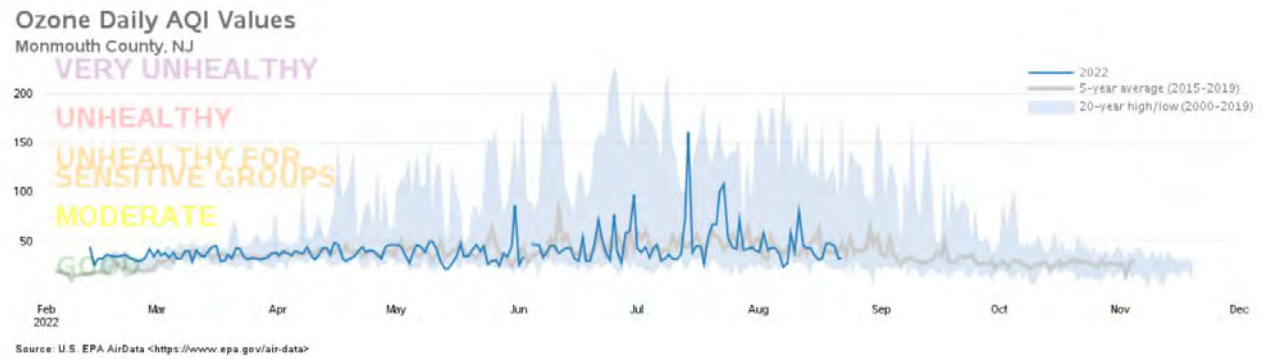

Figure 7 - USEPA Air Data - AQI Plot Monmouth County NJ (2022 & 5-Average & 20-Year Hi/Low)

The data indicate that ozone levels tend to spike upwards during warmer months and down in cooler months. The data also indicate that the 5-year average from 2000 to 2015 are in the moderate health risk range, which is lower than the 20-year high/low from years 2000 to 2019. For the year 2022, the data indicate spikes during the warmer months that exceed the previous 5-year average. The Year 2022 increases may be linked to increased mobility after COVID-19 shutdowns.

GEOLOGY & SOILS

Subsurface Geologic Formations

The deposits underlying the City of Long Branch are tilted southeastward in a series of increasingly younger marine deposits from northwest to southeast (the Hornerstown, Vincentown, and Manasquan formations), all of which are considered lower Tertiary in age (i.e., the Paleocene and Eocene Epochs).

The Hornerstown Formation is the oldest (lower Paleocene Epoch) and underlies the northern portion of the City. It is composed of sand and glauconite; is locally clayey; massive; and dark to dusky-green (Owens et al. 1998). The Hornerstown weathers readily to iron oxide (dusky yellow to red) because of the high iron content in the glauconite, which is relatively pure in some locations. In some portions of its occurrence, the Hornerstown overlies several older formations unconformably on an erosional surface; whereas in many areas it is contiguous with the Navesink Formation, separated by a bioturbation layer. The Hornerstown Formation is 5 – 23 feet thick (Owens et al. 1998) and represents the first material deposited locally following the close of the Cretaceous Period and the Age of Dinosaurs. It crops out in the western portion of the state. There are no apparent outcrops of the Hornerstown Formation within the City.

The Vincentown Formation is upper Paleocene in age and underlies the central and largest portion of the City of Long Branch. It is composed of medium-grained sand, is dusk yellow to pale gray and weathers orange-brown to red brown; is typically very glauconitic and clayey near the base (Owens et al. 1998). It is best exposed in the Pemberton, New Egypt and Mount Holly quadrangles, the type locality being located near Vincentown in Southampton Township. A basal core sample near New Egypt was dated at 56.4 +/- 18 MYA (Owens et al. 1998). In Monmouth County, the Vincentown Formation is exposed as unweathered sand along the Manasquan River near Farmingdale. The formation averages 10 – 49 ft in thickness, but extends to 98 ft. The contact with the underlying Hornerstown is disconformable, (i.e., represented by a hiatus and period of erosion), and often is characterized by fossil shell beds of two 5 ft thick in some areas (Owen's et al. 1998). Important and well-studied fossiliferous calcarenite beds up to 25 ft thick and characterized by an abundance of bryozoans occur, for example, at Vincentown and represent a reef ecosystem. There are no apparent outcrops of the Vincentown Formation within the City of Long Branch.

The Manasquan Formation is Lower Eocene in age, hence the youngest in the local sequence of sediments, and underlies the southern portion of the City of Long Branch. It is composed of several different sediment types including a clayey, quartz-glauconite sand in the northern portion as exposed along the Manasquan River in Farmingdale. An upper fine-grained quartz sand or silt is exposed along Hog Swamp Brook west of Deal (Owens et al. 1998). In Burlington County, the lower part is 16 ft, and the upper part is 26 ft thick. The Manasquan Formation lies disconformable on the Vincentown Formation and may

contain reworked material from it. Casts of marine mollusks from Manasquan time occur in some of the outcrops (Owens et al. 1998). The Manasquan Formation crops out in the City along the coastal bluff south of Pullman Avenue.

Surficial Geology

Because of the extensive and long-term alteration of land associated with urbanization of the region, surface material within the City of Long Branch is composed of a combination of soils derived directly from the parent material (i.e., fluvio-marine Tertiary quartz and glauconitic sands), Aeolian surface deposits of coastal sands and reworked parent material and fill and/or disturbed original soil material. Focus of the maps is not placed on of the subsurface formations (i.e., sediments) but rather on surficial geologic deposits and soils (**Map 9A**), thus providing an illustration of the native and altered soils of the surficial landscape.

Soils

Soil is composed of varying proportions of sand, silt and clay particles derived from underlying geologic parent material. These particles are the result of long-term forces acting on mountains and rock to break down these large masses into small particles. The native soils of the City of Long Branch were formed in the sediments laid down in glacial outwash plains and marine sediments when the ocean covered this land area. Coastal Plain soils represent a “geologic- ecologic” blend. Unlike soils in the northern part of the State which can be identified with a particular location, the Coastal Plain soils are influenced by greater variability during geologic formation and subsequent modification.

The Soil Conservation Act of 1935 led to the establishment of the Soil Conservation Service and with it a focus on soil characteristics. Today we draw on a combination of factors to describe soils. The United States Department of Agriculture (USDA) has taken the lead in describing the characteristics of soils in New Jersey. Because of the complexity, soils are described as groups with similar characteristics, often based on location (NRCS 2006)

The soil types found in the City of Long Branch are depicted on **Map 9A** and are described below. Notably much of the soil complexes are associated with sandy fluvio-marine deposits and owing to the placement of fill, and other land alterations associated with development in the City of Long Branch, native surficial soils have been extensively altered (USDA - Natural Resources Conservation Service, 2021).

Table 9 - USDA - Natural Resources Conservation Service Soil Types of Long Branch with Descriptions, 2021.

Soil Type	Soil Description
Atsion, 0 to 2 percent slopes (AtsAO)	The soil is associated with coastal plains, flats, depressions, drainageways, deflation flats. Ground cover is described to include Tree cover and Intermixed conifers and hardwoods associated with Wooded under natural conditions. The Hydric soil classification is Yes and is Poorly drained as it commonly occurs on tidal flats having a parent material of sandy fluvio-marine deposits.
Beaches, 0 to 15 percent slopes (BEADV)	The soil is associated with dunes on coastal plains. Ground cover is described to include Barren land and Other barren associated with Neither wooded nor farmable under natural conditions. The Hydric soil classification is Yes and is Poorly drained and also frequently flooded.
Mullica, 0 to 2 percent slopes (EveB)	The soil is associated with flood plains on coastal plains, depressions on coastal plains, drainageways on coastal plains. Ground cover is described to include Tree cover and Intermixed conifers and hardwoods associated with Wooded under natural conditions. The Hydric soil classification is Yes and is Very poorly drained although rarely flooded.
Downer, 5 to 10 percent slopes (EveC)	The soil is associated with coastal plains, knolls, low hills. The soil is not classified as Hydric and is defined as being well-drained. This soil consists of sand to loamy sand and has no flooding or ponding. It occurs on low hills and is excessively drained. The parent material is sandy aeolian deposits and/or sandy fluvio-marine deposits.
Urban land, 0 to 3 percent slopes (EvuB)	The soil is associated with coastal plains, urban land. Ground cover is described to include Artificial cover and Urban and built-up land. The Hydric soil classification is Unranked. This soil complex consists of sand and loamy sand and has no flooding or ponding. It occurs on low hills and is excessively drained. The parent material is sandy aeolian deposits and/or sandy fluvio-marine deposits.
Shrewsbury, 0 to 2 percent slopes (FrkB)	The soil is associated with flats on coastal plains, depressions. Ground cover is described to include Tree cover and Hardwoods associated with Wooded land under natural conditions. The Hydric soil classification is Yes and is Poorly drained. The parent material is glauconite bearing loamy Aeolian deposits and/or glauconite bearing loamy fluvio-marine deposits.
Colts Neck, 5 to 10 percent slopes (FrkC)	The soil is associated with coastal plains, knolls, low hills. The soil is not classified as Hydric and is defined as being well-drained. This soil consists of sandy loam and sandy clay loam and has no flooding or ponding. It occurs on hill slopes and knolls and is well drained. The parent material is glauconite bearing loamy Aeolian deposits and/or glauconite bearing loamy fluvio-marine deposits.
Urban land, 0 to 3 percent slopes (FrrC)	The soil is associated with coastal plains, knolls, low hills. Ground cover is described to include Artificial cover and Urban and built-up land associated with surfaces covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil. The soil is not classified as Hydric however drainage is not classified.

Soil Type	Soil Description
Urban land, 0 to 3 percent slopes (HofB)	The soil is associated with coastal plains, flats, low hills, urban land. Ground cover is described to include Artificial cover and Urban and built-up land. The soil is not classified as Hydric and is drainage is not classified. The Urban land includes surfaces covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil.
Hooksan, 0 to 5 percent slopes (HorBr)	The soil is associated with back-barrier beaches on barrier islands on coastal plains. Ground cover is described to include Shrub cover and Other grass/herbaceous cover associated with Neither wooded nor farmable under natural conditions. The Hydric soil classification is Yes and is Poorly drained although rarely flooded.
Manahawkin, 0 to 2 percent slopes (HumAt)	The soil is associated with coastal plains, flood plains. Ground cover is described to include Tree cover and Hardwoods associated with Wooded under natural conditions. The Hydric soil classification is Yes and is Very poorly drained and is frequently flooded.
Downer, 0 to 5 percent slopes (KkhB)	The soil is associated with coastal plains, knolls, low hills. Ground cover is typically associated with Urban land includes surfaces covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil. The soil is not classified as Hydric and is defined as being well-drained.
Shrewsbury, 0 to 2 percent slopes (ShrA)	The soil is associated with flats on coastal plains. Ground cover is described to include Tree cover and Hardwoods associated with Wooded under natural conditions. The Hydric soil classification is Yes and is Poorly drained. The parent material is fine-loamy marine deposits containing moderate amounts of glauconite.
Udorthents, 0 to 8 percent slopes (UdaB)	The soil is associated with low hills on uplands, fills, cuts (road, railroad, etc.). Ground cover is described to include Grass/herbaceous cover and Urban and built-up associated with fill and/or disturbed original soil material. The soil is not classified as Hydric and is defined as being well-drained.
Udorthents, 0 to 8 percent slopes (UdauB)	The soil is associated with low hills on uplands, fills, cuts (road, railroad, etc.). Ground cover is described to include Grass/herbaceous cover and Urban and built-up associated with fill and/or disturbed original soil material. The soil is not classified as Hydric and is defined as being well-drained.
Urban land, 0 to 2 percent slopes (USBROA)	The soil is associated with urban land on flats on coastal plains. Ground cover is described to include Artificial cover and Urban and built-up associated with fill and/or disturbed original soil material. The soil is not classified as Hydric and is drainage is not classified and is occasionally flooded.
Water, 0 to 0 percent slopes (WATER)	No soil class - water.

The Soils Map (**Map 9A**) shows the soil survey mapping units. **Table 10** below shows the limitations of the City of Long Branch soils for certain types of development.

Table 10 - USDA - Natural Resources Conservation Service Development Limitations of Soils, 2021.

Development Limitations of Soils (USDA - Natural Resources Conservation Service, 2021)		
Mapping Units	**Depth to Seasonal High Water Table (cm)**	**Limitations for Building Foundations (with basements)**
Atsion, 0 to 2 percent slopes (AtsAO)	5	Very limited: wetness, ponding, flooding
Beaches, 0 to 15 percent slopes (BEADV)	8	Very limited: wetness, flooding
Mullica, 0 to 2 percent slopes (EveB)	>200	Not limited
Downer, 5 to 10 percent slopes (EveC)	>200	Not limited
Urban land, 0 to 3 percent slopes (EvuB)	>200	Not limited
Shrewsbury, 0 to 2 percent slopes (FrkB)	>200	Not limited
Colts Neck, 5 to 10 percent slopes (FrkC)	>200	Not limited
Urban land, 0 to 3 percent slopes (FrrC)	>200	Not limited
Urban land, 0 to 3 percent slopes (HofB)	69	Very limited: wetness
Hooksan, 0 to 5 percent slopes (HorBr)	228	Very limited: wetness, flooding, subsidence, organic matter content
Manahawkin, 0 to 2 percent slopes (HumAt)	15	Very limited: wetness, ponding, flooding, shrink-swell
Downer, 0 to 5 percent slopes (KkhB)	46	Very limited: wetness, flooding
Shrewsbury, 0 to 2 percent slopes (ShrA)	15	Very limited: wetness, flooding
Udorthents, 0 to 8 percent slopes (UdaB)	>200	Not limited
Udorthents, 0 to 8 percent slopes (UdauB)	>200	Not limited
Urban land, 0 to 2 percent slopes (USBROA)	>200	Very limited: wetness, flooding
Water, 0 to 0 percent slopes (WATER)	>200	Not Rated

Topography and Slopes

The topography within and adjacent to the City Limits extends from sea level to a maximum height of approximately 77 ft MSL (**Map 5** or **Map 9B**). The geologic formations (**Map 9A**), topography and slopes (**Map 9B**), and subwatersheds (**Map 10**) provide insight into the relationship among the physical aspects of the landscape. For example, the Branchport Creek and Whale Pond Brook drainages trend in the NE-SW direction of the underlying sediments. The surficial geology including the soils within the City Limits (**Map 9A**) also show affinities to the broader landscape features.

The City of Long Branch includes four primary HUC-14 sub-watersheds (**Map 10**): Branchport Creek; Long Branch direct Atlantic drainage; Whale Pond Brook; and Poplar Brook. The northern Branchport Creek sub-watershed is underlain by the older sediments of the Hornerstown and Vincentown formations and is the lowest portion of the City, with elevations generally less than 20 ft. draining to tributaries of the Shrewsbury River but rising to 40 + ft. along the western portion of the southern watershed divide. The central Long Branch direct Atlantic drainage sub-watershed is underlain by the Vincentown Formation and lies at about 20 ft. elevation, draining east to the beach and ocean, but rising to the higher divide to the north, while maintaining a lower elevation to the southern divide with Whale Pond Brook. The Whale Pond Brook sub-watershed is underlain by the Vincentown Formation to the north and the Manasquan Formation to the south of Takanassee Lake, with southward and northward sloping flanks of the coastal pond ranging from 20 ft. to the north and 40 + ft. to the south, and drainage eastward to the beach and ocean. The Poplar Brook sub-watershed is underlain by the Manasquan Formation, the youngest in the local sequence, and is the overall highest area, with elevations in the 20 – 60 ft. range, but sloping east to the beach and ocean.

Areas subject to steep slopes are a key factor in identifying areas vulnerable to erosion. An analysis of New Jersey's LiDAR-based 10-foot Digital Elevation Model (DEM) was performed to identify those areas subject to percent slopes of twenty percent (20%) and greater. The results (**Map 9B**) indicate that there are a few primary categories of areas having steep slopes that may subject to erosion; namely the primary areas include:

- Riparian Water & Land Interface
- Along the Rail Road
- Along the Atlantic Ocean Beach/Dune/Historic Bluffs

Steep slopes (**Map 9B**) along the lakes, rivers and ponds (Riparian Interface) and also along the Rail Road constitute areas that are more vulnerable to erosion and breakdown of bank stabilization. The oceanfront steep slopes may (or) may not be problematic; for example, the existence of high dunes offers beachfront protection from coastal wave action and offers a buffer from coastal flooding, notwithstanding steeper slopes within the dune system may prevent adequate root stabilization for coastal vegetation. Tidal basins of the Shrewsbury River system may suffer from de-stabilization thus increasing the siltation of navigable channels, therefore long-term solutions for the management of dredge along with wetland system restoration may be a means of 1.) Keeping material in the system and 2.) Meeting both Federal/State goals of maintaining navigable waters as well as local needs of stabilizing wetland systems. Separate evaluations on whether wetland systems are actually in-need of material, as well as the potential to remediate a wetland from invasive species (e.g., *Phragmites australis*) would be advisable & necessary.

HYDROLOGY

Water is a critical resource for life. Groundwater provides wells with drinking water and contributes to the base flow of streams and water bodies. Groundwater is found below the ground surface in the spaces between soil and sediment particles in unconsolidated sediment and in the cracks and pore space within bedrock and subsurface formations. Surface water, in contrast to groundwater, is water flowing in natural channels carved into the surface of the earth. We refer to this water as streams, rivers, or creeks. Surface water has many uses, including drinking water and recreation for humans. It provides habitat for fish and other aquatic life. Historically, surface water also had an enormous role in waste disposal until surface waters became degraded and required remediation. Groundwater also has been subject to degradation by underground septic disposal, over-application of fertilizers and pesticides and leaking underground fuel and other chemical storage tanks. This experience has shown that it is technically and economically much easier to take steps to avoid contamination than it is to restore the resource to the original state. The groundwater and surface water resources of the City of Long Branch are described below.

Watersheds and Surface Waterways

The New Jersey Department of Environmental Protection (NJDEP) defines watershed as "the area of land that drains into a body of water such as a river, lake, stream or bay. It is separated from other systems in the area by high points such as hills or slopes. It includes not only the waterway itself but also the entire land area that drains to it" (NJDEP Division of Watershed Management 2005)

Watershed Management Areas are a designation used by NJDEP. The City of Long Branch is located within the Atlantic Coastal Drainage Basin. This basin drains lands located adjacent to the Atlantic Ocean. For NJDEP purposes, the entire municipality is located within Watershed Management Area # 12: Monmouth Watersheds: Raritan Bay and tributaries – Shrewsbury River, Navesink River and Atlantic Ocean and tributaries, including Shark River and Manasquan River. Refer to the Watershed HUC 14 Map (**Map 10**) to view the boundaries of the subwatersheds within the municipality.

In addition to the NJDEP Watershed Management Area designation, the USGS uses watershed units for the purpose of surface water management. The USGS designates Hydrologic Unit Codes (HUC) for watersheds and designates numeric values to define increasingly larger or smaller units. This project maps the HUC-14 level and is the smallest geographic area available. The HUC 14 areas are displayed on the Hydrology (**Map 10**). At the HUC 14 level, the City of Long Branch is divided between four different subwatersheds discussed below.

Branchport Creek Sub-watershed

The Branchport Creek Sub-watershed (**Map 10**) is the northernmost sub-watershed in the City of Long Branch and covers approximately 1406 acres of mostly urbanized land within the City Limits. Land use types include, for example, residential, multi-family residential, commercial, schools, and parks (**Map 7**). It is underlain by the older glauconitic sediments of the Hornerstown and Vincentown formations and is generally the lowest portion of the City of Long Branch, with elevations frequently less than 20 ft., draining north-northwest to tidal tributaries of the Shrewsbury River Estuary (i.e., the South Shrewsbury River, Manahassett Creek, Troutman's Creek, and Branchport Creek). Elevations rise to + 40 ft. along the western portion of the watershed and along the southern watershed divide. Characteristic soils include Freehold-Urban land complex; Holmdel-Urban land complex; Shrewsbury sandy loam; Udorthents; Udorthents-Urban land complex. This watershed includes the Jackson Woods open space with the upper drainage of Manahassett Creek, which flows into the Shrewsbury River. Adjacent portions of the sub-watershed are located in West Long Branch Borough to the west, Oceanport Borough to the northwest, and Monmouth Beach Borough to the north. The headwaters of the sub-watershed are located in Eatontown Borough. Formerly, the Monmouth Park Racetrack in Oceanport discharged manure-laden stormwater runoff Into Branchport Creek. In 1996, the racetrack was mandated by NJDEP to divert all stable runoff into the Two Rivers Water Reclamation Authority, rather than into Branchport Creek (MCHD 2005). Improvements include on-site treatment per an New Jersey Department of Environmental Protection (NJDEP) pollution elimination mandate requiring the Monmouth Park Race Track to treat horse stable area stormwater runoff to a 25-year/ 24-hour storm event design standard on Park property to improve downstream water quality.

Long Branch Direct Atlantic Drainage Sub-watershed

The central Long Branch Direct Atlantic Drainage Sub-watershed (**Map 10**) covers approximately 1098 acres of mostly urbanized land within the City Limits. Land use types (**Map 7**) include, for example, residential, multi-family, single-family residential, commercial, institutional, and parks. It is underlain by the glauconitic sands of the Vincentown Formation. The watershed lies at about 20 ft elevation, draining east to the beach and ocean, but rising to the higher divide with the Branchport Sub-watershed to the north at approximately 40 ft, while maintaining a lower elevation to the southern divide with Whale Pond Brook Sub-watershed. Adjacent portions of the sub-watershed are located in West Long Branch Borough. Characteristic soils include Freehold-Urban land complex; Holmdel-Urban land complex; Klej loamy sand – Urban land complex; Hooksan sand; Udorthents-Urban land complex; and Udorthents-Urban land complex (**Map 7**). The headwaters of this watershed are located within West Long Branch Borough. Of interest in this watershed is the exposure of the eroding Manasquan Formation along the southerly beachfront of the City of Long Branch. This exposure appears to be the last remnant of the coastal bluffs, for which the City of Long Branch was historically famous for (Wayne Ferren, personal communication 2011).

Whale Pond Brook Sub-watershed

The Whale Pond Brook Sub-watershed (**Map 10**) covers approximately 365 acres of mostly residential land within the City Limits. Land use types (**Map 7**) include, for example, residential, multi-family residential, institutional, and parkland. The sub-watershed is underlain by the Vincentown Formation to the north of Takanassee Lake and the Manasquan Formation to the south of the coastal pond. It is not unusual for a water course such as Whale Pond Brook (Takanassee Lake) to follow the weakest elements of subsurface geologic formations, including the contracts between formations. Hence, the geology, hydrology, and

habitats are apparently correlated in this boundary. Southward and northward sloping flanks of the coastal pond watershed range from a high of approximately 20 ft to the north and + 40 ft to the south. Drainage is eastward to the beach and ocean. The sub-watershed includes Takanassee Lake Park, the downstream portion of the Whale Pond Brook drainage, which empties through a controlled gate into the Atlantic Ocean. The upstream boundary of this sub-watershed surrounds the headwaters of Whale Pond Brook in Tinton Falls. Portions of Eatontown Borough, Ocean Township and West Long Branch Borough also contain the sub-watershed, upgradient from the City of Long Branch. Characteristic soils include Evesboro sand; Evesboro-Urban land complex; Freehold sandy loam; and Udorthents-Urban land complex.

Poplar Brook **Subwatershed**

The Poplar Brook Sub-watershed (**Map 10**) is the southernmost sub-watershed and covers approximately 367 acres of mostly residential land. Land use types (**Map 7**) include, for example, residential, school, commercial, institutional, and farmland. It is underlain by the Manasquan Formation, the youngest in the local geological sequence. The sub-watershed is the overall highest within the City, with elevations in the 20 – 60 ft range, sloping east to the beach and ocean. Adjacent portions of the sub-watershed are located in Deal Borough to the south and Ocean Township to the west. Characteristic soils include Atsion sand; Hooksan sand; Evesboro-Urban land complex; Klej loamy sand- Urban land complex. The Poplar Brook sub-watershed includes portions of Deal Borough and Ocean Township. Poplar Brook in Deal is the last freshwater stream on the East Coast with a direct, unchanneled discharge onto an ocean beach (MCHD 2005).

Groundwater Resources

Aquifers

An aquifer is a water-bearing bed or stratum of permeable rock, sand or gravel through which subsurface water can move to supply springs and wells. Groundwater, contained primarily in subsurface formations, is one of our most important resources. Sources of groundwater recharge include direct precipitation and discharge from wetlands and surface water bodies; groundwater may also discharge, or replenish, wetlands and surface water bodies. Since the City of Long Branch is largely developed with impervious surface, recharge areas are limited to impermeable areas throughout the City.

Extensive groundwater withdrawal from Coastal Plain aquifers in some areas has resulted in a ‘cone of depression’ where saline marine waters replace underground freshwater aquifers. This saltwater intrusion has been documented throughout New Jersey and resulted in groundwater that is no longer potable without treatment.

The diagram below shows how the ground below the water table (the blue area) is saturated with water. The "unsaturated zone" above the water table (the greenish area) still contains water (plant roots live in this area), but it is not totally saturated with water.

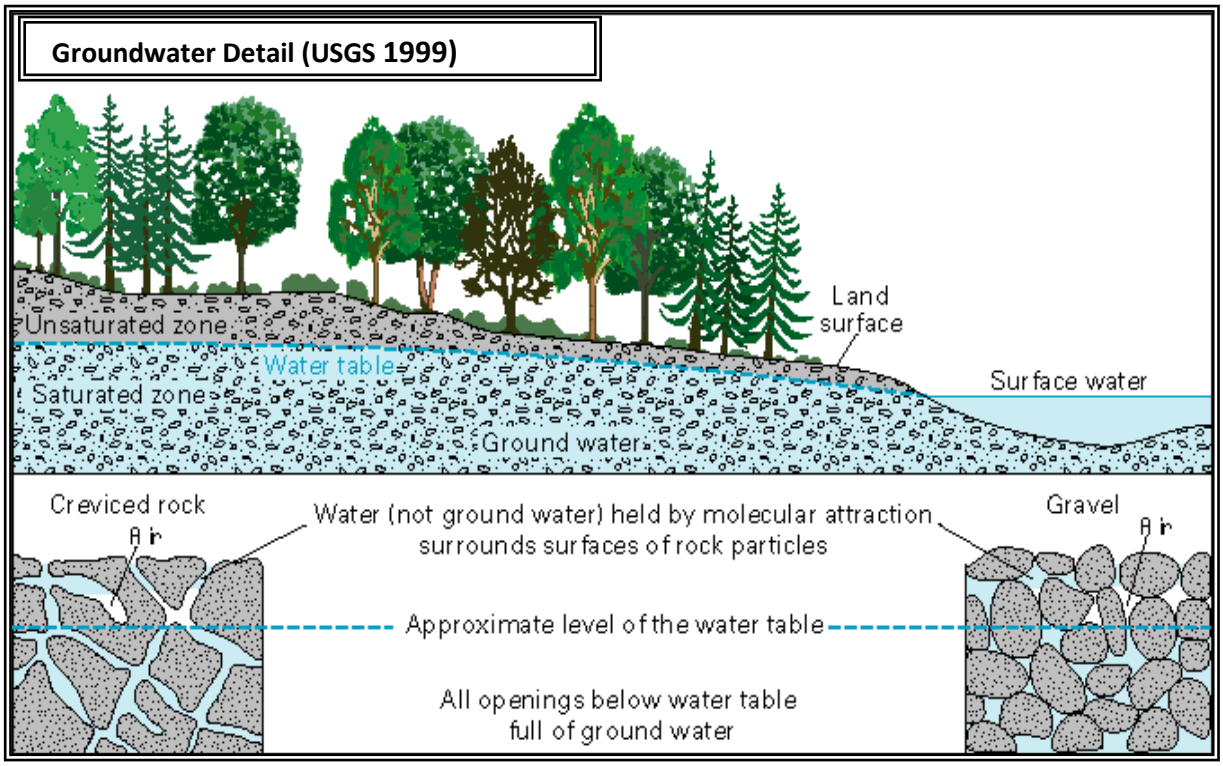

Figure 8 Conceptual Groundwater Detail (USGS 1999)

Aquifers at or near the land surface in the City of Long Branch consist of the composite confining unit (ccu/ccua). This aquifer system consists of silt and clay with confining units comprised of the following geologic formations: Shark River, Manasquan, Hornerstown, Tinton Formations and the Sandy Hook Member of the Red Bank Formations (Herman et. al., 1998).

Beneath Long Branch, groundwater is contained in the Manasquan, Hornerstown, Tinton Formations, and occurs under water table conditions. That is, the surface of groundwater is influenced by atmospheric pressure, with elevations varying with conditions at the land surface. The New Jersey American Water Company is the purveyor of potable groundwater for the City of Long Branch. The water supply is derived from the Upper Potomac-Raritan- Magothy aquifer by a series of municipal wells.

Water Quality

Surface Water Classification

The NJDEP has established use designations in its Surface Water Quality Standards (N.J.A.C. 7:9-4.1). These designations are described briefly below.

- FW – signifies fresh waters and include all nontidal and tidal waters with a salinity of less than 3.5 parts per thousand.

- FW-1 – signifies fresh waters that originate in and are wholly within federal or state parks, forests, fish and wildlife lands, and other special holdings, that are to be maintained in their natural state of quality and not subject to any man-made wastewater discharges.
- FW-2 – refers to fresh waters that are not designated FW1 or PL.
- PL – includes all waters within the boundaries of the Pinelands Area, as established in the Pinelands Protection Act.
- SE – is a general surface water classification of waters with a salinity greater than 3.5 parts per thousand.
- C1 (Category One) - waters are to be protected "…from measurable changes in water quality characteristics because of their clarity, color, scenic setting, other characteristics of aesthetic value, exceptional ecological significance, exceptional recreational significance, exceptional water supply significance, or exceptional fisheries resource(s)" (NJDEP 2011, p. 3).

Waters that are classified by the NJDEP as Category One waters receive extra protection under the State's Stormwater Management Rules (N.J.A.C.7:8) and Flood Hazard Area Control Act Rules (N.J.A.C. 7:13). Under the Stormwater management Rules, development projects that involve the disturbance of at least one acre of land or the placement of an additional one quarter acre of impervious cover on a site with a Category One Water are regulated as they pertain to development within the Special Water resource protection area (SWRPA). This area extends inland to a point 300-feet from the top of bank of the waterway. This includes perennial or intermittent streams that drain into or upstream of the Category One waters as shown on the USGS Quadrangle Maps or in the County Soil Surveys, within the associated HUC 14 drainage area. Also, under the Flood Hazard Area Control Act Rules, a 300 ft. riparian zone is established along all Category One waters and their tributaries. This 300 ft. riparian zone also extends inland from the top of bank of the waterway. Permits must be obtained from the NJDEP for any encroachments into the 300 ft. SWRPA or 300 ft. riparian zone.

The Shrewsbury River is a classified as a Category One water from its source to the Route 36 Highway Bridge. Those portions of Manahassett Creek and Branchport Creek, which are tributaries to the Shrewsbury River, located within the city limits of the City of Long Branch are not classified as Category One waters. Although Branchport Creek is upstream of the Shrewsbury River in this location, the boundary of the HUC 14 watershed of the Shrewsbury River containing Branchport Creek (ID# 12CA03, HUC 14 Code-02030104080030) is beyond the boundaries of the Category One classification. **No land areas in the City of Long Branch are impacted by the 300-foot SWRPA or riparian zones buffer associated with Category One waters.**

Map 11 illustrates the NJ Surface Water Quality designations for the various regulated waters and their tributaries located in the City of Long Branch. **Map 11** also illustrates the location of water quality monitoring locations. These stations are included in the Cooperative Coastal Monitoring Program (CCMP) and Water Quality Data Exchange (WQDE).

According to the same rules, "…all those streams and segments of streams that flow directly into the Atlantic Ocean or into back bays of the Ocean which are not included elsewhere in this list, are not within the boundaries of the Pinelands Protection or Preservation Areas and are not mapped as C1 waters by the Department are classified as FW2-NT/SE" (NJDEP 2011). Tidal waterbodies, such as Manahassett Creek and Branchport Creek within the drainage area of City of Long Branch are classified as FW2-NT/SE1 waters. Whale Pond Brook, which flows into Takanassee Lake and upstream impoundments and non-tidal tributaries to Branchport Creek and Manahassett Creek also receive the FW2-NT/SE1 water quality designation.

All classifications have designated uses. For example, FW2 waters are designated for maintenance, mitigation and propagation of natural land and established biota, for primary and secondary contact recreation, for industrial and agricultural water supply, for public potable water supply after conventional filtration treatment (a series of sedimentation, resulting in substantial particulate removal but no consistent removal of chemical constituents) and disinfection and for other reasonable uses. SE1 designated uses are for shellfish harvesting in accordance with N.J.A.C. 7:12, for the maintenance, migration and propagation of the natural and established biota, for primary and secondary contact recreation and for any other reasonable uses.

The regulation of stormwater within the City is defined by the Long Branch Stormwater Ordinance: Stormwater Management Ordinance 4-2021 which falls under the management of the Public Works Department. Users would want to consult the City's Stream Corridor Protection ordinance § 345-17.1 which was passed and added to the municipal code 6-26-2012 by Ord. No. 11-12]. In addition, the Public Works Department has defined a Stormwater Pollution Prevention Plan in 2019 and a 2008 Municipal Stormwater Management Plan. Each of these documents are found on the City's website at Public Works - Storm Water Management & Clean Water (https://www.longbranch.org/departments/PublicWorks/storm-water-management-clean-water).

Floodplains

The City of Long Branch participates in the National Flood Insurance Program (NFIP) since 1976 and has adopted a Flood Damage Prevention ordinance. The most recent Flood Damage Prevention ordinance is Ord. No. 12-22 and is codified as Chapter 177 of the municipal code. Ordinance Number 12-22 repealed the former municipal code Chapter 177, Flood Damage Prevention, which had previously been adopted 5-10-2018 by Ord. No. 11-18. Floodplain management is also regulated at the State-level through the NJ Administrative Code (NJAC) CHAPTER 13. FLOOD HAZARD AREA CONTROL ACT RULES.

The most recent Ordinance Number 12-22 explains in detail the FEMA map versions and map panels (Code §177-10 Establishment of flood hazard areas) that are to be relied upon and considered when determining the best available flood hazard data for an area. It is important to note that the overarching methodology that is employed for determining floodplain areas and expected flood elevations includes a 'most-restrictive approach' as described in the municipal code §177-10:

> "*The FHACA requires that the effective Flood Insurance Rate Map, most recent preliminary FEMA mapping and flood studies, and Department delineations be compared to determine the most restrictive mapping. The NJ Flood Hazard Area (FHA) Control Act or*

FHACA also regulates unstudied flood hazard areas in watersheds measuring 50 acres or greater in size and most riparian zones in New Jersey. Because of these higher standards, the regulated flood hazard area in New Jersey may be more expansive and more restrictive than the FEMA special flood hazard area."

For the purposes of the ERI Update, we have provided the two (2) most recent floodplain maps from FEMA covering the City of Long Branch - 2009 Effective FEMA Flood Hazard Areas as MAP 12A and 2018 Preliminary FEMA Flood Hazard Areas Map 12B. It is very important that readers of this document understand that 1.) the maps provided for this ERI should NOT be relied upon to make specific project-level or construction-based decisions; 2.) that the municipal code defines the procedural steps related to development within a floodplain which includes a review of projects by planning & zoning professionals, construction permitting officials, and the local floodplain administrator, and 3.) it is incumbent on any developer to demonstrate compliance to the appropriate local, State, and federal floodplain regulations.

FEMA Flood Hazard Areas in the City of Long Branch are predominantly mapped along Branchport Creek, Manahassett Creek, Shrewsbury River, Takanassee Lake, and along the oceanfront. Applicable Flood Hazard Areas (**Maps 12A** and **12B**) are as follows:

- AE: An area inundated by 100-year flooding, for which Base Flood Elevations (BFE) have been determined.
- VE: An area inundated by 100-year flooding with velocity hazard (wave action); Base flood elevations have been determined.
- X500: An area inundated by 500-year flooding; an area inundated by 100-year flooding with average depths of less than one foot or with drainage areas less than one square mile; or an area protected by levees for 100-year flooding.

Any construction within the A and V zones must meet certain construction standards which elevate habitable areas above the base flood elevation line. The NJDEP regulates development in floodplains under the Flood Hazard Area Control Act Rules (N.J.A.C. 7:13).

Flood Risk

Flood risk within the community was recently defined in the 2021 Hazard Mitigation Plan (HMP) accessible at:

(https://www.mcsonj.org/divisions/special-ops/emergency-management/hazard-mitigation-planning/)

in which Long Branch is a participant community in the countywide plan. The HMP inventories a plethora of natural hazard vulnerabilities, in addition to flooding which seems to have a significant focus based on the community input phase of the ERI 2022 update. The 2021 HMP should be consulted to gain a broad understanding of not only risk, but also community-identified mitigation actions that were identified through the HMP process. The ERI is not intended to re-produce the HMP, but the NFIP Statistics Chart is shown to offer perspective on the fact that Long Branch was the community having the highest number of critical facilities within the 2014 mapped floodplains.

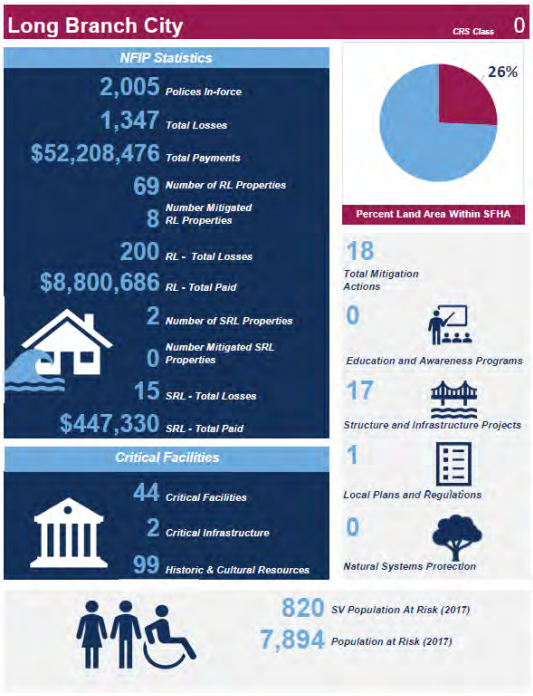

Figure 9 - 2021 Hazard Mitigation Plan - Long Branch City Community Flood Info Profile

Hurricane Sandy was a significant event for the State of New Jersey. Hurricane Sandy High Water Marks have been included in the FEMA Floodplain Maps (**Map 12A** & **Map 12B**) to offer perspective; however, any mitigation to individual buildings and structures need to meet requirements of the local floodplain ordinance which will reference the most restrictive elevations defined by the FEMA maps. Given that flood issues were of particular concern to citizens per data collected during the open public comment period, the flood-related points have been added to the Floodplain Maps (**Map 12A** & **Map 12B**).

Evacuation routes are mapped within **Map 13** along with the Effective FEMA Floodplains given the proximity and intersections between current evacuation routes and flood potential to inhibit safe evacuation. Please note that this ERI does not seek to evaluate the validity or safety of the existing evacuation routes. Notably the 2020 City Master Plan Reevaluation Report does however indicate concern over existing evacuation routes and therefore should be evaluated further as part of the City's transportation circulation planning efforts.

Coastal and Marine Areas

New Jersey's marine and coastal areas are subject to a series of statutory and NJDEP rules pertaining to the management of coastal and marine environment natural resources. Much of the thrust of the regulations are focused on managing development patterns in a manner that promotes responsible development such that natural resources are able to be preserved and natural ecological processes are able to function. In some cases, regulations are designed to correct past patterns of overdevelopment in an effort to give

natural resource processes room to function; for example, wetlands preservation – for many years the NJDEP was appropriately well-focused on the identification and preservation of wetlands. Recent understanding of wetlands and the vegetative types of species, indicates that certain prolific species (e.g., *Phragmites australis*) are very good at choking out native species. Consequently, focus in recent years is migrating from simply eradicating invasive species and turning towards watershed-based management plans in which wetland functions and control of species like Phragmites australis are rather replaced with more native species. The following is a summation of the core coastal and marine-related regulatory programs that apply to Long Branch and the Coastal and Marine areas of Long Branch are mapped as **Map 14** with Wetland areas represented in **Map 15**.

New Jersey's Coastal Management Program (NJCMP)

The Federal Coastal Zone Management Act of 1972 gave States the authority to devise strategies and policies to manage development and use of coastal land and water areas. The Coastal Zone in New Jersey is regulated under the Coastal Permit Program Rules and the Coastal Zone Management Rules (N.J.A.C. 7:7) which were consolidated as of July 6, 2015. The three major coastal statutes regulating development in the State's, and the City of Long Branch's, Coastal Zone are the Wetlands Act of 1970, the Waterfront Development Law and the Coastal Area Facility Review Act (CAFRA).

Coastal Area Facility Review Act (CAFRA N.J.S.A. 13:19)

The CAFRA area begins where the Cheesequake Creek enters Raritan Bay in Old Bridge, Middlesex County. It extends south along the coast around Cape May, and then north along the Delaware Bay ending at the Kilcohook National Wildlife Refuge in Salem County. The inland limit of the CAFRA area follows an irregular line drawn along public roads, railroad tracks, and other features. The CAFRA area varies in width from a few thousand feet to 24 miles, measured straight inland from the shoreline. The entire City of Long Branch is located within the State's CAFRA Zone.

The law divides the CAFRA area into pieces or zones and regulates different types of development in each zone. Generally, the closer you are to the water, the more likely it is that your development will be regulated. The CAFRA law regulates almost all development activities involved in residential, commercial, or industrial development, including construction, relocation, and enlargement of buildings or structures; and all related work, such as excavation, grading, shore protection structures, and site preparation.

The City of Long Branch applied for, and received, a special designation for its waterfront Redevelopment Zone from the NJDEP under the CAFRA Rules. More specifically, Subchapter 7 of the Coastal Zone Management Rules (N.J.A.C. 7:7 - Long Branch Redevelopment Zone Permit) was established to facilitate an expedited review of any projects proposed within the City's Redevelopment Zone(s). This Subchapter specifies that any project proposed in the Redevelopment Zone must comply with the City's Redevelopment Plan Ordinance to comply with the CAFRA Regulations. In addition to demonstrating compliance with this ordinance and the special conditions of Subchapter 7, private development must be approved by the Planning Board of the City of Long Branch. If the project meets the definition of public development and is

subject to review under Subchapter 7, it requires approval by the City Council or the Redevelopment Agency of the City of Long Branch. It is important to note that the Long Branch Redevelopment Zone permit established under Subchapter 7 does not apply to applications for development that are subject to review by the City's Board of Adjustment. Lastly, if any development proposed within the Redevelopment Zone does not meet the approval criteria of Subchapter 7, the applicant must apply for and obtain a CAFRA Individual Permit or meet the requirements for authorization under a CAFRA general permit or permit-by-rule.

All projects proposed outside of the Redevelopment Zone, and which meet the CAFRA thresholds, must submit an individual CAFRA permit application to the NJDEP. The City of Long Branch received "regional center" designation from the NJDEP under the CAFRA Rules which determines the allowable impervious cover and tree preservation requirements under the Coastal Zone Management Rules (N.J.A.C. 7:7E). Currently projects occurring in CAFRA regional centers are allowed 80% impervious cover and are required to preserve 10% of any portion of the site that is determined to be forested.

Waterfront Development Law (N.J.S.A. 12:5-3)

The Waterfront Development Law is a very old law, passed in 1914, that seeks to limit problems that new development could cause for existing navigation channels, marinas, moorings, other existing uses, and the environment. If development is proposed in a tidally influenced waterway anywhere in New Jersey, a Waterfront Development Permit is required. Examples of projects that need a Waterfront Development Permit include docks, piers, pilings, bulkheads, marinas, bridges, pipelines, cables, and dredging. Any projects proposed below the mean high-water line within the City of Long Branch are subject to the NJDEP's Waterfront Development Rules which are outlined and defined by issuance of Coastal Area Permits (New Jersey Department of Environmental Protection, 2022).

Wetlands Act of 1970 (N.J.S.A. 13:9A)

The land immediately adjacent to a tidal water often contains coastal wetlands. These wetland areas are a vital coastal resource serving as habitat for many creatures. The wetlands also serve as buffers that protect upland areas from the flooding and damage caused by storms.

The Wetlands Act of 1970 requires the NJDEP to regulate development in coastal wetlands. Any time land is located near tidal water, there is a good possibility of coastal wetlands on the property. Some signs that may indicate the presence of wetlands are tall reeds and grasses, or ground that is often soggy. The regulated coastal wetlands are shown on maps prepared by the NJDEP. Unlike NJDEP's freshwater wetlands maps, the coastal wetlands maps are used to determine jurisdiction representing the regulatory limits of the State's authority under the Wetlands Act of 1970. Copies of these maps are available for viewing at the Division of Land Use Regulation office in Trenton by filling out an Open Public Records Act (OPRA) request (or) there is also a Web Map Service (WMS) for the 1970 Coastal Wetlands base maps where you can obtain georeferenced digital copies. (You will need GIS or GIS compatible software to utilize this service (New Jersey Department of Environmental Protection, 2022).

An applicant must have a Coastal Wetlands Permit to excavate, dredge, fill or place a structure on any coastal wetland shown on the maps.

WETLANDS

According to the U.S. Army Corps of Engineers (USACE) and U.S. Environmental Protection Agency (USEPA) regulations described in Section 404 of the Clean Water Act (33 CFR Section 328.3 and 40 CFR Section 230.3) respectively, wetlands are "...areas that are inundated or saturated with surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Identification and delineation of wetlands are based on a functional approach that is commonly called the three-parameter approach and is outlined in the Federal Manual for Identifying and Delineating Jurisdictional Wetlands, an Interagency Cooperative Publication issued in 1989. The three parameters defining jurisdictional wetlands are hydric soils, hydrophytic vegetation, and wetland hydrology. Other types of non-jurisdictional wetlands can occur at a site based upon different definitions, such as that used for the U.S. Fish and Wildlife Service Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al. 1970), which also has broad acceptance and is used to classify wetlands in general.

Wetlands can be classified into systems, subsystems, classes, subclasses, and dominance, soil and habitat types, and other hierarchical categories. Cowardin et al. (1979) identified five systems of wetlands for the United States: Marine, Estuarine, Riverine, Lacustrine, and Palustrine. Marine wetlands occur along the intertidal shorelines of oceans, as contrasted to the Marine subtidal deep-water habitats. Estuarine Wetlands occur in the intertidal zones of estuaries, as contrasted to the Estuarine subtidal Deepwater habitats. Riverine Wetlands are characterized by non- persistent plants when vegetated and occur in shallow or intermittent river and stream channels and along shores affected by the energy of flowing water, as compared to subtidal deep-water habitats in channels. Lacustrine Wetlands are characterized by non-persistent plants when vegetated and occur in the littoral zones of lakes generally greater than 20 acres and with wave-formed shorelines, as contrasted to the limnetic Deepwater habitats of lakes. Palustrine Wetlands include those types not classified in the other systems and are represented, for example, by freshwater marshes, floodplain forested, vernal pools, bogs, seeps, and wetland types. There are no deep-water habitats in the Palustrine System. Wetlands in the City of Long Branch include examples classified as Marine Wetlands (e.g., intertidal beaches), Estuarine Wetlands (e.g., intertidal salt marshes and mud flats), and Palustrine Wetlands (e.g., freshwater marshes, scrub-shrub wetlands, and forested wetlands). Minor occurrences of Riverine Wetlands may also be identified in ditches and channels (**Map 15**).

In New Jersey, use of freshwater wetlands is regulated by the Freshwater Wetlands Protection Act, N.J.S.A 13:9B-1 et seq. (http://www.state.nj.us/dep/landuse/13_9b.pdf). Wetlands are recognized as important features of the landscape and provide many functions that are also beneficial to people and wildlife as described below.

Wetland Habitats, Functions, and Values

Wetland habitats have been defined as “part of the physical environment in which plants and animals live” (Novitzki et al. 1997). Wetlands are among the most productive habitats in the world, providing food, water, and shelter for fish, shellfish, birds, herpetofauna, and mammals. They serve as breeding grounds for numerous species and many endangered plant and animal species are dependent on wetland habitats for survival (Mitsch & Gosselink 1986; National Academy of Sciences 2001).

Wetland habitat functions and values have been considered a vital aspect of wetlands for many years. A national workshop was convened in 1983 to address the topic (Sather and Stuber 1984) and an overview of functions and values, also referenced as "functional values", was published subsequently by the US Fish and Wildlife Service (Sather and Smith 1984). Wetland "ecosystem functions" have been defined as a process or series of processes that take place within a wetland (Novitzki et al. 1997). They also have been identified as the normal or characteristic activities that take place in wetland ecosystems. These include, for example, the storage of water, transformation of nutrients, growth of living matter, and diversity of wetland plants, which have value for the wetland itself, for the surrounding ecosystem, and for people. Wetland "values" have been defined as attributes that are worthwhile, beneficial, or desirable (Novitzki 1997). The value of a wetland lies in the benefits it provides to the environment or to people, the latter of which also have been called "socio-economic values". Although there have been various approaches proposed to categorize functions and values, the approach to ecosystem functions designed for the U.S Army Corps of Engineers (Smith et al. 1995) is adopted herein for the purpose this ERI:

Wetland Ecosystem Functions (Smith et al. 1995)

Functions Related to Hydrologic Processes

- Short-term Storage of Surface Water
- Flood storage and conveyance
- Long-term Storage of Surface Water
- Storage of Subsurface Water
- Moderation of Groundwater Flow or Discharge
- Aquifer recharge and discharge
- Dissipation of Energy
- Erosion control
- Shoreline stabilization

Functions Related to Biogeochemical Processes

- Cycling of Nutrients
- Primary productivity of autotrophs
- Nutrient utilization
- Decomposition
- Denitrification
- Food-chain support of heterotrophs
- Export of organic carbon
- Removal of Elements or Compounds
- Toxicant removal
- Retention of Particulates
- Sediment removal

Functions Related to Habitat

- Maintenance of Plant and Animal Communities
- Plant diversity
- Submersed aquatic plants
- General habitat suitability
- Threatened and Endangered Species habitat
- Aquatic invertebrate & shellfish habitat
- Wetland associated vertebrates (herps, fish, birds, mammals)

Wetland Socio-economic Values (Sather & Smith 1884) Consumptive Values

- Harvesting (fish, shellfish, lumber, agriculture)
- Grazing

Non-consumptive Values

- Recreation
- Cultural
- Education and Scientific
- Heritage sites (uniqueness)
- Aesthetic Values

City of Long Branch Wetlands

Wetlands mapped as delineated by the New Jersey Department of Environmental Protection (NJDEP) within the City of Long Branch are shown on the Wetlands Map (**Map 15**). **Table 11** (below) includes the Wetland detail types, count of areas and acreage. **Map 15** also indicates areas for which the US EPA has defined areas of wetlands that are considered a priority. The identification of a priority wetlands list for New Jersey is part of EPA's commitment to develop comprehensive policy framework to establish a technically sound and consistent basis for EPA positions on proposed dredged or fill material discharges into waters of the United States, including wetlands. Notably the Shrewsbury River system includes navigable waters, this includes Branchport Creek and Manahassett Creek and therefore it is possible that wetland restoration efforts are appropriate and deemed necessary, the City may be eligible to receive dredge material for erosion/wetland restoration efforts within the overall framework of EPA's 404 regulatory Program.

There are multiple wetland subtype systems categorized in **Table 11** (below) within the City of Long Branch. The Marine types along intertidal beaches and coastal waterways are predominantly characterized by vegetated dune communities and saline marshes. Notably, excluded types from the NJDEP mapping are Aquatic Bed Wetland vegetation (i.e., Palustrine) associated with Takanassee Lake and Submerged Aquatic Vegetation (Estuarine) potentially associated with intertidal zones (and deep-water habitats) of the Shrewsbury River Estuary or offshore within the Atlantic Ocean. Various wetlands such as Palustrine Scrub-shrub Wetlands that exist at Takanassee Lake, are not mapped by NJDEP and hence are not able to be illustrated on the Wetlands Map (**Map 15**).

Mapping of wetlands and acreage calculations leverage the NJ Land Use Data from both 2012 and 2015 (Tables 11 & 12). Interestingly, these data are captured utilizing color infrared (CIR) imagery and delineating and coding areas through GIS imagery analyses. A thorough on-the-ground inventory, classification, and mapping of wetlands in the City of Long Branch could provide a more accurate map of the resources; for example, the community input appears to indicate an unmapped patch of Phragmites australis (See **Map 15**, Community Input – Item # 13). The 2015 Land Use wetland classifications indicate a reduction of 4.9 Acres of wetlands from the 2012 edition of data which is a reduction of the dunes along the Atlantic Ocean – which are VEGETATED DUNE COMMUNITIES.

Table 11 - NJDEP 2015 Landuse/Landcover Areas of Long Branch with Count & Acreages.

2015 LAND USE LABEL	COUNT	ACRES
AGRICULTURAL WETLANDS (MODIFIED)	1	1.3
DECIDUOUS SCRUB/SHRUB WETLANDS	10	16.7
DECIDUOUS WOODED WETLANDS	10	8.9
DISTURBED WETLANDS (MODIFIED)	1	0.7
HERBACEOUS WETLANDS	2	2.4
MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	1	0.5
MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	4	4.8
PHRAGMITES DOMINATE INTERIOR WETLANDS	1	1.9
SALINE MARSH (HIGH MARSH)	3	2.2
VEGETATED DUNE COMMUNITIES	3	5.2
Total Wetland Acres		44.6
Long Branch Total Acres		3372.0
Wetlands Percent of Long Branch		***1.3%***

Table 12 - NJDEP 2012 Landuse/Landcover Areas of Long Branch with Count & Acreages.

2012 LAND USE LABEL	COUNT	ACRES
AGRICULTURAL WETLANDS (MODIFIED)	1	1.3
DECIDUOUS SCRUB/SHRUB WETLANDS	10	16.6
DECIDUOUS WOODED WETLANDS	10	8.9
DISTURBED WETLANDS (MODIFIED)	1	0.7
HERBACEOUS WETLANDS	2	2.4
MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	1	0.5
MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	4	4.8
PHRAGMITES DOMINATE INTERIOR WETLANDS	1	1.9
SALINE MARSH (HIGH MARSH)	3	2.2
VEGETATED DUNE COMMUNITIES	5	10.2
Total Wetland Acres		49.5
Long Branch Total Acres		3372.0
Wetlands Percent of Long Branch		***1.5%***

VEGETATION

Botanical and/or vegetative resources are located in a variety of natural and man-made wetland and upland environments within the City. Examples of these vegetated locations are described herein as they occur within or on the periphery of the City of Long Branch. Wetlands can occur in five systems within New Jersey (marine, estuarine, riverine, lacustrine, and palustrine). Within and along the shores of the City of Long Branch, plant communities occur only within the estuarine and palustrine systems.

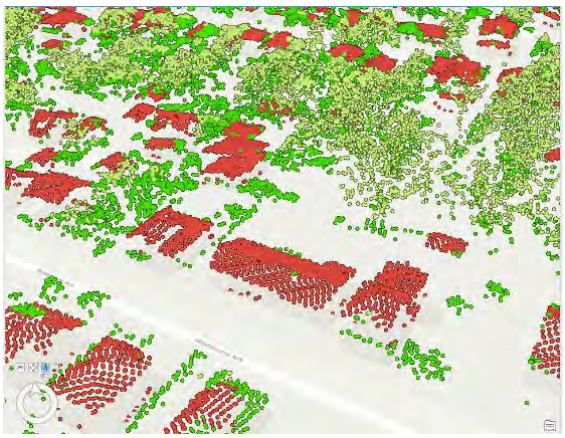

Figure 10 - LiDAR Classified Data Showing Roof Tops, Medium and High Vegetation.

The mapping of vegetation, trees and clusters of vegetation can prove to be quite challenging as there are minimal data available beyond landcover-type classifications which, for example, may miss the detail necessary to understand vegetative densities in Urban landscapes. While multi-spectral or infrared orthophotography are quite effective at defining gross areas of landcover, they are less effective at defining clusters or individual tree features which requires very high-resolution imagery and significant computing resources. NJDEP has developed data such as Landuse/Landcover which define broad areas of like or similar ground cover, wetland cover or the NJ Landscape Project which focuses on interconnected land areas that are ecologically significant for animals. To this end, T&M has developed LiDAR-based vegetative data that, while not developed to its full potential, is leveraged and offers a place to jump-off to improve analytical capabilities. The vegetative cluster/canopy analyses performed offers the ability to perform detailed inventories which the City can leverage for mapping clusters in detail or trees by species. Furthermore, the City may be able to enhance State-level efforts, such as the Landscape Project, by identifying local interconnected habitat environments and pathways. More specifically the identification of areas of biodiversity would require a field inventory to identify exact tree species and their locations to assess biodiversity (or lack thereof). A shade tree commission would be valuable to promote, for example an urban forestry management plan. A shade tree commission would be able to leverage these aforementioned data to perform inventories and may be able to pursue grants that would promote efforts to increase biodiversity or expand or connect habitat corridors.

Figure 11 - Vegetative Clusters/Trees Created from Post-Hurricane Sandy LiDAR Classified by T&M for Medium/High Vegetation.

Specific to vegetative clusters, tree mapping and vulnerability to invasive tree-boring insects, **Map 17** and **Map 18** leverage the LiDAR based data. In short, 3D LiDAR points from Post-Hurricane Sandy were analyzed for those point features that may be medium in height (7 ft) to high (100+ ft) – to develop 1.) Tree Cover Canopy estimates (**Map 18**) and 2.) Identify specific clusters/trees from the previous 2011 ERI of Ash Trees which are vulnerable to boring insects. **Map 16** offers an example of the challenges associated with physically mapping individual plants, trees, or clusters in that it ONLY leverages publicly

available data on the existence of Seabeach Amaranth. While the data enable showing the tabular counts of multiple survey timestamps (Year 2016 to 2020), the mapped area is broad which is the Atlantic coast inland approximately 2,000 feet. It would be advisable for the City to consider conducting regular/actual field survey efforts to collect detailed vegetative data that can be sorted and analyzed to support the need to conduct future/additional field surveys. Map 16 can be revised in the future when data are available.

Estuarine Plant Communities

Estuarine plant communities are located in estuaries, coastal embayment's inundated by oceanic tides at least part of the year and with salinities from ocean-derived salts exceeding 0.5 PPT (part per thousand) during low-flow conditions. They can occur in subtidal deep-water habitats in the form of Estuarine Aquatic Bed vegetation, also known as Submerged Aquatic Vegetation (SAV), or Emergent Wetlands dominated by herbaceous species; and in intertidal wetlands in the form of SAV, Emergent Wetlands, and Scrub-shrub or Forested Wetlands dominated by woody species.

In the City of Long Branch, estuarine plant communities occur as wetlands in small patches and narrow bands along the tidal shores of the Shrewsbury River Estuary and associated tributaries, and Troutman's Creek. Estuarine Emergent Wetlands are dominated by Salt Marsh Cordgrass (*Spartina alterniflora*) in low marsh habitats. Estuarine Scrub-shrub communities occur as patches and linear bands of vegetation in the vicinity of high tide, dominated by Marsh Elder (*Iva frutescens*) and Groundsel Bush (*Baccharis halimifolia*). Subtidal bottom habitats within the Shrewsbury River Estuary include mapped Estuarine Aquatic Bed or SAV communities dominated by Eelgrass (*Zostera marina*) and also including various species of macro-algae (NJDEP 1979). The original 1979 mapping of SAV resources remains as the state standard.

Palustrine Plant Communities

The Palustrine System of wetlands includes those wetlands not influenced by oceanic tides (marine and estuarine) unless the salinity is less than 0.5 PPT at low flow and the habitat is not a channel; those wetlands not influenced by the flow of water in river of stream channels (riverine); and those wetlands not occurring in true lakes (lacustrine), which are generally greater than 20 acres, may have deep-water limnetic zones, and exhibit wave-formed shorelines. Hence, freshwater marshes and swamps (tidal or not), floodplain forests, ponds and small lakes without wave-formed shorelines; and bogs, dune swales, seeps and springs, etc. are considered palustrine wetlands. Unlike the other four systems, there are no deep-water habitats in the Palustrine System.

Palustrine Aquatic Bed (PAB, or SAV as noted above) wetlands are located in Takanassee Lake and are dominated by one submerged aquatic plant species. Water Feather (*Myriophyllum aquaticum*), an introduced species, is abundant in several of the basins that compose the lake. Other species associated with Water Feather include Common Water-weed (*Elodea canadensis*), Tape Grass (*Vallisneria americana*), and Hornwort (*Ceratophyllum demersum*). Portions of the bottom of the lake are covered with a low-growing mat of Needle Spikerush (*Eleocharis acicularis*), another form of submerged vegetation. The various submerged species provide important food for waterfowl, especially dabbling ducks and swans.

Palustrine Emergent Wetlands, which are dominated by herbaceous species that are emergent from ponded or saturated lands, are located for example along the margins of Takanassee Lake and in portions of Jackson Woods. At the downstream and largest portion of Takanassee Lake, emergent species form a narrow band of Palustrine Emergent Wetland (PEW) characterized, for example, by Arrow-arum (*Peltandra virginica*), Broad-fruited Bur-reed (*Sparganium eurycarpum*), American Three-square Bulrush (*Schoenoplectus americanus*), Soft Rush (*Juncus effusus*), and Tussock Sedge (*Carex stricta*).

Purple Loosestrife (*Lythrum salicaria*), an invasive exotic plant species, also occurs within this community along the margins of the lake. A relatively extensive example of a degraded PEW is located at Jackson Woods. This marsh habitat is dominated by an introduced form of Common Reed (*Phragmites australis*), which is an invasive exotic species.

Palustrine Scrub-shrub Wetlands are dominated by hydrophytic shrubs. At Takanassee Lake, the toe of the bank includes scattered patches of this community characterized, for example, by Buttonbush (*Cephalanthus occidentalis*), Elder Berry (*Sambucus canadensis*), Smooth Alder (*Alnus serrulata*), and Swamp Rose-mallow (*Hibiscus palustris*).

Palustrine Forested Wetlands (PFW) are dominated by hydrophytic trees. At Jackson Woods, PFW are located along a small, channelized ditch or stream channel that traverses the open space, and on the margins and backwater habitats of a pond created by diverting some of the stream flow. Characteristic species include Pin Oak (*Quercus palustris*), Swamp White Oak (*Quercus bicolor*), Willow Oak (*Quercus phellos*), Black Willow (*Salix nigra*), Sour Gum (*Nyssa sylvatica*), and Sweet Gum (*Liquidambar styraciflua*). Representative understory shrub species include Elderberry (*Sambucus canadensis*), Highbush Blueberry (*Vaccinium corymbosum*), and Arrowwood (*Viburnum dentatum*). Because of the land use history of the site and the disturbed nature of the habitats, many introduced tree and shrub species not typical of forested wetlands, also have colonized the site.

Terrestrial Plant Communities

Terrestrial plant communities occur as natural and cultural types. Although virtually all examples of terrestrial or "upland" plant communities have been altered in some manner in the Long Branch area, recovery of altered forms and planted and maintained landscapes provide important open spaces within the City.

Natural Plant Communities

Remnant examples of Coastal Dunes are located at Seven President's County Park in the Central Beach Recreational Zone, within the North Beach Protected Zone, and south of Takanassee Lake within the South Beach Protected Zone within the Beach Management Plan Area. The dominant plant is a native grass, American Beach Grass (*Ammophila breviligulata*), which also has been planted in the region to help protect and stabilize the coast. Seaside Goldenrod (*Solidago sempervirens*) is the most common associated species. Regulations, management issues, and recovery goals regarding the Beach Management Area within the City are contained in the *City of Long Branch Beach Management Plan for the Protection of Federally and State-Listed Species* (NJDEP and USFWS 2008).

In addition to various types of Palustrine Wetlands, patches of natural terrestrial/upland vegetation, which is generally disturbed and characterized by a mixture of native and exotic species, have been observed at Jackson Woods. Although difficult to classify and map and also associated with wetland vegetation, these plant communities likely include elements of Successional Old Field, Successional Shrubland, Successional Red Cedar Woodland, and Successional Southern Hardwoods. At Jackson Woods, native trees of these successional communities include Black Cherry (*Prunus serotina*) and Silver Maple (*Acer saccharinum*), whereas exotic tree species include Tree of Heaven (*Ailanthus altissima*) and Norway Maple (*Acer platanoides*). Numerous weedy shrubs and herbaceous species also characterized the open areas and understory including, for example, Common Mugwort (*Artemisia vulgaris*), Japanese Honeysuckle (*Lonicera japonica*), and

Multiflora Rose (*Rosa multiflora*). At Takanassee Lake, the upper banks above the wetland vegetation (Palustrine Scrub-shrub Wetland) are characterized by Successional Scrubland vegetation dominated by the introduced Indigo Bush (*Amorpha fruticosa*).

Cultural Plant Communities

Cultural plant communities or land cover types include those spaces maintained as landscapes either for aesthetic or recreational purposes. The most common example is Mowed Lawn and Mowed Lawn with Trees, which occurs along the upland periphery of Takanassee Lake. Planted or naturalized trees include, for example, White Mulberry (*Morus alba*), Black Locust (*Robinia pseudoacacia*), and Black Cherry (*Prunus serotina*).

Rare Vegetation Communities and Unique Areas

No "Ecological Communities" listed by the NJDEP Natural Heritage Program for Monmouth County (NJDEP-NHP 2011) are known to occur in the City of Long Branch. The "Floodplain Forest" type listed for Monmouth County, however, may be considered for the Palustrine Forested Wetlands at Jackson Woods because they are within a Flood Hazard Area as mapped by FEMA (**Maps 9A and 9B**). Among the "unique" ecological areas considered for Monmouth County, none are listed for the City of Long Branch (Monmouth County Environmental Commission 1988).

Other ecological communities or habitat types known to occur in the City of Long Branch, which are usually considered to have environmental sensitivity due to their rarity and/or susceptibility to impacts, include Wetlands in general; Coastal Ponds (Takanassee Lake); Coastal Salt Marsh (Manahassett Creek); Submerged Aquatic Vegetation (Shrewsbury River Estuary); and Coastal Strand habitats including intertidal beaches (Marine Wetlands) and Coastal Dunes (North Beach Protected Zone and South Beach Protected Zone of the Beach Management Plan Area).

Rare Plant Species

Although no threatened, endangered, or rare plant species were noted for the City of Long Branch as a result of the requested search of the records of the Natural Heritage Program (NJDEP-NHP 2010), the following rare species are known to occur or may occur within the City Limits:

Seabeach Amaranth (*Amaranthus pumilus*): Seabeach Amaranth (**Map 16**), which is federally listed as threatened and state-listed as endangered, is an annual plant species that generally occurs in the vicinity of the high tide wrack line along sandy ocean beaches, including those of Monmouth County. Sparsely vegetated areas with limited wrack accumulation and lack of inundation during the flowering period of May to November are required for this plant to complete successfully in the coastal zone. The seeds are dispersed by the dynamic coastal processes including those affected by wind and water.

The City of Long Branch population of Seabeach Amaranth has ranged from 1-24 plants since the species was first observed in the City in the year 2000 (City of Long Branch 2008). Recovery goals for Seabeach Amaranth include a long-term population size of at least 10 plants and a minimum one-year size of 5 plants (City of Long Branch 2008). If the southern end

of the City of Long Branch (south of Lake Takanassee) receives beach nourishment, the goal should be revised to a long-term average population size of 100 plants, and a minimum one-year size of 20 plants (City of Long Branch 2008).

Seabeach Knotweed (*Polygonum glaucum*): Seabeach Knotweed, which is state listed as endangered, is an annual plant species that also occurs along the sandy ocean beaches of Monmouth County from May to November, where it typically grows above high tide.

Within the City of Long Branch, from 2001 to 2004, the number of plants averaged 3 – 10; 11 plants were documented in 2005; no data were available in 2006; and one plant was documented in 2007 (City of Long Branch 2008). Regarding the recovery goals for Seabeach Knotweed, the protection of plants is to be provided as they are documented on the beaches (City of Long Branch 2008).

Additional rare plant species that are known from elsewhere in New Jersey and may potentially occur on the beaches of the City of Long Branch (City of Long Branch 2008) include the following:

- Seabeach Evening Primrose (*Oenothera humifusa*): beach/ dune habitats; state endangered.
- Sea-milkwort (*Glaux maritima*): beach and salt marsh habitats; state endangered.
- Seabeach Sandwort (*Hockenya peploides*): beach habitats; state species of concern.
- Seabeach Purslane (*Sesuvium maritimum*): beach habitats; state species of concern.

Additional rare plant species that are known from coastal ponds in Monmouth County (Ferren & Olson 2005; NJDEP- NHP 2011), some of which may potentially occur at Lake Takanassee include the following:

- Parker's Pipewort (*Eriocaulon parkeri*): freshwater tidal wetlands and tidal ponds; state species of concern.
- Whorled Marsh Pennywort (*Hydrocotyle verticillata var. verticillata*): freshwater and slightly brackish wetlands and ponds; state species of concern.
- Mudwort (*Limosella australis*): freshwater tidal and slightly brackish wetlands and ponds; state endangered.
- Slender Water Milfoil (*Myriophyllum tenellum*): freshwater ponds; state endangered.
- Small Waterwort (*Elatine minima*): freshwater tidal wetlands and ponds; state species of concern.

Additional rare plant species that are known from coastal salt marshes and related environments in Monmouth County (NJDEP-NHP 2010), some of which may potentially occur in wetlands along the Shrewsbury River Estuary, including the following:

- Salt-marsh Spikerush (*Eleocharis halophila*): salt marshes; state species of concern.
- Salt-marsh Alkali Grass (*Puccinellia fasciculata*): salt marshes and shores; state species of concern.
- Seaside Plantain (*Plantago maritima var. juncoides*): salt marshes and shores; state species of concern.
- Seaside Buttercup (*Ranunculus cymbalaria*): mud in brackish marshes; state-listed endangered.
- Salt-marsh Bulrush (*Bolboschoenus (Scirpus) maritimus*): brackish and salt marshes; state-listed endangered.
- Seaside Arrow-grass (*Triglochin maritima*): brackish marshes; state-listed endangered.

The Urban Forest

An urban forest is a collection of trees that grow in a municipal setting (**Map 18**). Care and management of urban forests is called urban forestry. Urban forests play important roles in the ecology of human habitats in many ways: they filter air, water, and sunlight; provide shelter to animals and recreational areas for humans. They moderate local environments, help reduce noise and wind, help conserve energy by shading structures to conserve energy, and are critical in cooling the urban heat island effect. Benefits of urban trees and shrubs include but are not limited to beautification; reduction of heat, erosion and stormwater runoff, and air and noise pollution; contribute to carbon sequestration and active pollutant removal; enhance property values; improve wildlife habitat; and mitigate the overall urban environmental impact.

The Urban Forest Project is an environmental, public arts, and educational initiative around the world resulting in a series of outdoor exhibitions in various cities including the creation of banners employing the form of a tree to make a visual statement through the communities. Funding associated with the project is used to support various local environmental and forestry initiatives.

In the City of Long Branch, local urban forestry efforts can be enhanced by using trees native to the region, including those growing within the City Limits. Examples of locally native trees include those known to occur at or in the vicinity of the two study sites focused upon in this study: Jackson Woods and Takanassee Lake Park. Representative native tree species from these sites include the following:

Table 13 - Native Trees in Jackson Woods and Lake Takanassee (2010).

Native Trees in Jackson Woods and Lake Takanassee			
Common Name	**Scientific Name**	**Common Name**	**Scientific Name**
Red Maple	*Acer rubrum*	Silver Maple	*Acer saccharinum*
Gray Birch	*Betula populifolia*	American Beech	*Fagus grandifolia*
White Ash	*Fraxinus americana*	Black Walnut	*Juglans nigra*
American Holly	*Ilex opaca*	Black Cherry	*Prunus serotina*
Sweet Gum	*Liquidambar styraciflua*	Cottonwood	*Populus deltoides*
Tulip Tree	*Liriodendron tulipifera*	Sycamore	*Platanus occidentalis*
White Oak	*Quercus alba*	Sour/Black Gum	*Nyssa sylvatica*
Swamp White Oak	*Quercus bicolor*	Black Willow	*Salix nigra*
Willow Oak	*Quercus phellos*	Pussy Willow	*Salix discolor*
Pin Oak	*Quercus palustris*	Black Locust	*Robinia pseudoacacia*
Scarlet Oak	*Quercus coccinea*	Sassafras	*Sassafras albidum*
Pitch Pine	*Pinus rigida*		

The previous ERI included a “Walking Tour of Heritage Trees” which has been included below; the City is encouraged to expand upon the LiDAR-based vegetative cluster/tree data developed to inventory individual trees and create an urban forestry management plan:

Walking Tour of Heritage Trees

As a result of previous ERI plan site visits to the various portions of Takanassee Lake and the adjacent parkland, an opportunity to design one of several walking tours of the City's important, large, or unusual trees has become apparent. Native, naturalized, and planted trees (individual or rows of street trees) make up this rich assemblage. The following grouping of important trees can be observed at (1) Hoey Avenue Park (west of the railroad berm across the lake); (2) walking west to Woodgate Avenue; (3) continuing west to Norwood Avenue (and then to Red Oak Drive) where the following resources existed as of the previous Plan in 2011:

Whale Pond Brook empties into the upper end of Takanassee Lake at the boundary between Ocean Township and the City of Long Branch. Additional tree species also can be observed at the various sites, but these are common, small, or otherwise potentially less significant. From a diversity perspective, however, the total of all tree species for Takanassee Lake Park and vicinity is impressive.

It is recommended that the new 2023 ERI Update GIS data for tree canopy/vegetative clusters is leveraged to produce a GIS-based inventory of the many trees previously identified which would strongly support the development and implementation of a forestry plan for public spaces.

East of Hoey Avenue to railroad berm (Hoey Avenue Park and vicinity)

- Black Locust — *Robinia pseudoacacia* — (grove on north margin of park)
- Cottonwood — *Populus deltoides* — (one tree along railroad berm)
- Smooth Alder — *Alnus serrulata* — (Hoey Avenue Park, lake margin)
- Sour/Black Gum — *Nyssa sylvatica* — (grove in Hoey Avenue Park)
- Sycamore — *Platanus occidentalis* — (Overlook Avenue in private yard)

West of Hoey Avenue to Woodgate Avenue

- Swamp White Oak — *Quercus bicolor* — (one tree on north side of lake)

Woodgate Avenue west to Van Court Avenue

- Pin Oak — *Quercus palustris* — (planted along Overlook Avenue)
- Tulip Tree — *Liriodendron tulipifera* — (one tree on Overlook Avenue, lake margin)
- White Ash — *Fraxinus americana* — (planted along Overlook and Van Court Avenues)

Van Court Avenue west to Norwood Avenue

- American Beech — *Fagus grandifolia* — (row along Red Oak Drive, private yard)
- Bald Cypress — *Taxodium distichum* — (one tree at Van Court and Elinore Avenues)
- Black Locust — *Robinia pseudoacacia* — (lake margin, Red Oak Drive)
- Linden/Basswood — *Tilia americana* — (Elinore Avenue and Highland Avenue)

- Smooth Alder *Alnus serrulata* (lake margin, Van Court Avenue)
- Sycamore *Platanus occidentalis* (lake margin, Red Oak Drive)

Jackson Woods also has several heritage trees of note. Particularly large examples of Willow Oak occur along the stream channel and large examples of Sour Gum are located in the southwest portion of the site. Refer to Appendix D of the 2011 ERI Report for a checklist of all trees (native, naturalized, and planted) observed at Jackson Woods and Takanassee Lake and Park and adjacent lands at that time. The City is encouraged to physically map trees to fully develop and implement a forestry plan for these public spaces.

Additional native tree species known to occur in other nearby coastal sites within Monmouth County include, but are not limited to, the following species:

Table 14 - Trees of Coastal Monmouth County

Trees of Coastal Monmouth County			
Common Name	**Scientific Name**	**Common Name**	**Scientific Name**
River Birch	*Betula nigra*	Flowering Dogwood	*Cornus florida*
Black-jack Oak	*Quercus marilandica*	Big-tooth Aspen	*Populus grandidentata*
Red Oak (NJ State Tree)	*Quercus rubra*	American Elm	*Ulmus americana*
Black Oak	*Quercus velutina*		

Invasive Plant Species

Invasive vegetative species can be classified as biological pollution. Invasive vegetative species are defined as those vegetation types that are not native to an ecosystem and in-turn can cause harm to the natural functionality and symbiosis of the natural system. In essence, the ecosystem becomes out-of-balance at the minimum or worse, the overall function of the system may break-down. When a new and potentially aggressive species become introduced into an ecosystem, they may not have any natural predators or controls. Such invaders can breed and spread very quickly if left unknown or unchecked, ultimately taking over an entire area. Native species may not have natural defense mechanisms against the invasion, or they may not be able to compete with a foreign species that has no natural defense. Invasive species are primarily spread by human activities, often unintentionally and unknowingly. In short, as people, goods or even other animals travel around the world and move from place to place, this may cause the spread of uninvited species.

Phragmites australis is a wetland reed species that was once considered to be valuable for wetland bank stabilization, however in recent years has been identified as an invasive threat to the overall health of the marine estuarine environments in which it thrives. Phragmites australis is prolific throughout New Jersey and is known to grow dense stands which ultimately is believed to crowd-out native grasses and robs the riparian water/land interface of oxygen. To this end, strategies have been developed to root out Phragmites australis and restore wetlands with a variety of native grasses. It is important to understand that removal the reed typically involves a multi-year plan and may come at-cost to employ any one of multiple remediation approaches that may include mowing, prescribed burning, herbicide application, or mechanical removal. There is a single identified pocket of Phragmites australis within the Jackson Woods Park as depicted on **Map 16**, however from community input the pond at Jackson Woods has been identified to have Phragmites australis along its banks

which is highly likely to be contributing to pond stagnation. It should also be noted that the Jackson Woods pond is at an upstream-most portion of the Branchport Creek HUC14 watershed which would mean that flow in and out of the pond is also not adequate to cycle the water volume – thus also contributing to the observed stagnation. Remediation of stagnant water such as this pond may simply benefit from movement and the introduction of an aerator. However, noting the existence of Phragmites australis, a healthy pond may require revegetation of native transitional aquatic and non-aquatic vegetation.

Based on the two focused studies of Jackson Woods and Takanassee Lake, a number of invasive exotic plants species have been observed at open spaces within the City of Long Branch.

Regarding wetlands, perhaps the most serious impact is from Common Reed (Phragmites australis) (**Map 17**), which dominates the Palustrine Emergent Wetland at Jackson Woods and along the tidal margins of Troutman's Creek. Purple Loosestrife (*Lythrum salicaria*) has invaded wetlands at both sites but is not yet a dominant species. Water Feather (*Myriophyllium aquaticum*) has invaded Takanassee Lake and dominates portions of the six basins.

Margins of wetlands at Jackson Woods and Takanassee Lake have been colonized by a number of woody exotics including Multiflora Rose (Rosa multiflora), Indigo Bush (Amorpha fruticosa), and Japanese Knotweed (Polygonum cuspidatum). Several vines are becoming threats to native vegetation including English Ivy (Hedera helix), Oriental Bittersweet (Celastrus orbiculatus), Japanese Honeysuckle (Lonicera japonica), and Sweet Autumn Clematis (Clematis paniculata). Common invasive exotic trees include Norway Maple (Acer platanoides) and Tree-of-Heaven (Ailanthus altissima). A species of bamboo has colonized a portion of the northern margin of Jackson Woods, apparently invading the site from an adjacent private yard.

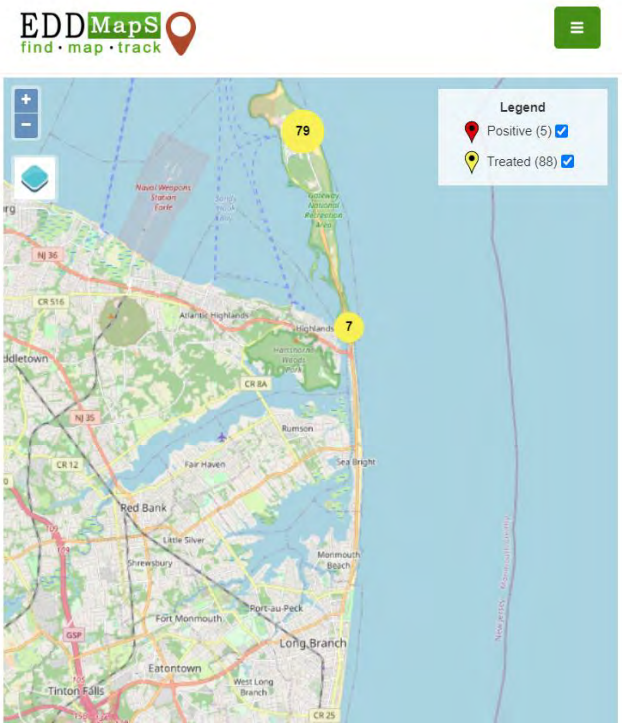

Figure 12 - Japanese Sedge (Carex kobomugi) near Long Branch, NJ (2022 https://www.eddmaps.org/).

Numerous herbaceous plant species not native to the region also have established at Jackson Woods and the parkland adjacent to Takanassee Lake. Although most of these exotic species are not necessarily invasive, most are indicative of the disturbed nature of the habitats.

The list of known invasive vegetative species for an area can be quite extensive and therefore challenging to encapsulate entirely. However, mapping resources from various government- and non-profit-funded projects are paving the way for tracking the distribution of invasives. Invasives have to be identified through on-the-ground surveys as there are limited methods available to identify vegetative species through remote-survey methods such as the use of multi-spectral high-resolution aerial imagery.

The scope of this project did not include field work or imagery analyses and therefore relies on resources available from pre-existing efforts and classification of LiDAR-based vegetative clusters/trees to establish the urban canopy.

As noted, web-based reporting and mapping websites are becoming a practical mechanism for tracking the existence and eradication or treatment of invasive species. However, one challenge includes the funding streams and backing of each respective resource noting that if funding runs-out, the resource may no longer be considered current. Research has revealed a couple of web-based invasive species tracking systems that may be able to utilize; to include Friends of Hopewell Valley Open Space (NJ-based) which is backed by the NJ Invasive Species Strike Team (https://www.fohvos.info/invasive-species-strike-team/) , and EDDMAPS (https://www.eddmaps.org/) Center for Invasive Species and Ecosystem Health at the University of Georgia which appears to have a broad national database and backing from federal agencies yet lacks input from NJ-based contributors.

According to the Monmouth County Park System (MCPS, 2008), the "Top 10 Invasive Plants" within the County Park System includes the list below and the Top 3 have been mapped in EDDMAPS (below). The EDDMAPS indicates the existence of these species in the vicinity near Long Branch, but does NOT identify individual specimens within the City.:

1. Norway Maple
2. Porcelain Berry
3. Autumn Olive
4. Russian Olive
5. Asian Bittersweet
6. Garlic Mustard
7. Japanese Stilt Grass
8. Japanese Barberry
9. Japanese Honeysuckle
10. Ailanthus (Tree of Heaven)

EDDMAPS – Norway Maple:

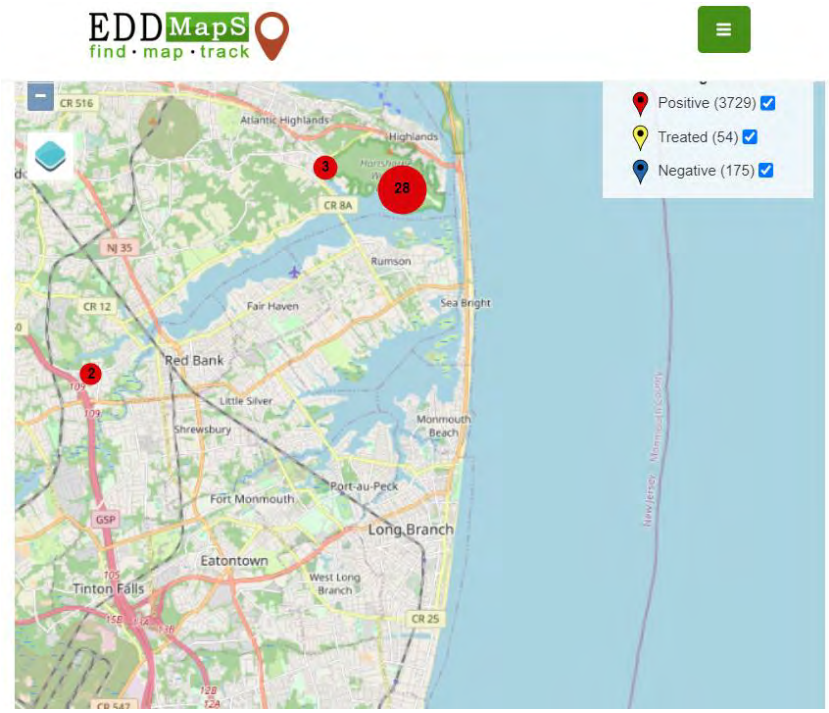

Figure 13 - Norway maple (Acer platanoides) near Long Branch, NJ (2022 https://www.eddmaps.org/).

EDDMAPS – Porcelain Berry:

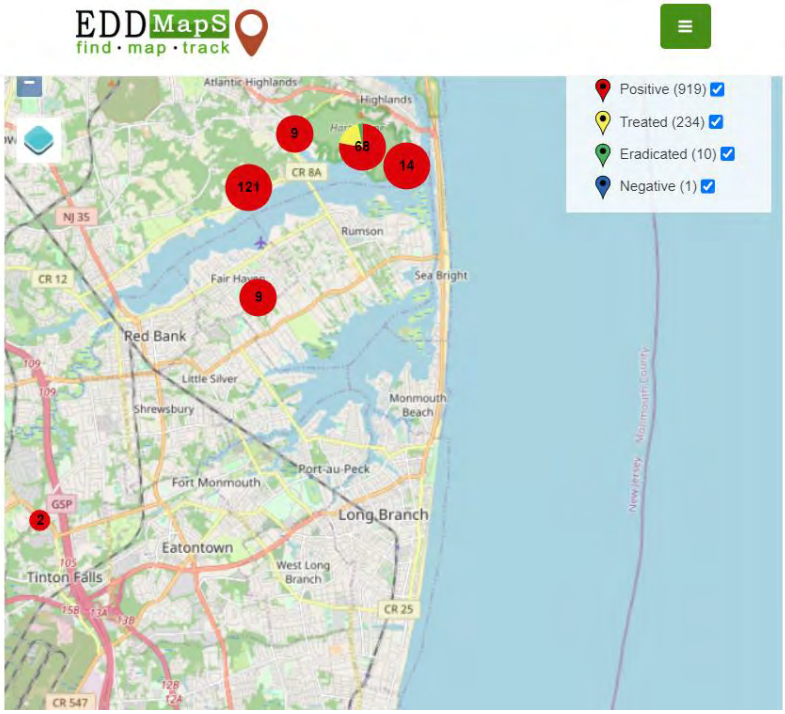

Figure 14 - Porcelain-berry (Ampelopsis glandulosa) near Long Branch, NJ (2022 https://www.eddmaps.org/).

EDDMAPS – Autumn Olive:

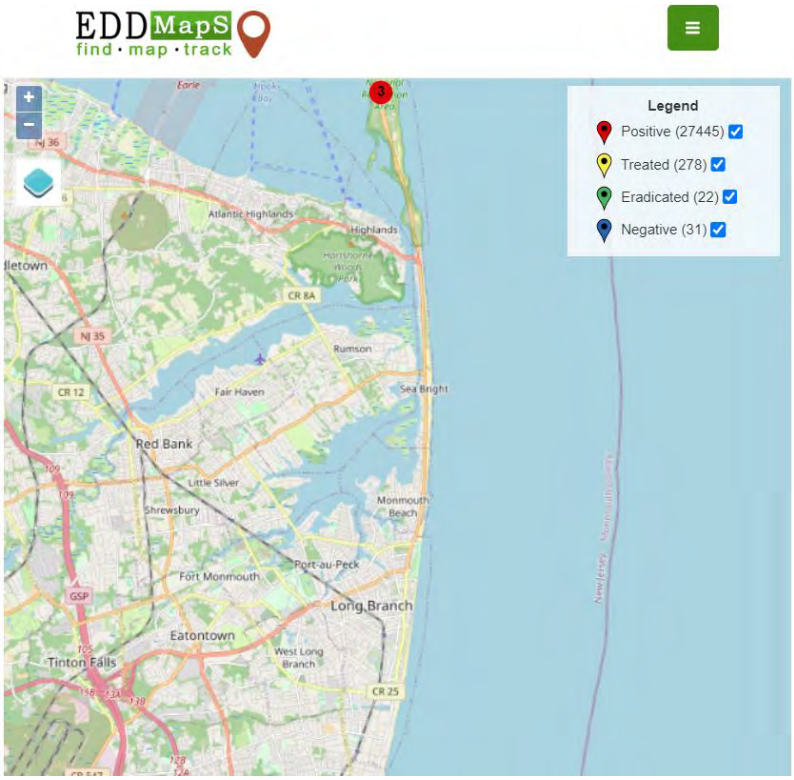

Figure 15 - Autumn olive (Elaeagnus umbellata) near Long Branch, NJ (2022 https://www.eddmaps.org/).

The EDDMAPS indicates that surveys of the noted species appear to be limited to County and Federal land in the vicinity (predominantly Hartshorne Woods and Sandy Hook). Therefore, if and when inventories of such species are performed or come available, the City may want to consider contributing to the web-based mapping resources noted. Furthermore, given the proximity of positive counts at nearby Hartshorne Woods and Sandy Hook of various species on the Monmouth County Park System Top-10, it may be advisable to seek partnerships with other stakeholders in order to perform surveys within the City.

WILDLIFE & WILDLIFE HABITAT

BIOLOGICAL RESOURCES

Biological resources include flora and fauna that inhabit an area. Owing to its location on the Atlantic Ocean, bisected and bordered by estuarine rivers and their tributaries, and along with its intense development pressure, the City of Long Branch continues to support a rich diversity of marine and freshwater, aquatic and terrestrial resources that are discussed in this document. **Map 19** demonstrates the NJ Landscape Project Version 3.0 Data which focuses on large areas throughout the State that are ecologically similar in regard to plant and animal communities referred to as Landscape Regions. The City of Long Branch is located within the Atlantic Coast Region, identified as one of the most productive coastal habitats in the United State.

Zoological Resources

Urbanization affects aquatic habitats, due to contaminants and pollutants present in stormwater and the warming of runoff coming from impervious surfaces. These factors reduce the diversity of freshwater aquatic animals (Adams 1994). In spite

of the high level of development, the City of Long Branch can support wildlife, including some threatened and endangered species, particularly those that find suitable habitat unique to a beach/dune ecosystem. The Ecological Inventory for the Mid-Coast Region of Monmouth County identifies several different wildlife habitat types for each category of animal. These tables list the common wildlife expected to be present and indicate the habitat most likely used by the species. Thirteen habitat classifications were used in that document: Landscaped Open space, Agricultural Land, Forest, Cultivated Trees and Shrubs, Shrubland, Forested Wetland, Shrub Wetland, Freshwater Marsh, (Non-tidal), Freshwater Tidal Marsh, Saltwater Marsh, Beach and Unvegetated Area habitats. These species were observed in the City of Long Branch or would be highly likely to be present.

Terrestrial Fauna (including mammals, reptiles, and birds)

Dozens of species of terrestrial fauna are known to reside in New Jersey including mammals, reptiles, and birds. Because the City of Long Branch contains extensive urban development, necessary habitats for some terrestrial wildlife species, such as extensive forest, woodland or grassland habitats will be absent. Still, the variety of wildlife present in an urban setting can be surprising. Species, which achieve the greatest numbers in such settings will be small to medium-sized herbivores, which are habitat generalists. Residents of the City of Long Branch can expect to see species such as Chipmunks, Gray squirrels, Raccoons, Opossums, House mouse and Eastern mole in their backyard. Landscaped yards provide cover, nesting and feeding habitats for local and migrating songbirds. Birds likely to visit backyard bird feeders include Juncos, House sparrow, House finch, Cardinal, Black-capped chickadee, Blue jay, Tufted titmouse, Mourning dove and House wren. The ubiquitous Turkey vulture and various species of hawk and gull commonly grace the skies overhead.

The smaller, disturbance-tolerant mammals have an easier time finding habitat than larger mammals, although one of New Jersey's larger mammals, the White-tailed deer frequently occurs in urban/suburban settings. A deer sighting would be most likely in a wooded area, such as Jackson Woods. They are also likely to wander the old estate properties surrounding the impoundments of Whale Pond Brook. **Table 15** lists the common and widespread wildlife species readily observable in the City of Long Branch.

Table 15 - Common Terrestrial Wildlife for City of Long Branch (2010).

Common Terrestrial Wildlife for City of Long Branch			
Mammals		***Mammals***	
Common Name	**Scientific Name**	**Common Name**	**Scientific Name**
Opossum	*Didelphis marsupialis*	Eastern Cottontail	*Sylvilagus floridanus*
Gray Squirrel	*Sciurus carolinensis*	Eastern Chipmunk	*Tamias striatus*
Raccoon	*Procyon lotor*	Woodchuck	*Marmota monax*
Striped Skunk	*Mephitis mephitis*	House Mouse	*Mus musculus*
Red Fox	*Vulpes vulpes*	White-tailed Deer	*Odocoileus virginianus*
Eastern Mole	*Scalopus aquaticus*	Marsh Rice Rat	*Oryzomys palustris*
Little Brown Bat	*Myotis lucifugus*	White-footed Mouse	*Peromyscus leucopus*
Big Brown Bat	*Eptesicus fuscus*		
Reptiles and Amphibians		***Reptiles and Amphibians***	
Common Snapping Turtle	*Chelydra serpentina*	Eastern Garter Snake	*Thamnophis sirtalis sirtalis*
Fowlers Toad	*Bufo woodhousei fowleri*	Eastern Milk Snake	*Lampropeltis triangulum*
Bullfrog	*Ranas catesbiana*	New Jersey Chorus Frog	*Pseudacris triseriata*
		Spring Peeper	*Hyla crucifer*

Birds		***Birds***	
Bald Eagle	*Haliaeetus leucocephalus*	Osprey	*Pandion haliaetus*
Mallard	*Anas platyrhynchos*	Great Blue Heron	*Ardia herodias*
Northern Junco	*Junco hyemalis*	Northern Cardinal	*Cardinalis cardinalis*
House Sparrow	*Passer domesticus*	House Finch	*Carpodacus mexicanus*
Black-capped Chickadee	*Parus atricapillus*	Blue Jay	*Cyanocitta cristata*
Tufted Titmouse	*Parus bicolor*	Mourning Dove	*Zenaida macroura*
House Wren	*Troglodytes aedon*	Turkey Vulture	*Cathartes aura*
Northern Mockingbird	*Mimus polyglottus*	Laughing Gull	*Larus atricilla*
Red-tailed Hawk	*Buteo jamaicensis*	Herring Gull	*Larus argentatus*
Canada Goose	*Branta canadensis*	Red-winged Blackbird	*Agelaius phoenicus*
Semi-palmated Sandpiper	Calidris pusilla	American Crow	*Corvus brachyrhynchus*
European Starling	Sturnus vulgaris	Double-crested Cormorant	*Phalacrocourax auritus*
American Robin	*Turdus migratorius*	Fish Crow	*Corvus ossifragus*
Purple Finch	*Carpodacus purpureus*	Gray Catbird	*Dumetella carolinensis*
Snowy Egret	*Egretta thula*	Common Tern	*Sterna hirundo*

Forested, scrub-shrub and emergent wetlands are found in Jackson Woods and in the Takanassee Lake area. The shyer wildlife species, such as shrews, voles and bats are more likely to be found in such areas. The American woodcock, flycatchers and various herons will seek the quieter parts of the City. Populations of eastern coyote are noted to be increasing. This species has been observed in suburban settings in NJ (Greenwire 2010). The black bear has even been observed in every county in NJ. Other shyer or uncommon species should occur but would be less easily observed. A listing of NJ mammals is presented in **Table 16**, most of which could potentially occur, at least occasionally, within the boundaries of the City.

Table 16 - New Jersey Mammals That May Occur in City of Long Branch.

New Jersey Mammals					
Common Name	**Scientific Name**	**Status**	**Common Name**	**Scientific Name**	**Status**
Opossum	*Didelphis marsupialis*	S	Eastern Cottontail	*Sylvilagus floridanus*	S
Masked Shrew	*Sorex cinereus*	S	Eastern Chipmunk	*Tamias striatus*	S
Short-tailed Shrew	*Blarina brevicauda*	S	Woodchuck	*Marmota monax*	S
Least Shrew	*Crytotis parva*	U	Gray Squirrel	*Sciurus carolinensis*	S
Eastern Mole	*Scalopus aquaticus*	S	Raccoon	*Procyon lotor*	S
Star-nosed Mole	*Condylura cristata*	U	Striped Skunk	*Mephitis*	S
Little Brown Bat	*Myotis lucifugus*	S	Beaver	*Castor candensis*	INC
Keen Myotis	*Myotis septentrionalis*	U	Marsh Rice Rat	*Oryzomys palustris*	S
Silver-haired Bat	*Lasionycteris*	U	White-footed Mouse	*Peromyscus leucopus*	S
Eastern Pipistrel	*Pipistrellus subflavus*	U	Red-backed Vole	*Clethrionomys gapperi*	S
Big Brown Bat	*Eptesicus fuscus*	S	Meadow Vole	*Microtus pennsylvanicus*	S
Red Bat	*Lasiurus borealis*	S	Pine Vole	*Microtus pinetorum*	S
Hoary Bat	*Lasiurus cinereus*	U	Muskrat	*Ondatra zibethicus*	S
Meadow Jumping Mouse	*Zapus hudsonius*	U	House Mouse	*Mus musculus*	I
Red Fox	*Vulpes*	S	White-tailed Deer	*Odocoileus virginianus*	D
Black Bear	*Ursus americanus*	INC	Eastern Coyote	*Canius latrans*	INC
St – Status E - Endangered D - Decreasing INC - Increasing S - Stable U – Undetermined I - Introduced P – Peripheral					

New Jersey is home to numerous reptiles. As is the case for plants and other terrestrial animals, one of the reasons for this diversity is that many species are at the limits of their geographical ranges, particularly southern Coastal Plain species. However, because the City of Long Branch is largely developed and most of its waters are saline or brackish, many of the species may be absent from the municipality. Garter snakes, Common snapping turtle and Eastern box turtle are the reptile species most likely to be encountered in the developed areas of the City of Long Branch (MCPB and MCEC 2000). **Table 17** lists reptiles found in Monmouth County, which could occur in the City, but are not the most common or the most easily observed species.

Table 17 - Monmouth County Reptiles (NJDEP, DFW 2001) That May Occur within City of Long Branch.

Monmouth County Reptiles (NJDEP, DFW 2001)			
Common Name	**Scientific Name**	**Common Name**	**Scientific Name**
Northern Water Snake	*Nerodia sipedon*	Northern Brown (Dekay's) Snake	*Storeria dekayi*
Northern Redbelly Snake	*Storeria occipitomaculata*	Eastern Garter Snake	*Thamnophis sirtalis*
Eastern Ribbon Snake	*Thamnophis sauritas*	Eastern Smooth Earth Snake	*Virginia valeriae*
Northern Ringneck Snake	*Diaphis punctatus edwarsdsi*	Southern Ringneck Snake	*Diaphis punctatus*
Eastern Worm Snake	*Carphophis amnoenus amoenus*	Rought Green Snake	*Opheodrys vernalis*
Black Rat Snake	*Elaphe obsolete*	Eastern Milk Snake	*Lampropeltis triangulum*
Scarlet Kingsnake	*Lampropeltis triangulum*	"Coastal Plain" Milk Snake Intergrade	*:. T. triangulum X L. t. elapsoides*
Northern Scarlet Snake	*Cemophora coccinea copei*	Common Snapping Turtle	*Chelydra serpentine*
Common Musk Turtle (Stinkpot)	*Sternotherus odoratus*	Eastern Mud Turtle	*Kinosternon subrubrum*
Spotted Turtle	*Clemmys guttata*	Eastern Box Turtle	*Terrapene carolina*
Northern Diamondback	*Malaclemys terrapin*	Red-eared Slider	*Trachemys scripta elegans*
Redbelly Turtle	*Pseudemys rubriventris*	Eastern Painted Turtle	*Chrysemys picta*

Amphibians are terrestrial animals in their adult life stage, but they require aquatic environments for breeding and early life stages. Degraded aquatic habitats subject to warmed and contaminated stormwater runoff will limit the ability of amphibians to breed within the City of Long Branch. In addition, many individuals may be lost to roadkill, attempting to move from aquatic breeding habitats to the terrestrial habitats suited to adult stages (Adams 1994). An ephemeral pond, identified in Jackson Woods, and small floodplain ponds, could potentially provide breeding habitat for amphibians, if contamination or lack of adequate upland habitat is not an issue. Spring peepers and New Jersey chorus frogs and Bullfrogs may be heard singing their Spring breeding songs in these waters and in inundated wetlands. A listing of Monmouth County amphibians is listed in the following:

Table 18 – Monmouth County Amphibians (NJDEP, DFW 2001) That May Occur Within Coty of Long Branch.

Monmouth County Amphibians (NJDEP, DFW 2001)			
Common Name	**Scientific Name**	**Common Name**	**Scientific Name**
Marbled Salamander	*Ambystocum opacum*	Spotted Salamander	*Ambystoma maculatum*
Red-spotted Newt	*Notophthalmus viridescens*	Northern Dusky Salamander	*Desmognathus fuscus*
Redback Salamander	*Plethedon cinereus*	Northern Slimy Salamander	*Plethedon glutinosus*
Four-toed Salamander	*Hemidactylium scutatum*	Northern Red Salamander	*Pseudotriton ruber*
Northern Two-lined Salamander	*Eurycea bislineata*	Eastern Spadefoot	*Scaphiopus holbrookii*
Fowler's Toad	*Bufo woodhousii fowleri*	Northern Cricket Frog	*Acris crepitans*
Northern Spring Peeper	*Pseudacris crucifer*	Bullfrog	*Rana caesbiana*
Carpenter Frog	*Rana virgatipes*	Green Frog	*Rana clamintans clamitans*
Wood Frog	*Rana sylvatica*	Southern Leopard Frog	*Rana utricularis*
Pickerel Frog	*Rana palustris*		

The diversity of terrestrial fauna, present, even in an urban environment is exemplified by the birds. The City of Long Branch contains several important habitat types for avian species. The coastal ponds, characterized by Lake Takanassee and other impoundments provide excellent habitat for waterfowl, both local and migrating species. A visit to one of these impoundments might provide sightings of the very common Mallard. You might also observe Canvasbacks, Blue-winged teals, Ring-necked ducks and Greater or Lesser scaups. A Great blue heron may be feeding in the shallows at the edge of the pond. These species also make use of the surrounding wetland areas.

The coastal sand dunes and beaches, ocean and estuaries provide important shorebird habitat. Sandpipers dart back and forth between the waves at the beach, and Herring gulls or Laughing gulls very likely tried to steal a lunch. Red fox and even feral cats can be observed on City beaches. Appendix F contains an extensive list of avian species observed in the Audobon Society's Christmas Bird Counts.

Aquatic Fauna (including marine mammals, fish, invertebrates, and amphibians)

A variety of aquatic fauna are found in the various aquatic habitats within the City of Long Branch and include representative species of mammals, fish, invertebrates, and amphibians. The surface waters of the City of Long Branch are mostly salty ocean waters to brackish rivers and creeks, with the exception of some human-made freshwater features (Lake Takanassee and other impoundments) and an ephemeral pond and ditch in Jackson Woods. Commonly observed freshwater species are found in **Table 19**.

Table 19 - Freshwater Fish of the City of Long Branch (LBEC 2011, MCPB and MCEC 2000).

Freshwater Fish of the City of Long Branch (LBEC 2011, MCPB and MCEC 2000)			
Freshwater Species		**Freshwater Species**	
Common Name	***Scientific Name***	***Common Name***	***Scientific Name***
American Eel	*Anguilla rostrata*	Common Carp	*Cyprinus carpio*
Blue Catfish	*Ictalarus spp..*	Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochinus*	Largemouth Bass	*Icropterus salmoides*
Brook Trout	*Salvelinus fontenalis*	Northern Pike	*Esox lucius*
Brown Trout	*Salmo trutta*	Smallmouth Bass	*Micropterus dolomieu*
Bullhead Catfish	*Ameirus spp.*	Banded Sunfish	*Enneacanthus obesus*
Calico Bass (Black Crappie)	*Pomoxis nigromaculatus*	Tiger Trout	*Salmo trutta X Salvelinus fontinalis*
Calico Bass (White Crappie)	*Pomoxis annularis*	White Perch	*Morone saxitilis*
Catfish	*Ameirus spp.*	Yellow Perch	*Perca flavescens*
Chain Pickerel	*Exox niger*	Alewife	*Alosa pseudoharengus*
White Sucker	*Catostomus comersoni*	Bluespotted Sunfish	*Enneacanthus gloriosus*
Creek Chubsucker	*Erimyzon oblongus*	Pumpkin Seed	*Lepomis gibbosus*
Mud Sunfish	*Lepomis punctatus*	Red Breasted Sunfish	*Lepomis sauritus*
Common Shiner	*Lxilus cornutus*	Inland Silverside	*Menidia beryllina*
Golden Shiner	*Notremigoonus crysoleucus*		

The bays, estuaries and marine waters of New Jersey can be home to 336 marine finfish at some point during the year. The adults of the finfish species will occur in the waters of the Atlantic Ocean. Other life stages may occur in the estuaries within, and adjacent to, the City of Long Branch. Anadromous fish, which spawn in freshwater, but live the bulk of their lives in salt water, such as American Eel, Herring or Shad, migrate upstream and breed in Manahassett, Troutman's and Branchport

Creeks and the Shrewsbury River. The estuarine waters of Branchport Creek, Troutman's Creek and Manahassett Creek, as well as the Shrewsbury River, are teeming with pre-adult life stages of fishes. These estuaries are designated as essential fish habitat for spawning young life stages of Whiting, Red hake, Witch flounder, Winter flounder, Yellowtail flounder, Windowpane flounder, Monkfish, Bluefish, Summer flounder, Black sea bass, King mackerel, Spanish mackerel, Cobia, Blue shark, Dusky shark, Sandbar shark, Shortfin mako shark, Tiger shark and Bluefin tuna (NOAA).

Surf fisherman hope for a Bluefish or a Weakfish, while out in the boats, fishermen drift for Winter or Summer flounder, and maybe the occasional Windowpane (a type of flounder). The ocean waters outshore of the City of Long Branch area are also considered as essential fish habitat for most of the previously mentioned fishes in their adult stages as well as the following species: Atlantic cod, Haddock, Pollock, Offshore hake, White hake, Redfish, American plaice, Ocean pout, Atlantic sea scallop, Atlantic sea herring, Long finned squid, Short finned squid, Atlantic butterfish, Atlantic mackerel, Scup, Spiny dogfish, Tilefish and Skipjack tuna. Fish species known to occur in the waters offshore of the City of Long Branch are contained in **Table 20**.

Table 20 - Anadromous and Saltwater Fish of the City of Long Branch (LBEC 2011).

Anadromous and Saltwater Fish of the City of Long Branch (LBEC 2011)			
Common Name	***Scientific Name***	***Common Name***	***Scientific Name***
Anadromous Fish		**Anadromous Fish**	
American Eel	*Anguilla rostrata*	Atlantic Sea Herring	*Clupea harengus*
Saltwater Fish		**Saltwater Fish**	
Albacore	*Thunnus alalunga*	Red Drum	*Sciaenops ocellatus*
American Eel	*Anguilla rostrata*	Redfish	*Sebastes fasciatus*
American Plaice	*Hippoglossoides*	Red Hake	*Urophycis chuss*
Atlantic Butterfish	*Peprilus triacanthus*	Sandbar (Brown) Shark	*Carcharhinus plumbeus*
Atlantic Halibut	*Hippoglossus*	Sand Tiger Shark	*Carcharias taurus*
Atlantic Mackerel	*Scomber scombrus*	Scup (Porgy)	*Senotomus chrysops*
Atlantic Bonito	*Sarda*	Shortfin Mako shark	*Isurus oxyrinchus*
Atlantic Cod	*Gadus morhua*	skipjack Tuna	*Katsuwonus pelamis*
Black Sea Bass	*Centropristis striata*	Spanish Mackerel	*Scomberomorusmaculates*
Blackfish	*Tautoga onitis*	Spiny Dogfish	*Squalus acanthias*
Bluefin Tuna	*Thunnus thynnus*	Spot	*Leiostomus xanthurus*
Bluefish	*Pomatomus saltatrix*	Striped Bass	*Morone saxitilus*
Dusky Shark	*Carcharhinus obscurus*	Summer Flounder (Fluke)	*Paralichtus dentatus*
Haddock	*Melanogrammus aeglefinus*	Tiger Shark	*Galeocerdo cuvieri*
Hickory Shad	*Alosa mediocris*	Tilefish	*Lopholatilus chamaeleonticeps*
King Mackerel	*Scomberomorus cavalla*	Weakfish	*Cynoscion regallis*
Little Tunny	*Euthynnus alletteratus*	Whiting	*Merluccius bilinearis*
Lobster	*Homarus americanus*	Windowpane Flounder	*Scophthalmus aquosus*
Monkfish	*Lophius americanus*	Witch Flounder	*Glyptocephalus cynoglossus*
Obia	*Rachycentron canadum*	Winter Flounder	*Pleuronectes americanus*
Ocean Pout	*Macrozoarces americanus*	Winter Skate	*Raja ocellata*
Pollock	*Pollachius virens*	Yellowtail Flounder	*Limanda ferruginea*

At the ocean, in the City of Long Branch there are Moon and Comb Jellies, Blue crab and the prehistoric strangeness of a Horseshoe crab. These waters are also essential fish habitat for the invertebrate Surf clam and Ocean quahog. Walking

along the beach you'll find the exoskeletons or shells of the invertebrates living in the intertidal and subtidal ocean waters. In addition to Surf clam and Ocean quahog, shells of Ribbed mussel, Common oyster, Hard-shelled clam, Boatsnail and Moon snail may be found on the beaches of the City of Long Branch. Off the shore of New Jersey 28 marine mammals are known to occur, although few species are observed in the waters directly adjacent to the City. Table15 lists the more common non-fish aquatic species.

Table 21 - Common Aquatic (non-fish) Species of the City of Long Branch (Grant 2010, LBEC 2011, NOAA 2011).

Common Aquatic (non-fish) Species of the City of Long Branch (Grant 2010, LBEC 2011, NOAA 2011)			
Common Name	**Scientific Name**	**Common Name**	**Scientific Name**
Marine Mammals		***Marine Mammals***	
Harbor Seal	*Phoca vitulina*	Fin Whale	*Balaenoptera physalus*
Gray Seal	*Halichoerus grypus*	Bottlenose Dolphin	*Tursiops truncatus*
Mollusks		***Mollusks***	
Arks	*Anadara spp.*	Softshell Clam	*Mya arenaria*
Hardshelled Clam	*Mercenaria*	Common Oyster	*Crassostrea virginica*
Chestnut Astarte	*Astarte castanea*	Atlantic Surf Clam	*Spisula solidissima*
Angel Wing	*Cyrtopleura costata*	Cocina	*Donax variabilis*
Jingle Shells	*Anomia simplex*	Razor Clam	*Ensis directus*
Blue Mussel	*Mytilus edulus*	Ribbed Mussel	*Modilus demisis*
Northern Moon Snail	*Lunatia heros*	Common Slipper Snail	*Crepidula fornicata*
Knobbed Whelk	*Buyscon carica*	Lobed Moon Snail	*Polinices duplicatus*
Common MarshSnail	*Melampus bidentatus*	SeaScallop	*Placopecten magellanicus*
Channeled Whelk	*Busycon canaliculatum*	False Angel Wing	*Petricola pholadiformis*
Rough Periwinkle	*Littorina littorea*	Bay Scallop	*Aequipecten irradians*
Tunicates		***Tunicates***	
Sea Grapes	*Mogula manhattensis*	Salp	*Salpidae family*
Echinoderms		***Echinoderms***	
Sand Dollars	*Echinarachnius parma*	Purple Sea-urchin	*Arabicapunctulata*
Forbes Asterias Sea Star	*Asterias forbesii*		
Crustaceans		***Crustaceans***	
Blue Crab	*Callinectes sapidus*	Horseshoe Crab	*Limulus polyphemus*
Rock Crab	*Cancer irroratus*	Lady Crab	*Ovalipes ocellatus*
Hermit Crab	*Pagarus spp.*	Spider Crab	*Linina enmarginata*
Mud Fiddler Crab	*Uca pugnax*	Green Crab	*Carcinus onaenus*
Rough Barnacle	*Balanus balanus*	Ghost Crab	*Ocypods quadrata*
Northern Lobster	*Homarus americanus*	Mole Crab	*Emerita talpoida*
Cnidarians		***Cnidarians***	
Moon Jelly	*Aurelia aurita*	Beroe's Comb Jellies	*Beroe spp.*
Crown Jelly	*Nausithoe punctata*		
Cephalopods		***Aquatic Reptiles***	
Long Finned Squid	*Loligo pealeii*	Diamondback Terrapin	
Short Finned Squid	*Illex illecebrosus*		

Shellfish Harvest Areas

The NJDEP Bureau of Marine Monitoring periodically assesses water quality in the location of shellfish beds to determine the safety of ingesting shellfish growing there. The transmission of shellfish borne infectious diseases begins with the

contamination of growing waters with fecal matter. Contamination can reach shellfish growing waters through stormwater runoff from urban and agricultural areas and from direct discharges such as wastewater treatment facilities and septic systems. Since shellfish filter large quantities of water through their bodies while feeding, microorganisms, heavy metals and chemicals become concentrated in their tissues, which can lead to disease or poisoning in humans ingesting contaminated shellfish (Watkins 1998).

The shellfish growing waters adjacent to the City of Long Branch include the Atlantic Ocean, the Shrewsbury River, Manahassett Creek and Branchport Creek. Branchport Creek and the waters of the Atlantic Ocean off the City of Long Branch are classified as prohibited areas for shellfish harvesting. The Shrewsbury River and Manahassett Creek are classified as special restricted areas. The designation indicates that further processing under special permit is required for shellfish harvested in these waters (NJDEP Bureau of Marine Water Monitoring 2009).

Rare Species and Species of Special Concern

The State of New Jersey maintains a database of records for occurrences of threatened and endangered wildlife species, rare plants or natural communities, and critical wildlife habitat within the State. A search of the New Jersey Department of Environmental Protection Natural Heritage Program (NHP) Database was performed, and the New Jersey Landscape Mapping Project was reviewed for the City of Long Branch. Several threatened and endangered animals and habitats associated with them are known to occur within City of Long Branch (**Map 19**). Rare vertebrates are listed below. No rare, threatened or endangered invertebrates were identified within the City of Long Branch or in the immediate vicinity of the City.

Table 22 - Rare Vertebrate Animals of the Vicinity of the City of Long Branch (NJDEP 2010).

Rare Vertebrate Animals of the Vicinity of the City of Long Branch (NJDEP 2010)					
Common Name	**Scientific Name**	**Status**	**Common Name**	**Scientific Name**	**Status**
Atlantic Leather Back	*Dermochelys coriacea*	LE,E	Least Tern	*Sterna antillarum*	E
Atlantic Loggerhead	*Caretta*	LT, E	Piping Plover	*Charadrius melodus*	LT, E
Fin Whale	*Balaenoptera physalus*	LE, E	Great Blue Heron	*Ardea herodias*	SC/S
E – Endangered; T – Threatened; S – Stable; SC – Special Concern E/T, T/T, T/S – Dual Status, letter before the slash is status of breeding population, letter after the slash is for the migratory population (LT) – Federal Status, formally listed as threatened, LE – formally listed as endangered.					

Three searches of the NHP databases were requested and received: Long Branch, Jackson Woods, and Takanassee Lake, each of which provided information regarding rare vertebrate animals (see Appendix G). Atlantic leather back, Atlantic loggerhead, and Fin whale are not addressed in the 2008 *Beach Management Plan* (City of Long Branch, 2008) and hence are not considered herein to be of significance for the coastal habitats within the City Limits. The Threatened or Endangered Species Habitat Map (**Map 19**) illustrates threatened or endangered species habitat, including habitat for "Bald Eagle, Carpenter Frog, and Black Skimmer". None of the species were listed in the NHP searches or by the NJDEP iMap program. Areas included on the map for these species are only known for occurrences of Least tern.

Least terns (State endangered) are small colonial nesting sea birds that occur along the New Jersey shore from April to September. According to the *Beach Management Plan*, a colony with a peak number of 128 adults was observed in the City in 2003 (in the beachfront area at Pier Village), but this area is no longer suitable habitat. Least tern is also listed for

Takanassee Lake and Seven Presidents County Park and is listed by the NJDEP iMap program for various sites along the tidal shores of the Shrewsbury River, Branchport Creek, and Manahassett Creek, highlighted as emergent wetlands on **Map 19**.

Piping plovers (Federal threatened and State endangered) are small, colonial nesting shorebirds present along the New Jersey shore between March and August. According to the *Beach Management Plan*, one pair nested in the City in 2003 in the beachfront area at Pier Village, but this area is no longer suitable habitat. Piping plovers are also known to occur at Seven Presidents County Park (**Map 19**).

Great blue heron is a wading bird that is a State species of special concern listed for Takanassee Lake.

Critical Habitats and Special Ecological Communities

The New Jersey Department of Environmental Protection's (NJDEP) Division of Fish and Wildlife has developed maps identifying critical areas for threatened and endangered species based on land-use classifications and species location. This effort was coordinated through a study known as the Landscape Project. The project focuses on large areas throughout the State that are ecologically similar in regard to plant and animal communities referred to as Landscape Regions. The City of Long Branch is located within the Atlantic Coast Region, identified as one of the most productive coastal habitats in the United State.

The Landscape Project divides the State into five habitat classes: forest, grassland, forested wetland, emergent wetland and beaches. These classes are based on information extracted from the NJDEP's Land Use/Land Cover data. Habitat patches within these areas are classified by a ranking system based on the status of the species present in each. The prioritized ranking system is as follows:

- **Rank 5** is assigned to areas containing one or more occurrences of at least one wildlife species listed on as endangered or threatened on the Federal list of endangered and threatened species.
- **Rank 4** is assigned to areas containing one or more occurrences of at least one State endangered species.
- **Rank 3** is assigned to areas containing one or more occurrences of at least one State threatened species.
- **Rank 2** is assigned to areas containing one or more occurrences of at least one non-listed State priority species.
- **Rank 1** is assigned to areas that meet habitat-specific suitability requirements such as minimum size criteria for endangered, threatened or priority wildlife species, but do not intersect with any confirmed occurrences of such species.

As shown on the Threatened and Endangered Species Map (**Map 19**), the City of Long Branch's critical habitat is identified as beach or emergent wetlands. Each of these habitats are reported to contain State endangered species (Rank 4). The beach habitat also is associated with Federally endangered species, as discussed in section 4.3.

Fisherman's Survey

The Environmental Commission of the City of Long Branch interviewed local fishermen to find out what fish species they were catching in the City of Long Branch and in the nearby tidal estuaries and ocean waters. **Table 23** presents the results of this survey.

Table 23 - Observed Game Fish Species of the City of Long Branch (LBEC 2011).

Observed Game Fish Species of the City of Long Branch (LBEC 2011)			
Freshwater Species		**Freshwater Species**	
Common Name	***Scientific Name***	***Common Name***	***Scientific Name***
American Eel	*Anguilla rostrata*	Common Carp	*Cyprinus carpio*
Blue Catfish	*Ictalarus spp..*	Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochinus*	Largemouth Bass	*Icropterus salmoides*
Brook Trout	*Salvelinus fontenalis*	Northern Pike	*Esox lucius*
Brown Trout	*Salmo trutta*	Smallmouth Bass	*Micropterus dolomieu*
Bullhead Catfish	*Ameirus spp.*	Sunfish	*Eliacanthus spp.*
Calico Bass (Black Crappie)	*Pomoxis nigromaculatus*	Tiger Trout	*Salmo trutta X Salvelinus fontinalis*

Table 24 - Observed Game Fish Species of the City of Long Branch (LBEC 2011).

Observed Game Fish Species of the City of Long Branch (LBEC 2011)			
Calico Bass (White Crappie)	*Pomoxis annularis*	White Perch	*Morone saxitilis*
Catfish	*Ameirus spp.*	Yellow Perch	*Perca flavescens*
Chain Pickerel	*Exox niger*		
Saltwater Species		**Saltwater Species**	
Albacore	*Thunnus alalunga*	Red Drum	*Sciaenops ocellatus*
American Eel	*Anguilla rostrata*	Sandbar (Brown) Shark	*Carcharhinus plumbeus*
Atlantic Bonito	*Sarda sarda*	Scup (Porgy)	*Senotomus chrysops*
Atlantic Cod	*Gadus morhua*	Spanish Mackerel	*Scomberomorusmaculates*
Black Sea Bass	*Centropristis striata*	Spot	*Leiostomus xanthurus*
Blackfish	*Tautoga onitis*	Striped Bass	*Morone saxitilus*
Bluefish	*Pomatomus saltatrix*	Summer Flounder (Fluke)	*Paralichtus dentatus*
Hickory Shad	*Alosa mediocris*	Weakfish	*Cynoscion regallis*
Little Tunny	*Euthynnus alletteratus*	Winter Flounder	*Pleuronectes americanus*
Lobster	*Homarus americanus*	Winter Skate	*Raja ocellata*
Pollock	*Pollachius virens*		
*As reported by local fisherman			

See EPA MARCQ - https://portal.midatlanticocean.org/

- Management Units for Summer Flounder, Scup, and Black Sea Bass

OPEN SPACE

Open Space and Public Land

Open space, for the purpose of this inventory, is defined as undeveloped land which is permanently deed restricted. The presence of open space confers social, economic and ecological benefits to municipalities that preserve and protect it. Much of the tourist industry in coastal municipalities is based on the presence of public open space containing beaches and dunes and fishable waters. Extensive wetlands attract birds and birdwatchers and provide habitat for the juveniles of many commercial and sport fish species. Two County Parks, Seven Presidents Park and the Monmouth County Skate Park, are located in the City of Long Branch.

The City of Long Branch is committed to providing abundant opportunities for outdoor recreation. Numerous municipal parks are also present within the City (**Map 20**). The municipal parks are listed in **Table 25**.

Table 25 - Listing of Municipal Parks (T&M 2022).

Municipal Parks (T&M 2022)		
Name	**Location**	**Acres**
Bath Avenue Park	NW corner of North Bath Ave. & 3rd Ave.	0.24
Beach	Ocean Ave. & Atlantic Ocean	17.34
Branchport Park	Atlantic Ave. & Branchport Ave.	3.01
Elberon Park (aka Truax Park)	Truax St. & Eaton Ter.	5.10
Fireman's Park	Hoey Ave. & Overlook Ave.	7.50
Florence Avenue	Florence Ave. & Mac Arthur Ave.	.49
George Naylor Park	Cherry St. & Jeffrey St.	2.38
Great Lawn	Pier Village	2.94
Hoey Avenue Park	Hoey Ave.	6.34
Jackson Woods	Calvert Ave. & Ocean Blvd.	12.78
Jerry Morgan Park*	Union Ave. & Monmouth Ave.	3.20
Manahassett Creek Park*	Long Branch Ave. & Naberal Ave.	23.85
MLK Memorial	Atlantic Ave. & Atlantic Dr.	.40
Ocean Place Promenade	Ocean Ave. between Madison & Ocean Terr.	5.00
Pinsky Plaza	Broadway & Long Branch Ave.	.60
Pleasure Bay Park	Atlantic Ave. & Pleasure Bay Dr.	5.19
Presidents Promenade	Ocean Ave. between Brighton & S. Bath Ave.	3.64
Ross Lake Park	Elinore Ave. between Norwood and Van Court Aves.	4.54
Slocum Park/Library/City Hall	N. Broadway at Lippincott Ave.	5.58
Takanassee Lake	Takanassee Lake at Lake Dr.	17.15
Third Avenue Park	3rd Ave. & Union Ave.	.19
Third Avenue Triangle	Westwood Ave. & 3rd Ave.	.19
Troutman's Greenway	Atlantic Dr. at Branchport Creek	2.00
Van Court Park	Van Court Ave. & Overlook Ave.	7.23
West End Park	Ocean Blvd. & Brighton Ave.	.92
Wilbur Ray Avenue Park	Wilbur Ray Ave. & Liberty Street	1.89
Total		**139.69**
* Former Brownfields Site		

Open Space Remediation Efforts

One of the strategies the City of Long Branch has implemented to increase open space and recreational lands in the City has been the mitigation of abandoned or underutilized contaminated sites to create access, recreation, and viable uses for the City. Recent projects are described below:

Manahassett Creek Park

This parcel was subject to well testing and monitoring by NJDEP for a 50'x30' portion of the park. This portion of the site was remediated by capping with a parking lot. The more than 23 acres comprising Manahassett Creek Park serves as the centerpiece for the City's recreation program. The park has baseball fields, Pop Warner football fields, soccer fields, a recreation building and snack bar, off-street parking, walking trails, basketball courts, tennis courts and boat ramps on the Manahassett Creek.

Jerry Morgan Park

The remediation and construction of this park was completed in 2005-2006. This site was previously a NJ Natural Gas Manufacturing Plant – MGP Site. Remediation began in the late 1990s and was led by the NJDEP. Remediation efforts included excavating 2 feet of topsoil and refilling with clean soil and re-piping for drainage. After remediation, a walkway was constructed over the creek to meet Memorial Plaza. Remediation at Memorial Plaza was completed in 2007 and Memorial Plaza was then connected to Jerry Morgan Park.

Cherry Street Park (George Naylor Park)

To fulfill a Green Acres requirement, a Phase I Assessment, as part of renovations to the park, was performed. Hot spots were found in areas used by the railroad and the other business that used the property. Remediation, which included excavation and removal of topsoil, then capping and preparation of a deed restriction for digging depth, was monitored by Green Acres. Remediation, except for the monitoring of wells, is complete at the site. This park is used for baseball and basketball and also has a tot lot.

Pinksky Park (Broadway Park)

This former deteriorated 0.6-acre parking lot was remediated, constructed and completed in 2007. It hosts an interactive water feature one block from Ocean Boulevard.

Van Court Park

To fulfill a Green Acres requirement, a Phase I Assessment was performed, and the required remediation was completed on this site as part of renovations to the park.

Coal Gasification Plant

The cleanup and remediation of the 12-acre Coal Gas Site on Long Branch Avenue is underway, resulting in a cleaner Troutman's Creek.

UTILITIES, INFRASTRUCTURE, AND TRANSPORTATION

WATER SUPPLY

Potable water within the City is provided by NJ American Water (NJAW). NJAW is responsible for safe conveyance of potable water to consumers in the City.

SEWERAGE & DRAINAGE

The Long Branch Sewerage Authority is responsible for management of wastewater. The approximate volume of wastewater generated and treated in the City is up to a maximum of 5.4 million gallons per day (gpd). Wastewater is discharged through a designated ocean outfall and is subject to regular testing and stringent State/Federal compliance regulations.

STORM WATER

To comply with applicable State and federal regulations, stormwater management must remain a critical and priority objective for municipalities relative to the protection of existing environmental resources; most importantly open water areas and the fauna and flora that inhabit these areas. Due to the City's location adjacent to the Atlantic Ocean, the Shrewsbury River, and its tributaries, stormwater management should remain a top priority in the interest of protecting environmental resources while the City advances its planning and redevelopment goals. In addition to utilizing the City's Master Plan as a planning tool, parameters specified in the NJDEP's Stormwater Management Regulations (NJAC 7:8) and the recently adopted NJDEP Green Infrastructure Standards must be followed to ensure stormwater management objectives are achieved. More specifically, stormwater management Best Management Practices (BMPs) must be implemented as they pertain to quantity control, groundwater recharge, water quality, and green infrastructure to the greatest extent possible. Lastly, the City is encouraged to regularly update its Stormwater Outfall mapping and maintain conformance with the NJDEP's Municipal Stormwater Regulation Program (MS4 Permitting).

The City's stormwater infrastructure currently discharges to a variety of locations throughout the City including detention basins, infiltration basins, combined infiltration/detention basins, retention basins (i.e., wet ponds), surface water discharge points, and through stormwater outfalls that convey stormwater into receiving water bodies. The primary receiving water bodies include the Atlantic Ocean, Branchport Creek, Troutman's Creek, Manahassett Creek, Takanassee Lake, Hollywood Lake, and the smaller open water areas associated with the Whale Pond Brook sub-watershed. **Map 21** illustrates the locations of these various discharge points throughout the City. This map was largely produced using data collected from the City's 2019 MS4 Stormwater Outfall map. Basin locations/surface water discharge points were identified using information taken from the NJ Hydrologic Modeling database. It is important to note that there are a number of Surface Water Discharge points located along Branchport Creek that originate at Monmouth Park Racetrack. While these discharge points are not owned and/or maintained by the City, they collectively represent an important stormwater management consideration because the receiving waterbody (i.e., Branchport Creek) is a shared resource located at the City's municipal boundary with the Borough of Oceanport. To this extent, it is important that the City maintain an acute awareness relative to the quality of stormwater discharged through these points and the affect it may have on the City's environmental resources along this open water corridor.

Based on recent conversations with the City's Department of Public Works personnel, the City does not appear to have any noteworthy or robust green infrastructure currently in place to improve stormwater quality before it discharges to surface

and/or groundwater resources. Green infrastructure plays a critical role in improving stormwater quality by filtering out suspended solids, dissolved contaminants, floatables such as petroleates, heavy metals, and even bacteria. Green infrastructure can include, but necessarily be limited to, rain gardens, bioswales, green roofs, permeable pavement systems, green streets, and other less obvious implementations such as disconnection of rainwater downspouts from underground utility systems.

The City is encouraged to pursue implementation of green infrastructure where opportunities present themselves. Ideal candidate sites for implementation of green infrastructure include those areas where stormwater can receive pre-treatment before it is discharged to underground collection systems or into receiving water bodies. Improving typical gutter flow areas by converting pavement into bio-filtration swales can have a dramatically positive impact on stormwater management quality. Stabilizing the standard eroded and undercut embankments where stormwater outfalls are typically located along waterbodies by planting hydrophytic vegetation or applying a proven riparian zone seed mix is also a proven method of improving stormwater quality. Removal of damaged pavement in parking lots and sidewalks and replacing it with a porous cover system such as permeable pavers is another opportunity to implement green infrastructure. Basically, any site where stormwater can be passed over or through an area of appropriately selected vegetation is representative of an opportunity to implement green infrastructure. Stormwater inlets located in parking lots or other paved areas not subject to extensive vehicle traffic are ideal candidate sites for the implementation of green infrastructure. Stormwater quality can be improved in these locations by creating vegetated borders around the inlets. This promotes groundwater infiltration, improves water quality, and reduces run-off quantities of stormwater that are otherwise directly conveyed to underground utilities and downstream waterbodies. Even the use of rain barrels placed under rainwater downspouts creates an opportunity to improve stormwater discharge dynamics by collecting it for beneficial re-use (e.g., watering of curbside and/or hanging plant containers).

While green infrastructure candidate sites are contemplated, it is imperative that the City focus on regular maintenance of existing swales and stream corridors by removing accumulated sediment, solid waste, and snags. This will improve the flow of stormwater through naturally vegetated corridors and minimize the potential for flooding and/or accumulation of standing water for long periods of time.

SOLID WASTE

According to correspondence received from the City's Department of Public Works (DPW), the City generates approximately five tons of solid waste per week or approximately 10,000 pounds. The City also generates 13 tons of combined recyclables per week or roughly 28,660 pounds. Solid waste is transferred to the Monmouth County Landfill at 6000 Asbury Avenue in Tinton Falls, NJ. Recyclables are transferred to Mazza Recycling on Shafto Road in Tinton Falls, NJ. According to correspondence received from the City's Department of Public Works, the City does not have any available data relative to the degree to which recyclables are contaminated. At the time of publication of the report, the City did not have any documented amounts of leaf litter/yard waste collection. The leaf litter/yard waste is collected by DPW forces and transferred to a City-owned facility on Atlantic Avenue where it is subsequently processed on site by a third party operator that converts the leaf-litter/yard waste into mulch for subsequent commercial use.

In terms of reducing the volume of waste transferred to the County Landfill, the City can promote the benefits of composting kitchen wastes, yard waste, and compostable paper products. This can be easily accomplished by homeowners by collecting

kitchen waste and paper products and placing both in a compost bin or heap located on their properties. Monmouth County has a current composting education program in place and advocates its use by all residents and businesses to the extent deemed practical. Commercial kitchens may not readily have an immediate opportunity for on-site composting due to property restrictions, but opportunities for collection and transfer of kitchen waste to composting facilities may be regionally available. Composting has many benefits besides the reduction of the waste stream directed to landfills. Once processed correctly, compost can be used as an organic, nutrient-rich soil amendment in many personal and commercial landscaping applications. It can even be converted into fuel for renewable energy sources. If resources are put in place, the City can embark on a public outreach initiative to promote the benefits of composting similar to what other cities in the US and Europe conducting. More specifically, the City can implement a future program for curbside collection of kitchen/food waste or establish drop off sites for kitchen/food waste for later composting. The opportunities to implement such a program are numerous and well-documented as being successful when managed correctly. The environmental, educational, and community benefits of waste reduction through composting are very well documented and possible.

TRANSPORTATION

Transportation systems are manmade infrastructure and are generally understood to be beneficial to the overall economic well-being of a community. Notwithstanding, transportation systems can also have environmental impacts. Common cited negative impacts may include noise and air pollution from fossil fuel emissions. Noise pollution is a factor that may be harmful to certain individuals affecting overall quality of life, however the negative impacts from noise may only affect segments of the population in proximity to the transportation system corridors – and as noted at the outset of this subsection – the economic benefits of having transportation systems may far outweigh a lack of transportation system options. Fossil fuel emissions may be linked to negative effects on certain individual's health, although a more indirect impact, individuals may experience respiratory or cardiovascular issues. In addition, vehicular emissions along roadway corridors may be linked to negative effects on roadside vegetation; yet the same existence of roadside vegetation may also produce positive outcomes by effectively diminishing the harmful effects of vehicular emissions.

Map 22 shows the various transportation and mass-transit systems, to include walking radii to mass transit hubs. **Map 13** shows existing evacuation routes along with FEMA Flood Insurance Rate Map floodplains.

It is recommended that the 2020 Master Plan Reexamination Report (City of Long Branch, 2020) is leveraged for guidance as to how to integrate environmental concerns into the City's Circulation Plan. For example, the Circulation Plan includes the following element:

> "Create a multi-use trail system that links neighborhoods, community facilities, parks and open space."

The creation of a system that links neighborhoods, facilities, parks and open space may also provide ecological system improvements for wildlife and fauna which would be in congruence with the Connecting Habitat Across New Jersey (CHANJ) program. CHANJ is an effort to make our landscape and roadways more permeable for terrestrial wildlife by identifying key areas and actions needed to achieve habitat connectivity across the state for the beneficial movement of animals through the landscape to find food, shelter, mates, and other resources.

Specific to automobile traffic, pedestrian traffic and bicycle mobility, again the City's Circulation Plan includes the City's vision for improving these aspects of transportation, access and mobility. Furthermore, because the City includes multiple corridors that are owned and operated by Monmouth County, the State of New Jersey (e.g., NJDOT) and transportation authorities (e.g. NJTPA), the City may benefit from programs, data, tools, initiatives or grants under the auspices of these other entities, For example, the City may want to consider how the NJTPA Small Area Land Use Impact Tool (NJTPA,

Copyright ©2023 NJTPA, Inc.) may be leveraged to support the relationship(s) between transportation and environmental impacts.

Ultimately, detailed studies that definitively define both the positive and negative impacts of transportation systems are suggested and warranted for the City of Long Branch given that the community is a tourist destination. The influx of tourists to the City are important to the socio-economic viability of the community given that the City is continually competing for tourist dollars. The City of Long Branch has weathered economic viability since the construction of the Garden State Parkway and in recent years has bolstered its economic future along the Atlantic Ocean. The City has multiple modes of transportation available to citizens and visitors alike, and therefore may be well-served to explore avenues in which to sustain inland transportation systems yet seek various best management ecological practices that leverage the benefits of natural systems to support the existing transportation systems.

RENEWABLE RESOURCES

Wind & Wind Energy

According to the Koppen climate classification, the portion of New Jersey, in which the City of Long Branch is situated, experiences a humid mesothermal climate (Strahler and Strahler 1992). The undulating flow of air masses, generally moving from west to east across the continent of North America dominates the climate of New Jersey. This pattern of air mass movement is called the westerlies. Since these streams of air vary in intensity and can be wet or dry, cold or warm, New Jersey weather is highly variable on a day-to-day basis. Despite its small size, differences in geology, proximity to the Atlantic Ocean and the pattern of north-south variation in the track of air masses across the State, allow five distinct climate regions to be delineated. These five regions are Northern, Central, Pine Barrens, Southwest and Coastal (ONJSC 2006a).

The City of Long Branch is located in the Coastal Region of the State of New Jersey in terms of climate characteristics. Recent research by the US Department of Energy includes the DOE ‘Wind Vision’ project and includes a primary finding that “Wind energy is available nationwide. The (US Department Of Energy, 2017) shows that wind can be a viable source

of renewable electricity in all 50 states by 2050."

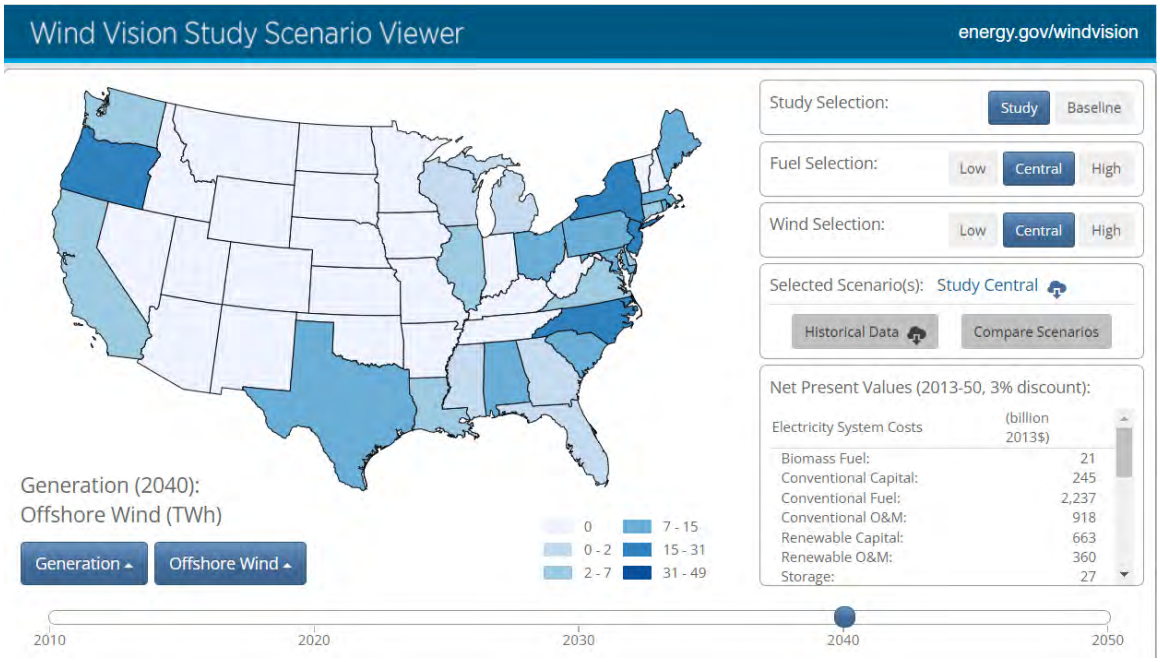

Figure 16 - US Department of Energy 'Wind Vision' Project Demonstrates Wind Energy Potential.

The adjacent Atlantic Ocean tempers and sometimes dominates the continental climate prevalent over inland areas. Because of this, seasonal temperatures are subject to less variation (ONJSC Accessed 2006a). The sea breeze causes local changes in temperature, humidity, wind speed, wind direction, cloud cover, and sometimes precipitation. Weather forecasts for near-shore locales must consider the modifying effects of sea breezes on weather conditions for the general public, as well as for boaters (Dunk 2005).

In the autumn and winter, air over the ocean is warmer than over the land and ocean breezes moderate the cold. The opposite is true in the spring and summer when the ocean's influence is cooling. During spring and summer, land heats more quickly than the water. As the air over land rises, cooler air over the ocean moves inland (ONJSC 2006a). The patterns of prevalent seasonal wind direction are shown on Figure 1. The distribution of sea surface temperature along and near the shore both influences and is influenced by sea breezes. During prolonged periods of southwesterly wind flow resulting from pressure differences in the atmosphere, the upwelling of colder water from below the ocean surface can be induced. This upwelling can produce near-shore pockets of water that are at least 5 to 10 degrees Centigrade © colder than the surrounding ocean. These cold pockets of upwelling help to get sea breezes started (Dunk 2005).

Wind is a predominant factor associated with coastal geographies such as the City of Long Branch. Consequently, the entire City of Long Branch exists within an area with wind speeds of 6.0 to 6.5 meters per second at 80 meters of altitude. The City of Long Branch is in an area estimated to have "Fair" Resource Potential with an average wind speed of 6.4 to 7.0 m/s at 50 meters of altitude (USDOE 2010). More recent studies such as the National Renewable Energy Laboratory (NREL) has mapped wind potential values similarly to historical studies such as ARC Renewable Energy, L.L.C. between March 9, 2010,

and May 4, 2010. The average wind speed, during this period was 8.52 miles per hour. These results show that the City of Long Branch is characterized by above average wind speeds and consistently high wind speeds which may be beneficial in capturing wind as a renewable resource; for example, even a small wind turbine could be expected to generate energy 80 percent of the time (ARC 2010).

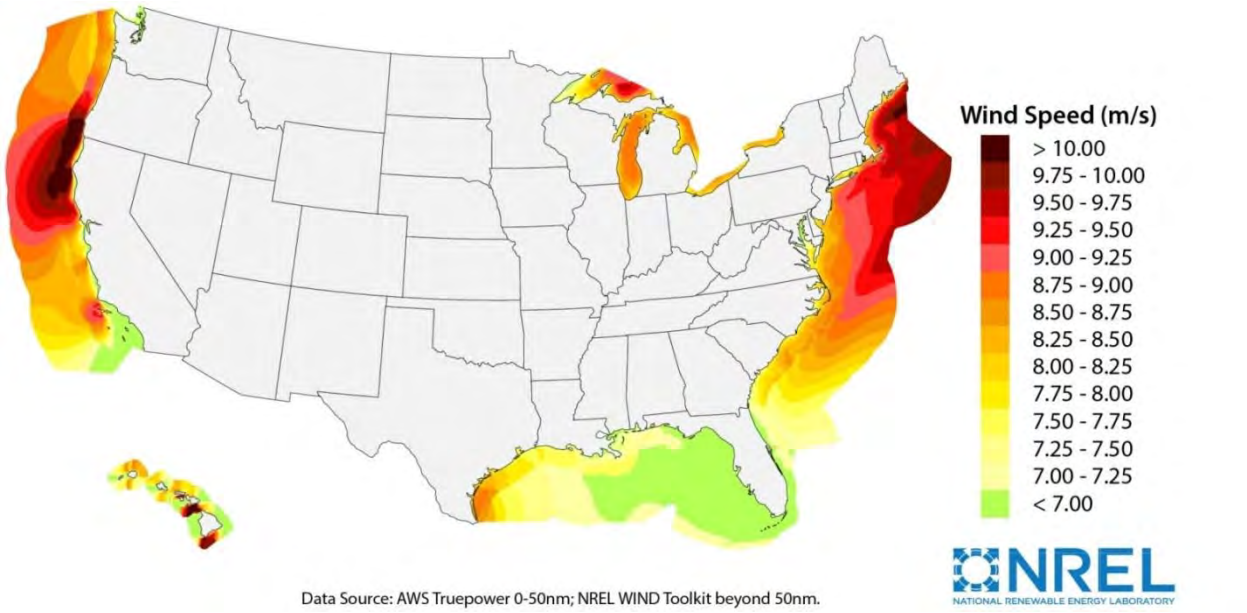

Figure 17 - US Coastal Average Wind Speeds at 80 meters of Altitude.

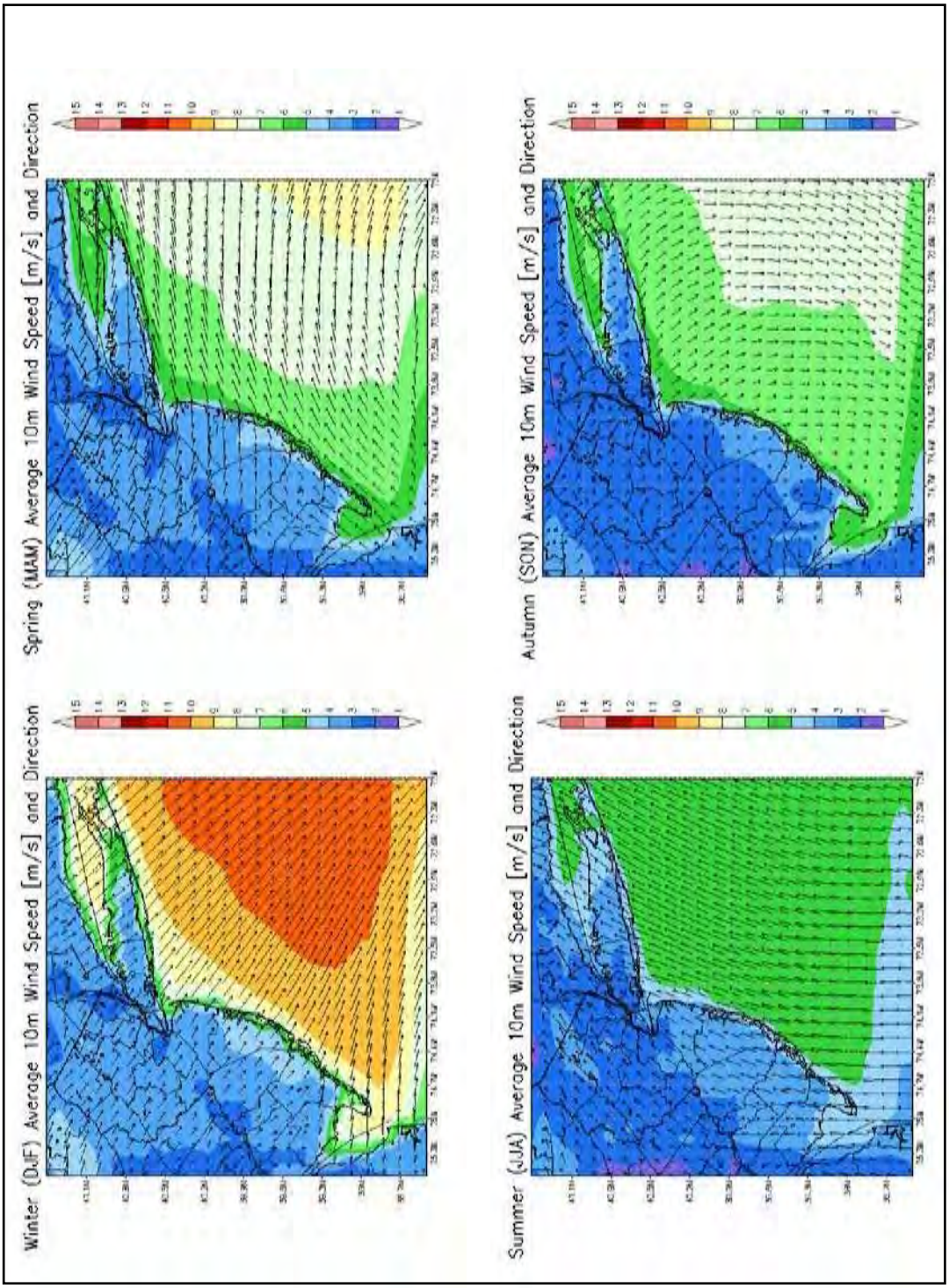

Figure 18 - New Jersey Seasonal Average Wind Speeds with Wind Directional Predominance.

Solar Energy and Electric Vehicles

Additional renewable resources include solar energy and the use of electric vehicles. The benefits of solar energy are well documented. There is demonstrable use of solar energy throughout the City and the region. Many private and commercial properties feature appropriately sized solar energy systems (i.e., panels) that have been installed to offset energy consumption and reduce the carbon footprint associated with fossil fuel use. There

are large-scale solar farms in our region, but none within the City. Construction of solar farms requires large tracts of developable open space that are generally free of environmentally sensitive areas. Former agricultural sites are typically utilized to build solar farms. In general, the City lacks large, undeveloped areas of land that can be used to build solar farms. That said, installation of solar energy systems is generally limited to roof tops applications.

Promoting the use of electric vehicles is also well documented, but the infrastructure required for available charging is generally lacking in today's electric vehicle (EV) market. It is important to note, however, that the State has implemented a new law to require installation of EV charging stations at designated parking spaces. More specifically, the State has implemented the Model Statewide Municipal Electric Vehicle Ordinance that was signed into law on July 9th, 2021. The law requires that Electric Vehicle Supply/Service Equipment (EVSE) and Make-Ready parking spaces be designated as a permitted accessory use in all zoning or use districts and establishes associated installation and parking requirements related to EVSE in New Jersey's 565 municipalities.

The intent of the model statewide ordinance is to ensure that municipalities are requiring installation of EVSE and Make-Ready parking spaces in a consistent manner and also to provide an ordinance that can be easily used by every municipality with no or minimal amendments by the municipality. It is understood that the City of Long Branch is applying this requirement to new development projects. The goal of the law is to alleviate typical concerns associated with too few charging stations (also known as 'range anxiety') that are precluding consumers from fully embracing the shift towards EVs. By implementing this law and abiding by its guidelines, more EV charging stations will become available to the public thereby accelerating the shift to EVs in the near future which in time will have a profound impact on air quality.

ENVIRONMENTAL ISSUES

HEALTH

According to the American Public Health Association, environmental health is defined as a discipline that focuses on the relationships between people and their environment; promotes human health and well-being; and fosters healthy and safe communities. Environmental health is a key part of any comprehensive public health system. The field works to advance policies and programs to reduce chemical and other environmental exposures in air, water, soil and food to protect people and provide communities with healthier environments (American Public Health Association (APHA), 2022 © American Public Health Association).

Air Quality

According to the US Environmental Protection Agency (USEPA), research have shown that air pollutants such as ozone and particulate matter (PM) increase the amount and seriousness of lung and heart disease and other health problems (US Environmental Protection Agency (USEPA), 2023). The USEPA indicates that more research is needed because the impact of air pollution exposure depends on the duration and concentrations, and the health status of the affected populations. The USEPA indicates that studies are needed to increase knowledge of the exposure duration and the possible cumulative increase in risk but note that children, the elderly, and people living in areas with high levels of air pollution are especially susceptible to health issues related to poor air quality. Known pollutants include (National Institute of Environmental Health Sciences, 2023):

- Traffic-Related Air Pollution
- Ozone Pollution
- Noxious Gases
- Particulate Matter (PM)
- Fine Particulate Matter (FPM)
- Volatile organic compounds (VOC)
- Polycyclic aromatic hydrocarbons (PAH)

Common impacts from both Short- and long-term exposure to the aforementioned pollutants may result in adverse respiratory and cardiovascular effects, including premature death, hospital and emergency room visits, aggravated asthma, and shortness of breath (U.S. Global Change Research Program, 2018). Individuals with pre-existing conditions associated with lung and heart function are often vulnerable to air pollution.

Air pollution within the City of Long Branch is covered in the subsection on Air Quality.

Water Quality

According to the New Jersey Department of Health (New Jersey Department of Health, 2018), while the majority of New Jersey residents enjoy some of the most pure and safe drinking water anywhere, there are still possible contaminants, and it is important to understand potential impacts. The City of Long Branch does not have private drinking water wells because the City is serviced by a private water utility – New Jersey American Water (https://www.amwater.com/njaw/). According to NJAM Customer Service Line Material Map Long Branch is within the Coastal North system having a Public Water System ID of #NJ1345001.

The New Jersey Department of Health indicates and lists the following subject contaminants relating to water contamination (New Jersey Department of Health, 2018):

- Lead
- Arsenic
- 1,2,3-Trichloropropane (TCP)
- Disinfection By-Products
- Per- and Polyfluoroalkyl Substances (PFAS)

Public health effects of each contaminant are enumerated in PDF documents which are available at the following website:

https://www.nj.gov/health/ceohs/environmental-occupational/drinking-water-public-health/

Readers of this document are encouraged to examine the documents because full reproduction within this report is not practical.

Notably, NJAM has also created a public service online web map to demonstrate the tracking of lead service line replacement – a topic that has become important in recent years. The figures below offer a look at the web map which can be accessed at:

https://njaw.maps.arcgis.com/apps/webappviewer/index.html?id=2aa6e04ed2204b86a6bd233600870dc2

Please note that the user needs to zoom-in or search for an address to obtain the view depicted in Figure 19.

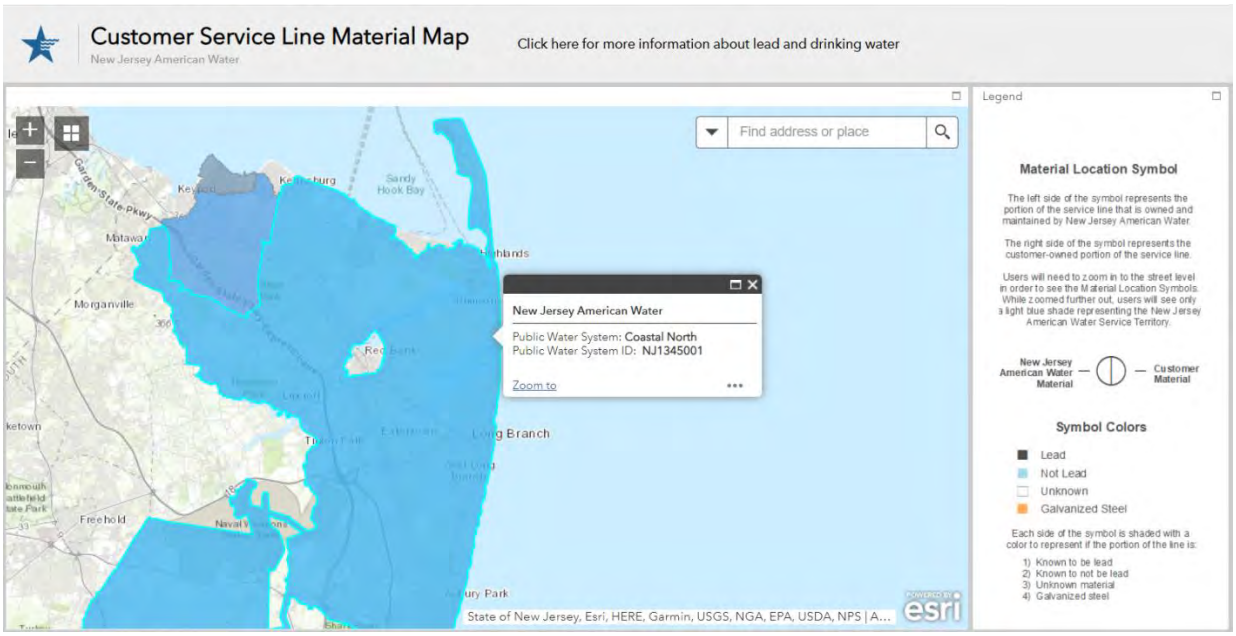

Figure 19 - NJ American Water Customer Service Line Material Online Mapping Tool - Regional View.

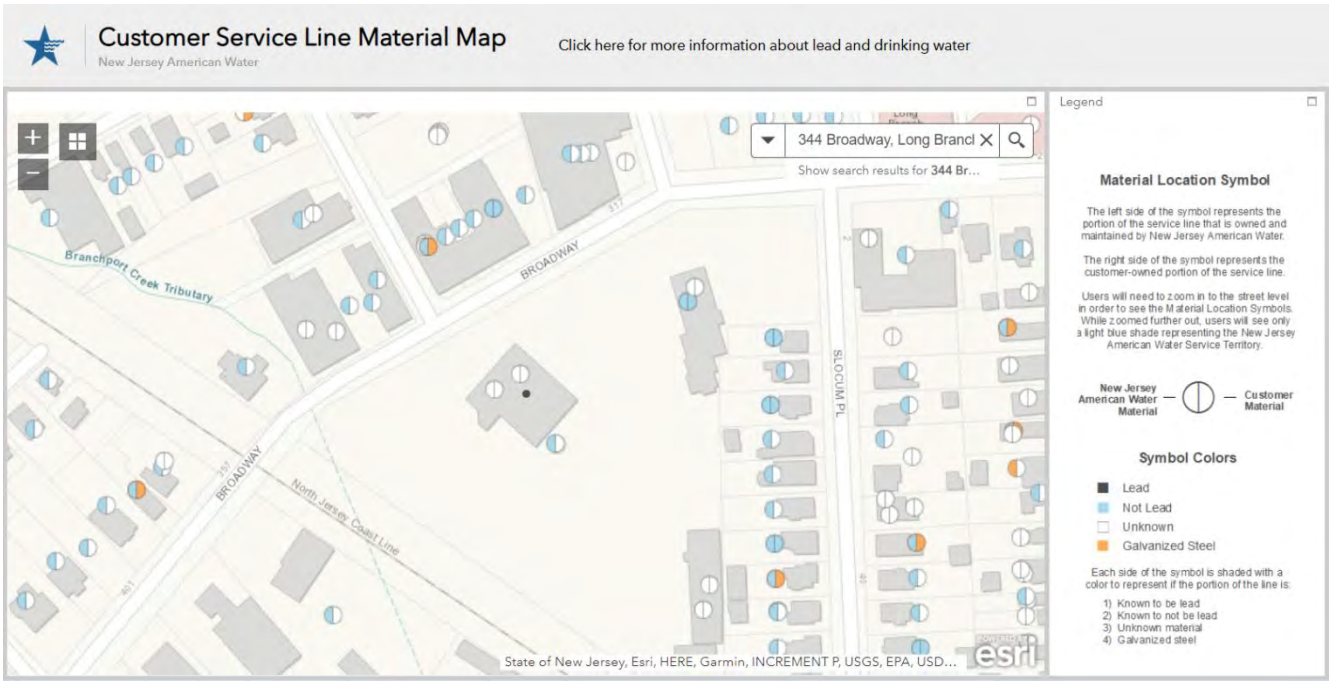

Figure 20 - NJ American Water Customer Service Line Material Online Mapping Tool - Address View.

Insect & Tick-Borne Disease

According to the Center for Disease Control (CDC), multiple insects including…

- Mosquitoes
- Ticks

- Fleas
- Flies

…can spread diseases such as malaria, yellow fever, Zika, dengue, chikungunya, and Lyme disease. While some cases are mild, these diseases can be severe and have lasting consequences. Some diseases caused by insect bites can be prevented with vaccines or medication, like yellow fever and malaria; however, many cannot, such as Zika and Lyme (Centers for Disease Control, 2022). While the NJ Department of Health certainly lists Lyme disease as a significant risk, research did not produce a concise resource that listed ticks and lymes along with various insect diseases. However, research revealed that the CDC includes what would appear to be a more comprehensive list of insect-related health diseases on web pages dedicated to Travelers Health under Advice for Travelers.

The CDC Advice for Travelers lists a variety of health risk subjects on its website for insect bites to include the following items that are enumerated in the CDC's Yellow Book which also has an online version of the updates performed in Year 2020:

- Chikungunya
- Dengue
- Japanese Encephalitis
- Lyme Disease
- Malaria
- Plague (Bubonic, Pneumonic, Septicemic)
- Rickettsial Diseases (Ticks)
- Tickborne Encephalitis
- Trypanosomiasis, African (Sleeping Sickness)
- Trypanosomiasis, American (Chagas Disease)
- Yellow Fever
- Zika

Readers are encouraged to visit the CDC Yellow Book and 2020 Online Updates because full reproduction within this report is not practical:

- Yellow Book - https://wwwnc.cdc.gov/travel/page/yellowbook-home-2020
- Udates to Yellow Book - https://wwwnc.cdc.gov/travel/yellowbook/2020/updates

Seasonal Surges in Population

Seasonal surges in population and the health impacts they may cause may include effects that fall under multiple disciplines; for example epidemiology as well as law enforcement. This report does not seek to discuss all aspects such as law enforcement approaches to crowd control however we note that, epidemiology is the branch of medicine which deals with the incidence, distribution, and possible control of diseases and other factors relating to health. As a result of COVID-19, much of the population became exposed to the science of epidemiology. The science or discipline of epidemiology has a long history of studying the health impacts related to seasonal surges which may stem from a variety of factors to include, but not limited to, the influx of populations from tourism, migrant agricultural workers, persons seeking evacuation from another area due to a natural or man-made disaster or the assembly of large groups for a festival. Students re-assembling for a new school year can even be considered a population surge within a specific school building.

The epidemiological or pathogen health risks associated with surges in population are typically studied under the purview of health departments. Health departments work hand-in-hand with other governmental departments to manage and mitigate risks in-part by the establishment of limitations; for example, occupancy codes or maximum temporary occupancies by fire code. Because the spread of pathogens are highly dependent on environmental variables which may affect seasonal variation in the incidence of disease, in short, the health risks associated with human movements are very complex. For example, the seasonality and incidence of Influenza, is likely to reflect both the assembly of persons and variation in absolute humidity. Other factors such as availability of parking and limitations/capacity of transportation systems may also determine the practical volume of a given surge event placing persons in proximity of one another; for example, if public transportation systems (i.e., passenger rail or bus) are operating at full-potential and roadways are open and functioning, population influxes can be at their maximum.

Ultimately, seasonal influxes and surges are an issue that need to be managed and mitigated with a 'whole of government' approach in which all City departments establish approaches and solutions to accomplish desired outcomes. Given that the City of Long Branch is a popular tourist location along the New Jersey shore, outcomes will presumably seek to balance the needs of the community, meaning that the economic viability of the City needs to be balanced with health concerns.

Readers may also want to consider State and/or County-level initiatives for relationships, approaches or methods at addressing health impacts:

- NJ Health Improvement Plan (Healthy NJ 2020, 2020) which is New Jersey's course of action and collaborative strategies developed by the state health department, sister agencies, community-based stakeholders, and local public health agencies to address shared priority health issues. See https://www.nj.gov/health/chs/hnj2020/about/sh_improvement_plan/.
- Monmouth County Community Health Improvement Plan (CHIP) – See https://www.co.monmouth.nj.us/page.aspx?ID=1997.

Heat Island Impacts

The US Environmental Protection Agency (US EPA) defines a heat island as an urbanized area that experiences higher temperatures than outlying areas. Structures such as buildings, roads, and other infrastructure absorb and re-emit the sun's heat more than natural landscapes such as forests and water bodies. Urban areas, where these structures are highly concentrated and greenery is limited, become "islands" of higher temperatures relative to outlying areas. Daytime temperatures in urban areas are about 1–7°F higher than temperatures in outlying areas and nighttime temperatures are about 2-5°F higher (US EPA, 2023).

Extreme heat is one of the most dangerous hazards because of its public health impacts, which are most likely to affect people with underlying chronic conditions. The CDC indicates that deaths may result from heat stroke and related conditions, but also from cardiovascular disease, respiratory disease, and cerebrovascular disease. Heat waves are also associated with increased hospital admissions for cardiovascular, kidney, and respiratory disorders (Centers for Disease Control, 2022).Shade trees would be a valuable resource to reduce the possibility or incidence of Long Branch experiencing heat island effects. The use of shade trees to reduce heat island effects has been long established as demonstrated by a news release from NJDEP which reads in-part (NJDEP, 2003):

> "*Trees can significantly cool urban areas that generate heat and clean the air by absorbing pollution, according to two studies sponsored by the U.S. Environmental Protection Agency (EPA) and the New Jersey Department of Environmental Protection (DEP). The studies examined so-called "urban heat islands" surrounding the cities of Newark and Camden and explored various measures to mitigate their adverse effects… The studies also showed that heat islands*

can be tempered by using lighter colored or more reflective surfaces on buildings, roofs and streets."

This report supports the concept of the City creating a Shade Tree Commission to facilitate an urban-forestry management plan.

The City is already accredited by the NJUCF and has an active grant to perform a tree inventory. See the following NJUCF website for more information:

- New Jersey Urban & Community Forestry Program (NJUCF) - https://www.nj.gov/dep/parksandforests/forest/urbanandcommunity/

NJUCF is a state-sponsored program in which municipal and county governments can become accredited by developing and implementing a New Jersey Forest Service approved management plan for trees and forests, training and education, and annual reporting. As noted, the City of Long Branch is already accredited by the NJUCF and therefore have access to grants for development and implementation of their Community Forestry Management Plan and a basis for liability protection associated with local urban forestry programs (New Jersey Forest Service, 2023).The City may want to consider additional or follow-on opportunities with NJUCF to fully exploit the GIS Tree Canopy data developed coupled with the current grant to complete a tree inventory (circa Spring 2023).

NOISE

The City of Long Branch manages nuisance or unlawful noise through its municipal ordinance. Generally-speaking, this noise management code is generally aimed towards the benefit of humans. Wildlife may benefit indirectly from City noise law, however the City may want to consider avenues with which to focus additional attention towards noise law specifically to benefit wildlife and wildlife habitats. City Code covers noise under Chapter 235 and lawful sound levels by receiving land use are defined by 235 Attachment 1. Allowable noise types and specific exceptions are enumerated as follows:

1. Horns, signaling devices as permitted § 235-2A(1).

2. Loudspeakers, amplifiers as permitted by § 235-2A(3).

3. Nonvehicular whistles, horns and other signaling devices as permitted by § 235-2A(6).

4. Construction work as permitted by § 235-2A(9).

5. Refuse collection and tree removal and trimming.

6. Drums as permitted by § 235-2A(12).

7. Lawn mowers, chain saws and domestic power tools as permitted by § 235-2A(16).

8. Sound trucks as permitted by § 235-3.

9. Railroad locomotives and cars.

10. All other exemptions provided by § 235-7.

Potential environmentally noise-sensitive locations within the City would include habitat corridors in proximity to existing noise-generating settings such as the railroad and rail activities, busy highways and main thoroughfare streets. Notably however, the community is in fact a City and railroad locomotive cars are considered an

exception. Therefore, proximity noise is not inherently unlawful but could potentially be a disturbance to certain wildlife that seek seclusion. Some animal species may appear adaptable to human activity, a prime example includes Canadian Geese – yet this species is even still often deterred or driven away from areas with loud noise at least proving anecdotally that loud noise is still viewed as a threat to even some of the most adaptable species. Furthermore, emerging research in this area indicates that noise may decrease the fitness of individual animals (Barber, 2013); in essence – the animal may experience a lower quality of life.

There are two (2) approaches to addressing noise; 1.) Reducing noise exposure and/or 2.) Incorporating sound measurement into environmental planning. Should the City want to gain a clear picture of the current noise setting, noise levels would need to be recorded and mapped in order to understand the spatio-temporal (Space & Time) relationship to the ecological systems of the City. In combination, work would need to be done to understand the response of specific species to current noise levels in order to define appropriate remedial approaches and solutions. This methodology or approach to establishing or better understanding the effects is similar to a recent effort described in a 2019 Pew Charitable Trust article regarding orcas (Brown, 2019):

> "*Once officials know the noise level each of the seven classes of ferries emits at various speeds, the agency will pair the details with a recently launched orca-tracking app. Ferry captains will be directed to slow down or reroute to accommodate the orcas.*"

In closing, the subject of addressing noise pollution as it relates to improving the environment on behalf of wildlife is an area that does not have a lot of well-defined best-management practices. The aforementioned Pew article supports this notion. Ultimately, any action would be dependent on the will of the City and its citizenry to decide whether a project is warranted and feasible.

LIGHTING

Light pollution is generally defined as the presence of anthropogenic and artificial light in the night environment; and/or the inappropriate or excessive use of artificial light. It can be classified into four (4) separate categories:

1.) Glare - excessive brightness that causes visual discomfort.

2.) Skyglow - brightening of the night sky over inhabited areas.

3.) Light trespass - light falling where it is not intended or needed.

4.) Clutter - bright, confusing, and excessive groupings of light sources.

Light pollution best-management practices are emulating from Green Building Construction Practices. Here in NJ, Rutgers has sponsored the New Jersey Green Building Manual. The manual is a voluntary, web-based educational resource tailored for New Jersey that provides economic and environmental best practices across the spectrum of green building categories including energy, emissions, water, waste, transportation, and human health. The New Jersey legislature authorized the creation of the Manual (C:52:27D130.6) to provide this guidance to owners and builders who participate in any state program that either encourages or requires the construction of green buildings (New Jersey Department of Community Affairs (NJDCA) [Funded Update 2018], 2022).

The City has included addressing "light pollution" within the 2020 Master Plan Reexamination (City of Long Branch, 2020) under the Land Use element as defined in the following bulleted item extracted from the Reexamination Report:

> "*Encourage commercial development and retrofitting that emphasizes quality architecture, shared access and parking, transit friendly facilities, pedestrian circulation, appropriate intensification of buildings, and extensive landscaping; and which avoids oversized parking areas,* ***light pollution (emphasis added)****, and multiple and uncontrolled highway access points.*"

From the standpoint of wildlife and their sensitivity to light, best-management practices for green buildings would practically solve some of the issues related to the disruption of wildlife activity. For example, well-directed lighting for a specific building or site can increase visibility and safety and also reduce or diminish light that disturbs functional wildlife habitats. The City may want to consider avenues with which to advocate for intelligent, dynamic lighting that adapts to the presence and behavior of human activity and also minimizes light pollution impacts to wildlife and their habitats with the City.

CONTAMINATED SITES AND SOURCES OF POLLUTION

Based on a review of currently available Monmouth County and NJDEP GIS data, there are many records of contaminated sites within the City of Long Branch. This is not unique to the City since many densely populated, urban municipalities share the responsibility of inventorying and managing known contaminated sites. **Map 23** illustrates the location of the known, active contaminated sites within the City. This map also illustrates the locations of known underground storage tanks (USTs), but due to the density of the City, there are invariably many others (both regulated and non-regulated) that are not documented by the GIS data used to create **Map 23**. Known contaminated sites are assigned case numbers by the NJDEP and depending on complexity, are often managed by Licensed Site Remediation Professionals (LSRPs). Management of USTs are subject to applicable NJDEP regulations especially as it pertains to the closure (i.e., removal) of same.

Superfund sites, or those sites included on the National Priorities List designated as such under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), are managed by the EPA in its Superfund Program. In New Jersey, the NJDEP Site Remediation Program oversees the Superfund Program. At the time of publication of this report, the EPA identifies 152 Superfund sites in New Jersey, none of which are located in the City of Long Branch. The closest Superfund sites are located in the City of Asbury Park, Wall Township, Howell Township, Colts Neck Township, Freehold Township, Morganville, Upper Freehold Township, and Marlboro Township.

With regard to the known contaminated sites within the City, a full list of known contaminants at each site is not readily available at the time of publication of this report. This was cross-checked by reviewing available GIS data maintained by the NJDEP in its GeoWeb database. It is possible, however, to research the case status, NJEMS Site ID, Program Interest Name, and physical address of each known contaminated site shown on **Map 23** by locating it in the GeoWeb database. It should be noted however, that at least a partial list of known contaminants is available in the GeoWeb database for those sites that have recorded Deed Notices for soil contamination.

With regard to hazardous substance storage and use, the City is required to adhere to the OSHA Hazard Communication Standard at 29 CFR 1910.1200. The Hazard Communication Standard is designed to protect employees from hazardous chemicals used or stored in the workplace. It also gives all workers the 'Right To

Know' and understand the chemicals they work with and how they must be properly stored. Under this standard, the various departments and/or workers in the City that utilize hazardous chemicals (i.e., have potential for exposure) are required to maintain a chemical inventory and have a written hazard communication program. The written program documents how it will meet the Hazard Communication Standard through labeling and other forms of warning for hazardous chemical containers, Safety Data Sheets for all hazardous chemicals, and regular training for all employees who have the potential for being exposed to a hazardous chemical. The program must also include a detailed list/inventory of hazardous chemicals in a given department/workplace, how the City will inform workers of the hazards of non-routine tasks, and how hazardous chemical information will be communicated to workers especially in those instances when multiple contractors are working on a given site. The City of Long Branch's Department of Public Works or similar department should have a written Hazard Communication Program in place that can be reviewed by other stakeholders and/or interested parties in the City.

With regard to the brownfield site on Long Branch Ave., the remediation case is still active and is under LSRP oversight. The NJDEP's GeoWeb database provides a preferred NJEMS Site ID for this site as 012251. The Program Interest (PI) Name is Long Branch Plant and is listed as an active Classification Exception Area (CEA). The CEA Status was established on May 2nd, 2019 due to groundwater contamination. Accordingly, use of groundwater at the site is extremely limited. Groundwater cannot be accessed and/or pumped via wells for drinking, direct contact, or irrigation purposes. If the site was redeveloped for any purpose, the details of the CEA would need to be incorporated into any redevelopment plan. Any disturbance that may expose or otherwise impact groundwater such as excavation and/or installation of underground utilities would need to be managed carefully under LSRP and NJDEP oversight. It is also critical to note the site cannot be readily redeveloped to feature a school or residential project due to the potential for vapor intrusion (from contaminated groundwater) and vapor accumulation inside any proposed above ground structure. Lastly, a Deed Notice has been filed for this site due to the presence of extensive soil contamination. The Deed Notice is an institutional control to limit and manage the potential for disturbance of surface or sub-surface soils. More specifically, any proposed surface soil disturbance at this site will require permits from the NJDEP Site Remediation Program in coordination with oversight from the designated LSRP. Any proposed re-use of this site must be very carefully coordinated by qualified professionals to maintain public health and safety and for this reason, no recommendations for beneficial re-use of this site are included in this section.

CRITICAL ENVIRONMENTAL AREAS

As referenced throughout this document, the City of Long Branch features many unique and critical environmental areas that are necessary to sustain local populations of resident and migratory wildlife species, protect and maintain regional water quality, and enhance biodiversity. This being the case, protection and future enhancement of these areas via focused management should remain a priority objective of the City. Promoting this kind of environmental stewardship can also enrich the lifestyle of the City's resident and tourist communities by maintaining these areas for passive and active recreation. Doing so will also have an added benefit of identifying those unique areas that require specific and long-term protection such as critical breeding habitat for nesting migratory shorebirds.

Map 24 illustrates the location of critical wildlife areas located throughout the City. The Critical Wildlife Areas shown on **Map 24** are those listed as having historic, cultural, scenic, or environmental sensitivity. Other critical environmental areas such as stream corridors, plant communities, rare habitats that support threatened and endangered species, flood plains, various wetlands, marshes, and vegetated dune communities are also shown.

The sections above provide a great amount of detail relative to the location, definition, function, type, and resource classification of these specific areas. In particular, the Critical Habitat and Special Ecological Communities section on page 68 provides details relative to threatened and endangered species habitat classifications and locations. **Map 19** illustrates the location of these habitat areas based on the NJDEP's Landscape Project.

In addition to the soils information starting on page 29, the Topography and Slopes section on page 33 provides information relative to steep slopes where soils can be highly erodible. **Map 9B** shows the locations of steep slope areas in the City. Steep slopes are generally those areas that feature a gradient of 20% or greater. Such areas are considered critically sensitive in some contexts. More specifically, erosion of steep slopes can contribute to excessive sedimentation to critical environmental areas such as downstream waterbodies and wetlands. It is important to note that the vast majority of the steep slope areas along the beach front are protected with structural reinforcement measures such as steel sheet piling, concrete retaining walls, or stone revetments. These areas can still be subject to soil erosion during larger storm events and/or incidents of slope failure due to aging infrastructure or a lack of maintenance.

Erosion of steep slope areas can also lead to the degradation of wildlife habitats when not addressed through soil restoration measures. To some extent, entire communities can be affected by the presence of highly erodible soils such as those along beach front areas. In these cases, routine beach replenishment projects are required to protect ocean front property and infrastructure.

Highly erodible soils can also be found along roadway embankments, railroad berms, and stream corridors as a result of uncontrolled surface water runoff flows that damage existing stabilization measures such as vegetative cover or soil retaining structures (e.g., undermining of retaining walls or older scour protection measures). In these instances, restoration projects may be required to mitigate the downstream effects of soil erosion as a result of excessive stormwater flows. In general, this is a common issue in municipalities similar to Long Branch that have been subject to increased development (i.e., increase in impervious cover). This issue is routinely addressed through restoration projects involving bioengineering or hard-armoring (e.g., riprap, gabion walls, reno-mattresses, etc.).

As stated above, protection of the critical environmental areas referenced in this section should be prioritized to achieve a balance between the long-term sustainability of natural resources and the redevelopment/planning goals slated for the various communities throughout the City.

DEVELOPMENT LIMITATIONS

With regard to development in the City, the Planning and Zoning Boards maintain jurisdiction with regard to ensuring development is completed in compliance with applicable regulations and City Ordinances. The City's Master Plan and Ordinance are used by the Boards, and in some cases the Governing Body, to regulate the types of development that are permissible and where they can occur based on zoning (i.e., use) classification. It is incumbent upon all developers to propose a project that is compliant with all applicable planning and zoning requirements to the greatest extent possible. Where full compliance is not achievable, the Boards may grant approval(s) to developers by issuing variances.

Outside State, federal, and County agencies also share jurisdiction to limit development that is proposed in the City whether it is proposed by the City itself or by private entities. Such agencies include the NJDEP Division of Land Resource Protection, the NJDEP Green Acres Program, NJDEP Blue Acres Program, NJDEP Bureau of Tidelands Management, the US Army Corps of Engineers (NY District), and the Freehold Soil Conservation

District. The NJDEP's Division of Land Resource Protection regulates development and/or infrastructure upgrade projects that have the potential to affect sensitive areas including wetlands, wetland transition areas, State open waters, beaches, mapped coastal wetlands, and floodplains. The Freshwater Wetlands Protection Act Rules, Flood Hazard Area Control Act Rules, and Coastal Zone Management Rules are used by the NJDEP's Division of Land Resource Protection to enforce regulations and limit development in the aforementioned sensitive areas. The NJDEP's Green Acres program limits development that affects public open space that is dedicated, or will be dedicated, for recreation and/or conservation purposes. The NJDEP's Blue Acres Program focus is to better protect public safety and the environment by relocating New Jersey residents whose homes are subject to repeat flooding events. In this case, the Blue Acres Program acquires these properties and converts them to natural flood storage areas, parks, and/or community open spaces through a Buy-Out process generally using outside funding sources such as FEMA grants. The NJDEP's Bureau of Tidelands Management limits the degree of development that is proposed in current or historically mapped tidelands claim areas. Where appropriate, the Bureau of Tidelands Management will issue interim licenses or grants commonly referred to as Tidelands Instruments to applicants who propose to place structures (e.g., floating docks, fixed piers, bridges, culverts, bulkheads, revetments, utilities, etc.) in tidal waters that are currently claimed by the State of New Jersey. The US Army Corps of Engineers, whose local office is the NY District, regulates the placement of fill in tidal waters. Lastly, the Freehold Soil Conservation District regulates those projects that incur 5,000 square feet or more in total site disturbance to ensure the project will not have an adverse impact on the environment as a result of soil disturbance. Each of these agencies play a critical role in limiting development in the City. Depending on the nature of a given project, the City's Boards maintain a responsibility to require project applicants to obtain all necessary approvals required by any one of these outside agencies.

In the case of the Lower Broadway Corridor (LBC), this area is in the City's Redevelopment/Area in Need of Rehabilitation Zone. The City's 2020 Master Plan Reexamination Report and corresponding Land Use Map provides additional details relative to this designation. There are no significant areas of environmentally sensitive resources in, or immediately adjacent to, the LBC. Accordingly, the only critical limitations to consider that could affect redevelopment of the LBC are those listed in the City's Master Plan, Ordinance, and 2020 Master Plan Reexamination Report. Development of the LBC should be reviewed for conformance with current Municipal Land Use Law (MLUL) regulations and relevant NJ case law. According to the 2020 Master Plan Reexamination Report, the Redevelopment Guideline Handbooks shall also be reviewed to ensure continuity as well as to amend land uses and bulk requirements to meet current social and economic conditions.

REGIONAL RELATIONSHIPS

MONMOUTH COUNTY MASTER PLAN

Principles of responsible management include cooperation, collaboration and the implementation of best practices. The management of environmental resources includes applying responsible management principles within the appropriate regulatory context along with development law and pre-existing guiding documents such as master planning documents. It is advisable for the City of Long Branch to continue fostering a collaborative relationship with Monmouth County and seeking avenues with which the City can participate in like-minded goals and recommendations found within the Monmouth County Master Plan. Specifically, Section 3 – Natural Resources of the County Master Plan enumerates a series of recommended goals under sub-section 3.6 Master Plan Recommendations and Stakeholder Strategies (Jersey, 2016 & 2018):

- **Recommendation 3.1**: Maintain and update inventories of the county's natural features and systems and promote the protection of natural resources in conjunction with the Monmouth County Park System (**Nearing Completion**).
- **Recommendation 3.2**: Participate in initiatives that identify, target, and protect important resources, critical habitats, species of concern, and Areas of Significant Environmental Quality (**Continuous**).
- **Recommendation 3.3**: Encourage and support new and continuing partnerships for resource protection (**Continuous**).
- **Recommendation 3.4**: Continue to educate the public on the county's valuable natural resources, environmental impact assessment procedures, and other important environmental issues (**Continuous**).
- **Recommendation 3.5**: Assist municipalities with floodplain management and planning initiatives that improve community resiliency and/or advance their standing in the National Flood Insurance Program (NFIP) Community Rating System (CRS) program (**Continuous**).

The City may be well-served to seek funding partnerships with the County or neighboring municipalities through projects that would meet any of the County-level goals captured in the recommendations found in Section 3 of the County Master Plan.

MONMOUTH COUNTY "AREAS OF SIGNIFICANT ENVIRONMENTAL QUALITY" (ASEQ)

The Monmouth County Environmental Council's (MCEC) mission directs the identification of ASEQ. The Natural Features Study for Monmouth County (1975) initially identified these areas and in 1978, the Monmouth County Unique Areas Study refined the list and summarized their importance. Over the years, the MCEC added more Unique Areas to the list, primarily through recommendation from municipalities and the Monmouth County Park System (MCPS), renaming the list to ASEQ (2007). The City may consider how to actively participate in this goal by inquiring with the responsible county-level entities to include:

- Division of Planning
- Monmouth County Environmental Council (MCEC)
- Monmouth County Park System (MCPS)

CONCLUSIONS AND RECOMMENDATIONS

The City and its Environmental Commission has dedicated resources to update the 2011 City of Long Branch Environmental Resource Inventory (ERI). The updates presented in this report are based on refreshed data available from the NJDEP, Monmouth County, appropriate federal repositories of natural resource/meteorological/climate data, and other academic sources of information deemed appropriate for inclusion in this updated ERI. It can therefore be concluded that the City and its Environmental Commission has fulfilled its commitment to update the inventory of environmental resources in the City as specified in the City's 2020 Master Plan Reexamination Report.

It is recommended that the City and the Environmental Commission continue to foster a positive working relationship in the interest of focused environmental stewardship. To this extent, the City and the Environmental Commission may consider discussion, and possible introduction of, ordinances that

accomplish the following:

- Renew Regional Center designation as deemed appropriate by the City's Administration
- Expand the pre-existing work towards a mature Urban Forest Management Plan
- Development of GIS-based Inventories of Vegetation Clusters, Individual Trees, and Tree Species
- Develop GIS-based Inventories of Invasive Species
- Encourage the planting of native species and control the introduction of invasives
- Remediate invasive plants on public lands, with an initial focus on Jackson Woods
- Utilization of the Monmouth County Rare Wildlife Reporter (https://data-monmouthnj.hub.arcgis.com/apps/c671c1f5eac24dd79f63b243f0302192/explore)
- Expand the scope of the Stormwater Management Ordinance to cover smaller development/re-development applications as well as updating the Stormwater Management Plan (which is from 2008).
- Creation of a Green Infrastructure Initiative Program and implement Green Infrastructure (rain barrels, rain gardens, etc.) on city properties to help mitigate street flooding as well as to demonstrate these techniques to the community.
- Create a Shade Tree Commission and make progress towards becoming a Tree City USA; establish an annual budget for the urban forest.
- Update the Urban Forest Management Plan
- After the Tree Inventory is finished, institute a protocol to keep the database up to date
- Apply for a NJUCF Forest Restoration grant and plant more trees in Long Branch to increase the canopy and decrease the heat island effect.
- Create a focused and specific Stream Corridor Protection Plan to include a regional look at our watersheds.

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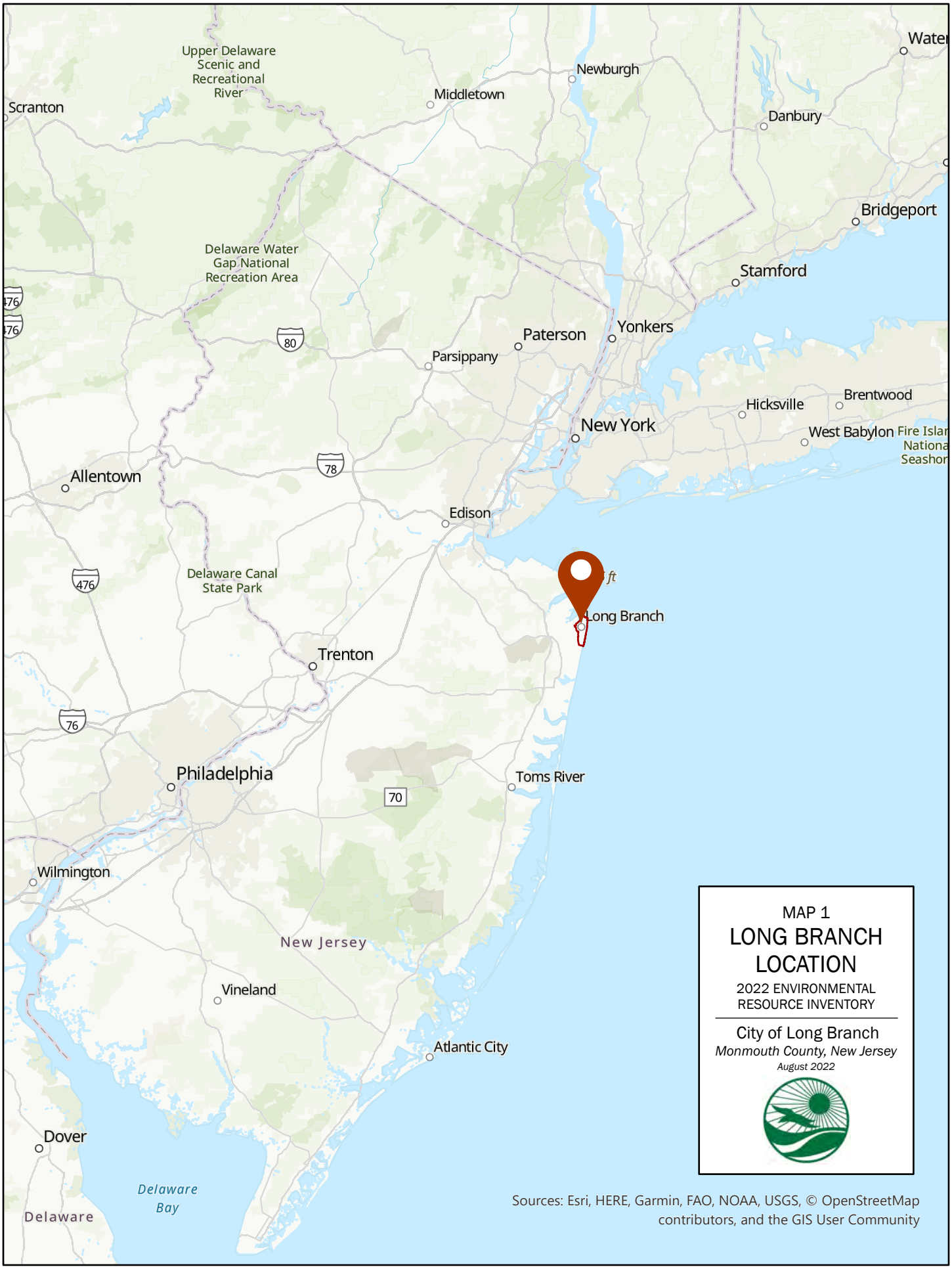
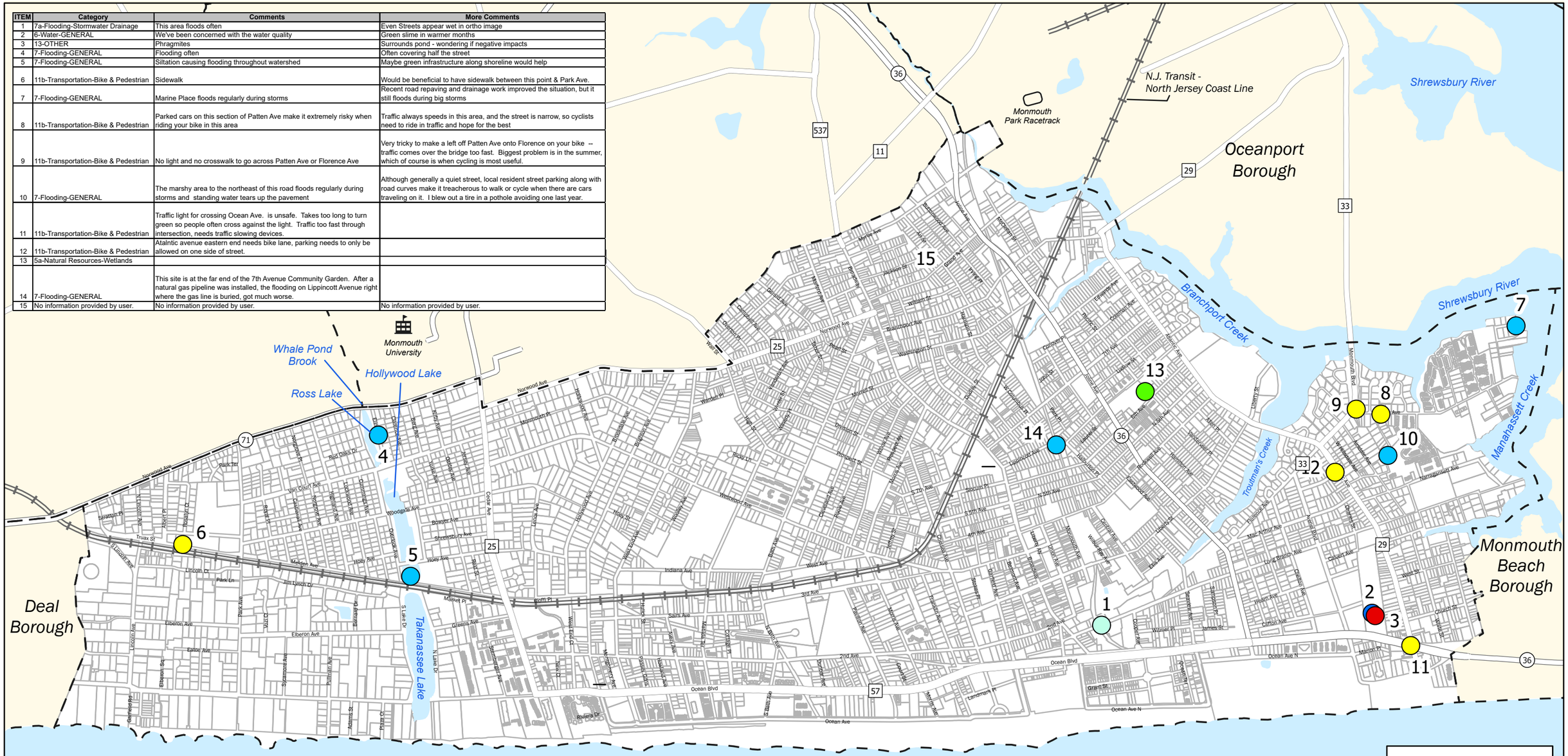
APPENDIX A – ERI MAPPING


Upper Delaware Scenic and Recreational River
Scranton
Middletown
Newburgh
Danbury
Bridgeport
Stamford
Delaware Water Gap National Recreation Area
476
80
Paterson
Yonkers
Parsippany
Hicksville
Brentwood
New York
West Babylon
78
Allentown
Edison
476
Delaware Canal State Park
Long Branch
Trenton
76
Philadelphia
Toms River
70
Wilmington
New Jersey
Vineland
Atlantic City
Dover
Delaware Bay
Delaware
MAP 1
LONG BRANCH LOCATION
2022 ENVIRONMENTAL RESOURCE INVENTORY
City of Long Branch
Monmouth County, New Jersey
August 2022
Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

ITEM	Category	Comments	More Comments
1	7a-Flooding-Stormwater Drainage	This area floods often	Even Streets appear wet in ortho image
2	6-Water-GENERAL	We've been concerned with the water quality	Green slime in warmer months
3	13-OTHER	Phragmites	Surrounds pond - wondering if negative impacts
4	7-Flooding-GENERAL	Flooding often	Often covering half the street
5	7-Flooding-GENERAL	Siltation causing flooding throughout watershed	Maybe green infrastructure along shoreline would help
6	11b-Transportation-Bike & Pedestrian	Sidewalk	Would be beneficial to have sidewalk between this point & Park Ave.
7	7-Flooding-GENERAL	Marine Place floods regularly during storms	Recent road repaving and drainage work improved the situation, but it still floods during big storms
8	11b-Transportation-Bike & Pedestrian	Parked cars on this section of Patten Ave make it extremely risky when riding your bike in this area	Traffic always speeds in this area, and the street is narrow, so cyclists need to ride in traffic and hope for the best
9	11b-Transportation-Bike & Pedestrian	No light and no crosswalk to go across Patten Ave or Florence Ave	Very tricky to make a left off Patten Ave onto Florence on your bike -- traffic comes over the bridge too fast. Biggest problem is in the summer, which of course is when cycling is most useful.
10	7-Flooding-GENERAL	The marshy area to the northeast of this road floods regularly during storms and standing water tears up the pavement	Although generally a quiet street, local resident street parking along with road curves make it treacherous to walk or cycle when there are cars traveling on it. I blew out a tire in a pothole avoiding one last year.
11	11b-Transportation-Bike & Pedestrian	Traffic light for crossing Ocean Ave. is unsafe. Takes too long to turn green so people often cross against the light. Traffic too fast through intersection, needs traffic slowing devices.	
12	11b-Transportation-Bike & Pedestrian	Atalntic avenue eastern end needs bike lane, parking needs to only be allowed on one side of street.	
13	5a-Natural Resources-Wetlands		
14	7-Flooding-GENERAL	This site is at the far end of the 7th Avenue Community Garden. After a natural gas pipeline was installed, the flooding on Lippincott Avenue right where the gas line is buried, got much worse.	
15	No information provided by user.	No information provided by user.	No information provided by user.

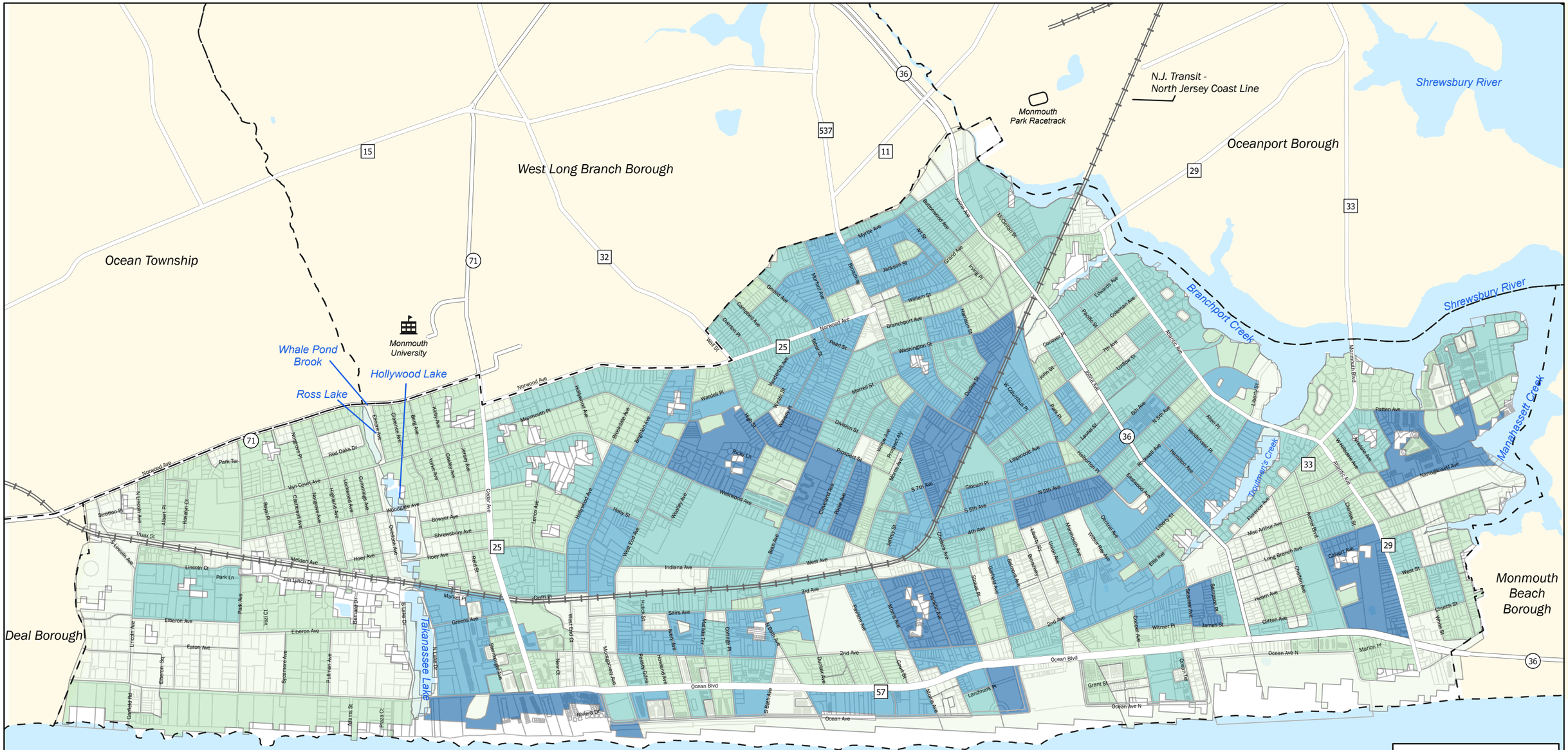


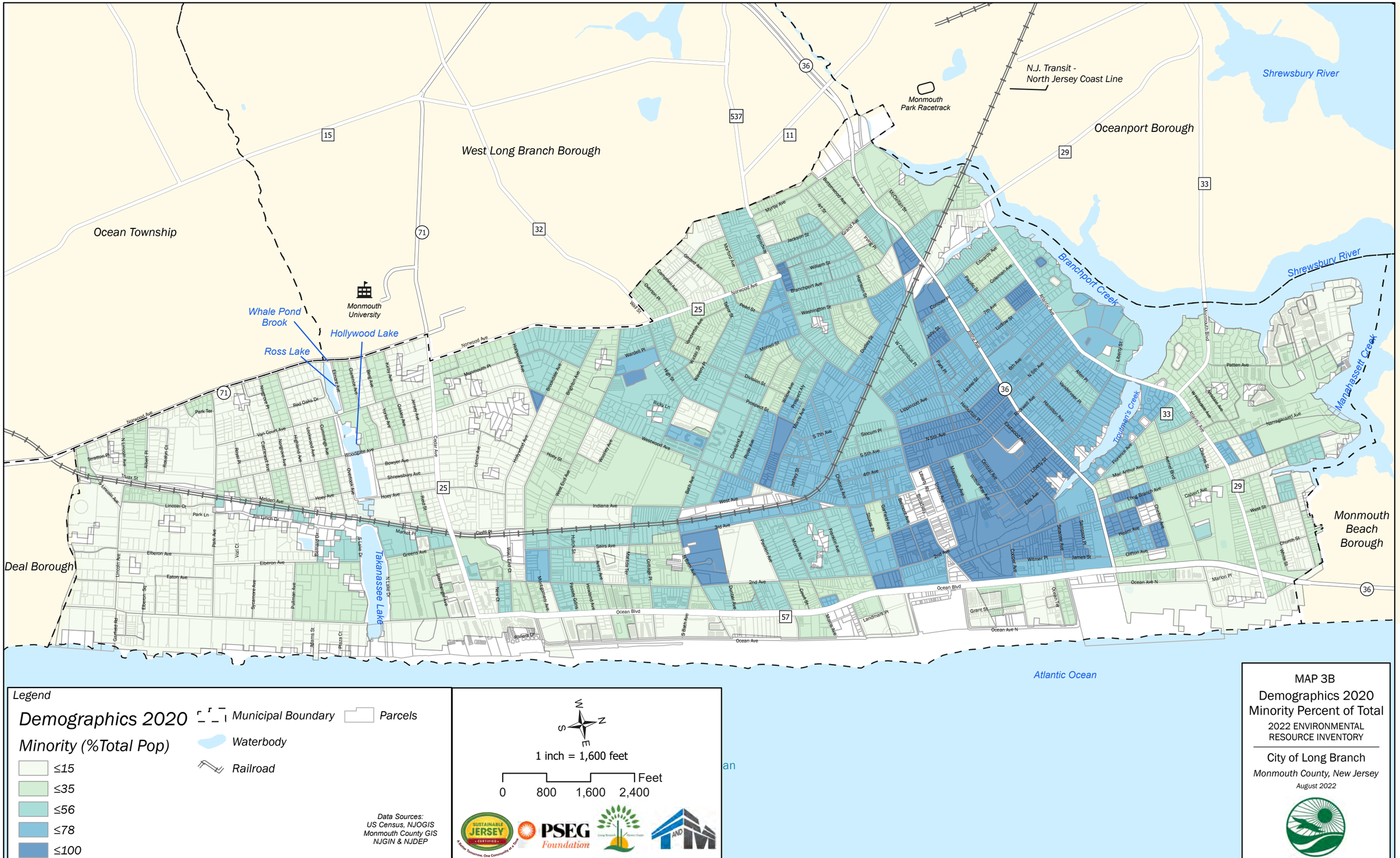
MAP 2
KEY AREAS
(Community Input)
2022 ENVIRONMENTAL RESOURCE INVENTORY

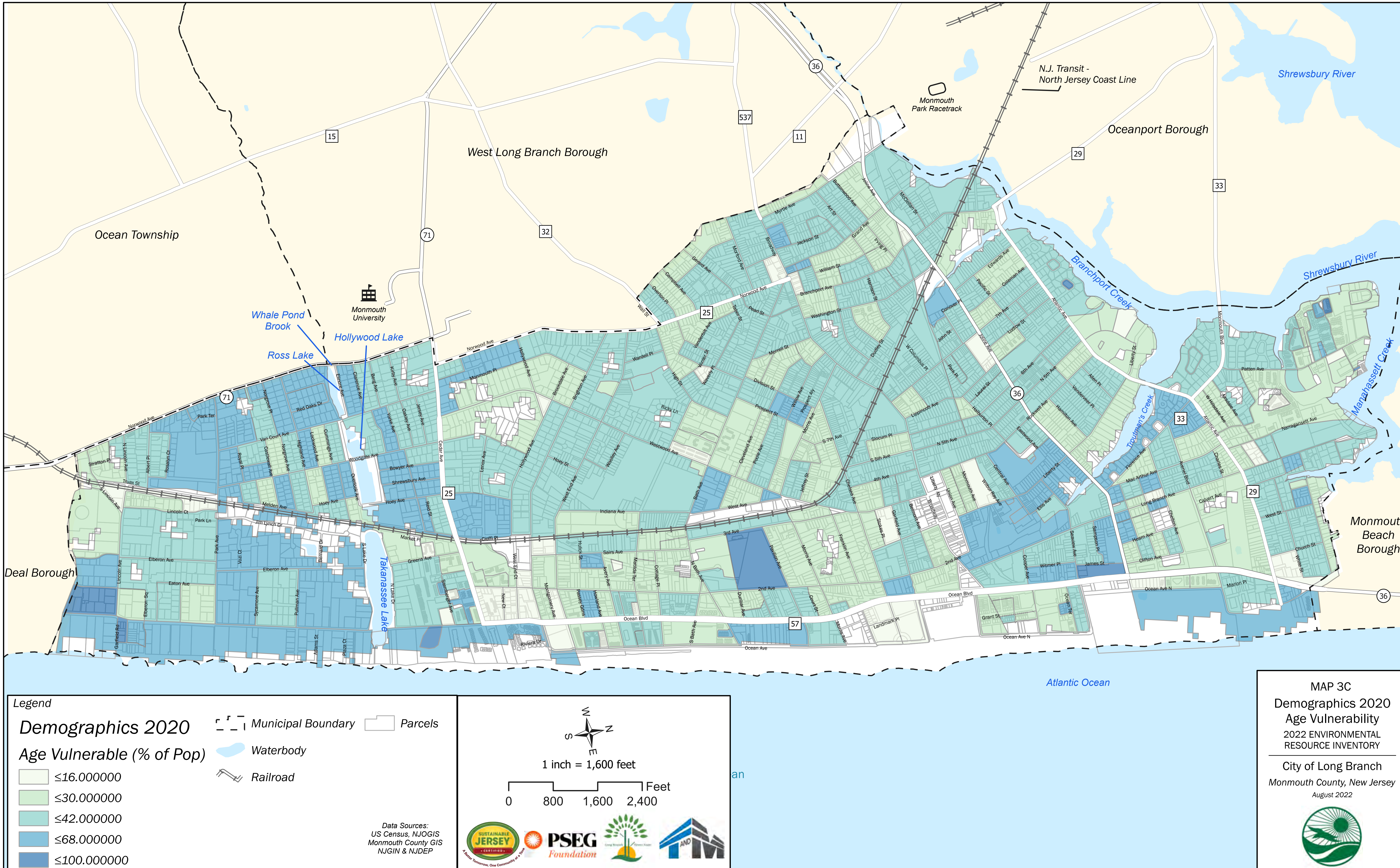
City of Long Branch

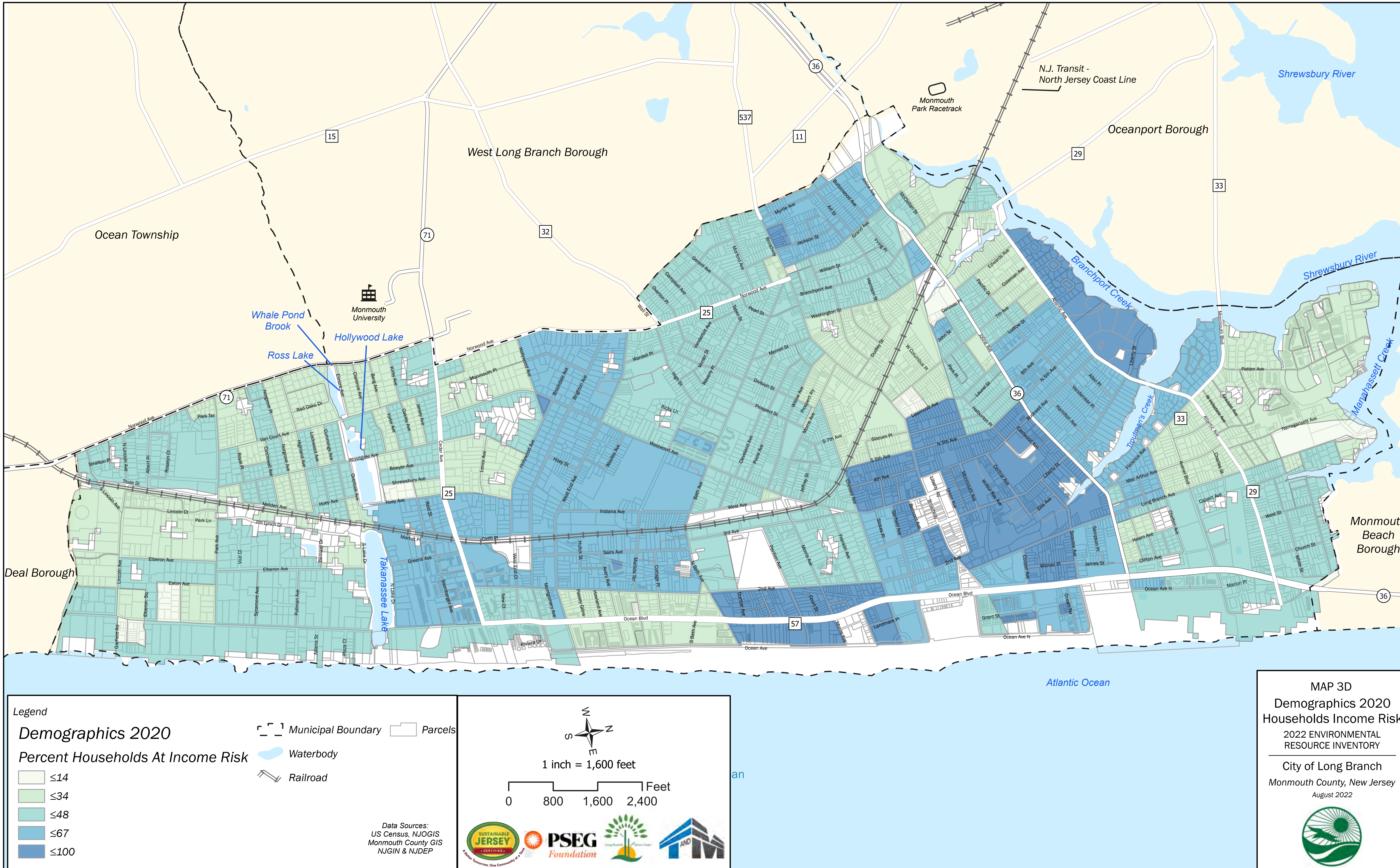
Monmouth County, New Jersey

August 2022

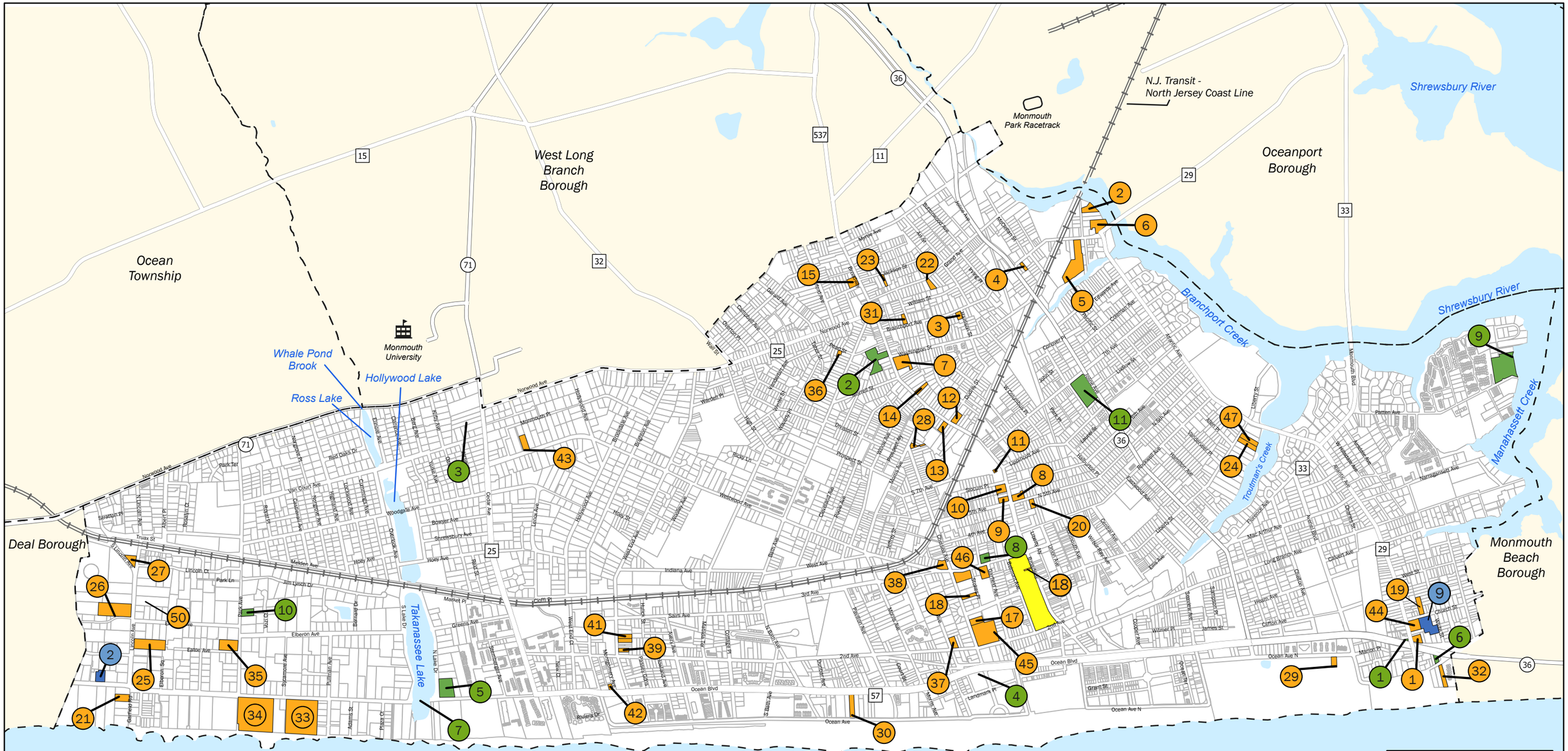

West Long Branch Borough
Ocean Township
Deal Borough
Oceanport Borough
Monmouth Beach Borough
Monmouth University
Monmouth Park Racetrack
N.J. Transit - North Jersey Coast Line
Whale Pond Brook
Ross Lake
Hollywood Lake
Takanassee Lake
Shrewsbury River
Branchport Creek
Manahassett Creek
Troutman's Creek
Atlantic Ocean
Norwood Ave
Ocean Blvd
Shrewsbury Ave
Indiana Ave
West Ave
Monmouth Blvd
Ocean Ave N
Ocean Ave
Legend
Demographics 2020
Total Population
≤30
≤74
≤131
≤242
≤472
Municipal Boundary
Waterbody
Railroad
Parcels
Data Sources:
US Census, NJOGIS
Monmouth County GIS
NJGIN & NJDEP
1 inch = 1,600 feet
0 800 1,600 2,400 Feet
MAP 3A
Demographics 2020
Total Population
2022 ENVIRONMENTAL RESOURCE INVENTORY
City of Long Branch
Monmouth County, New Jersey
August 2022


Ocean Township
West Long Branch Borough
Oceanport Borough
Deal Borough
Monmouth Beach Borough
Monmouth University
Monmouth Park Racetrack
N.J. Transit - North Jersey Coast Line
Shrewsbury River
Branchport Creek
Manahassett Creek
Troutman's Creek
Whale Pond Brook
Ross Lake
Hollywood Lake
Takanassee Lake
Atlantic Ocean
15
71
32
537
11
36
29
33
25
57
Legend
Demographics 2020
Minority (%Total Pop)
≤15
≤35
≤56
≤78
≤100
Municipal Boundary
Waterbody
Railroad
Parcels
Data Sources:
US Census, NJOGIS
Monmouth County GIS
NJGIN & NJDEP
1 inch = 1,600 feet
0
800
1,600
2,400
Feet
MAP 3B
Demographics 2020
Minority Percent of Total
2022 ENVIRONMENTAL RESOURCE INVENTORY
City of Long Branch
Monmouth County, New Jersey
August 2022


MAP 3C
Demographics 2020
Age Vulnerability
2022 ENVIRONMENTAL
RESOURCE INVENTORY
City of Long Branch
Monmouth County, New Jersey
August 2022
Legend
Demographics 2020
Age Vulnerable (% of Pop)
≤16.000000
≤30.000000
≤42.000000
≤68.000000
≤100.000000
Municipal Boundary
Parcels
Waterbody
Railroad
Data Sources:
US Census, NJOGIS
Monmouth County GIS
NJGIN & NJDEP
1 inch = 1,600 feet
0
800
1,600
2,400
Feet
Ocean Township
West Long Branch Borough
Oceanport Borough
Monmouth Beach Borough
Deal Borough
Monmouth University
Monmouth Park Racetrack
N.J. Transit - North Jersey Coast Line
Shrewsbury River
Branchport Creek
Manahassett Creek
Troutman's Creek
Whale Pond Brook
Hollywood Lake
Ross Lake
Takanassee Lake
Atlantic Ocean



Shrewsbury River
N.J. Transit -
North Jersey Coast Line
Monmouth
Park Racetrack
Oceanport Borough
West Long Branch Borough
Ocean Township
Monmouth
University
Whale Pond
Brook
Hollywood Lake
Ross Lake
Branchport Creek
Shrewsbury River
Manahassett Creek
Troutman's Creek
Takanassee Lake
Deal Borough
Monmouth
Beach
Borough
Atlantic Ocean
Legend
Demographics 2020
Percent Households At Income Risk
≤14
≤34
≤48
≤67
≤100
Municipal Boundary
Parcels
Waterbody
Railroad
Data Sources:
US Census, NJOGIS
Monmouth County GIS
NJGIN & NJDEP
1 inch = 1,600 feet
0
800
1,600
2,400
Feet
PSEG
Foundation
MAP 3D
Demographics 2020
Households Income Risk
2022 ENVIRONMENTAL
RESOURCE INVENTORY
City of Long Branch
Monmouth County, New Jersey
August 2022



Legend

- Municipal Boundary
- State Historic Preservation Office (SHPO) Opinion
- Monmouth County Historic Sites Inventory
- National Historic Register
- Monmouth County Historic Districts
- Waterbody
- Railroad
- Parcels

Data Sources:
NJGIS
Monmouth County GIS
NJDEP

National Historic Register

Label ID	Name	Address
1	North Long Branch School	469 Church Street
2	Saint James Chapel	1260 Ocean Avenue

State Historic Preservation Office (SHPO) Opinion

Label ID	Name	Address
1	44 Atlantic Avenue	44 Atlantic Avenue
2	Broadway School (Primary No. 1)	540 Broadway
3	364 Cedar Avenue	364 Cedar Avenue
4	58 Chelsea Avenue	58 Chelsea Avenue
5	St. Michael's Roman Catholic Church	796 Ocean Avenue
6	468 Ocean Avenue	468 Ocean Avenue
7	Ocean Avenue Bridge	Ocean Avenue over Lake Takanassee
8	Long Branch Post Office (US Post Office)	60 Third Avenue
9	Patten Point Yacht Club	Patten Avenue
10	Summer Cottage at 109 Park Avenue	109 Park Avenue
11	Gregory Primary School	157 North Seventh Avenue

Monmouth County Historic Sites Inventory

Label ID	Name	Address
1	Presley Garage (1325-2)	45 Atlantic Avenue
2	(1325-3)	573 Berdan Place
3	(1325-4)	99 Branchport Avenue
4	(1325-5)	207 Branchport Avenue
5	Slocum House (1325-6)	291 Branchport Avenue
6	Hotel Norwood (1325-7)	336 Branchport Avenue
7	St. Luke Methodist Church (1325-10)	535 Broadway

Monmouth County Historic Sites Inventory

Label ID	Name	Address
8	Garfield-Grant Hotel (1325-11)	275 Broadway
9	(1325-12)	290 Broadway
10	St. James Episcopal Church (1325-13)	300 Broadway
11	Long Branch Public Library (1325-14)	328 Broadway
12	(1325-15)	415 Broadway
13	(1325-16)	426 Broadway
14	(1325-17)	479 Broadway
15	First Reformed Church (1325-19)	646 Broadway
16	Star of the Sea Lyceum (1325-24)	179 Chelsea Avenue
17	(1325-25)	127 Chelsea Avenue
18	(1325-27)	163 Chelsea Avenue
19	Benjamin White House (1325-28)	464 Church Street
20	(1325-29)	25 North 5th Avenue
21	Elberon Hotel Cottage (1325-30)	2 Garfield Road
22	(1325-31)	77 Grand Avenue
23	(1325-32)	29 Jackson Avenue
24	(1325-33)	331 Liberty Street
25	James W. Gerard House (1325-35)	55 Lincoln Avenue
26	John U. Fraley House (1325-36)	100 Lincoln Avenue
27	Elberon Library (1325-37)	168 Lincoln Avenue
28	(1325-38)	389 Morris Avenue
29	Navaho Lodge/The Reservation (1325-39)	40.316988, -73.978144
30	Theodore Moss House (1325-40)	290 Ocean Avenue
31	(1325-41)	468 Ocean Avenue

Monmouth County Historic Sites Inventory

Label ID	Name	Address
32	(1325-42)	475 Ocean Avenue
33	Sea Cliff Villa/James M. Brown House (1325-46)	981 Ocean Avenue
34	(1325-47)	1035 Ocean Avenue
35	Elberon Memorial Presbyterian Church (1325-50)	70 Park Avenue
36	Captain J.B. Flinn House (1325-51)	67 Pearl Street
37	(1325-53)	140 2nd Avenue
38	Salem Baptist Church (1325-55)	116 3rd Avenue
39	(1325-56)	103 West End Avenue
40	Hulick House (1325-57)	119 West End Avenue
41	Hulick House (1325-58)	123 West End Avenue
42	Windmill Restaurant (1325-59)	586 Ocean Boulevard
43	(1325-60)	692 Westwood Avenue
44	Ashbury Methodist Episcopal Church (1325-61)	61 Atlantic Avenue
45	Our Lady of the Sea Roman Catholic Church (1325-62)	101 Chelsea Avenue
46	Simpson Memorial M.E. Church (1325-64)	206 Garfield Avenue
47	(1325-66)	337 Liberty Street
48	Long Branch Record Building (1325-9-2)	192 Broadway
49	Neptune Hose Co. No. 1	30 Branchport Avenue
50	Richmond Talbot House	111 Lincoln Avenue

1 inch = 1,600 feet

0 800 1,600 2,400 Feet

MAP 4

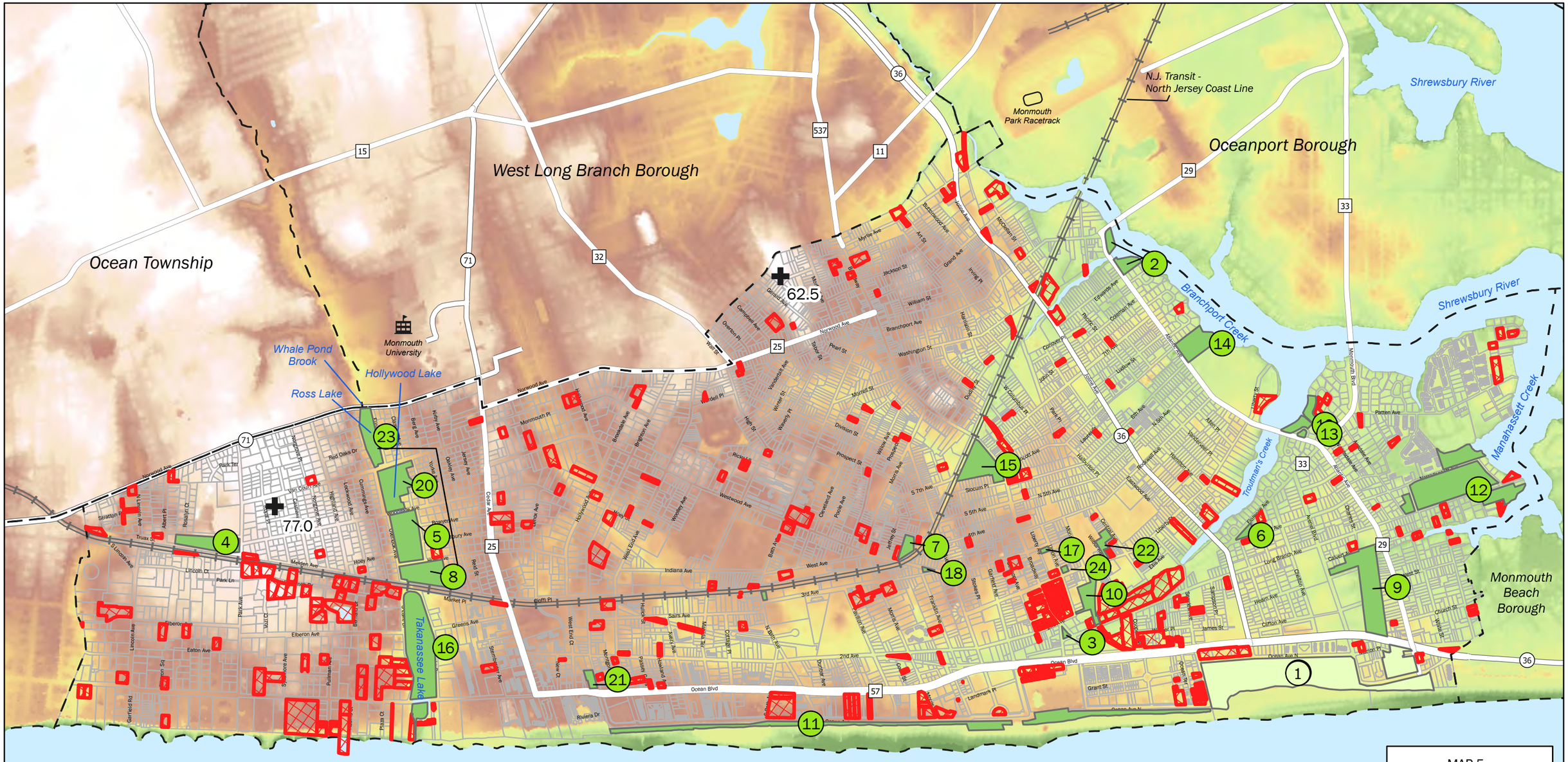
HISTORIC SITES AND DISTRICTS

2022 ENVIRONMENTAL RESOURCE INVENTORY

City of Long Branch

Monmouth County, New Jersey

August 2022



Legend

Monmouth County Spot Elevations

- Monmouth County Spot Elevations

Open Space Ownership

- County
- Municipal
- Vista Potential (Vacant Land)

- Municipal Boundary
- Waterbody
- Railroad
- Parcels

NJ DEM 10ft Elevation (Ft)

375.131

-12.7725

Data Sources: NJOGIS, Monmouth County GIS, NJDEP

N S E W

1 inch = 1,600 feet

0 800 1,600 2,400 Feet

County Park		Municipal Park		Municipal Park	
Label ID	Name	Label ID	Name	Label ID	Name
1	Seven Presidents Park	8	Hoey Avenue Park	18	Third Avenue Triangle
Municipal Park		9	Jackson Woods	19	Troutmans Greenway
Label ID	Name	10	Jerry Morgan Park	20	Van Court Park
1	Bath Avenue Park	11	Long Branch Beach	21	West End Park
2	Branchport Park	12	Manahassett Park	22	Wilbur Ray Avenue Park
3	Broadway Park	13	MLK Memorial	23	Ross Lake Park
4	Elberon Park	14	Pleasure Bay Park	24	Liberty Park
5	Firemans Park	15	Slocum Park		
6	Florence Ave	16	Takanassee Lake		
7	George Naylor Park	17	Third Avenue Park		

MAP 5

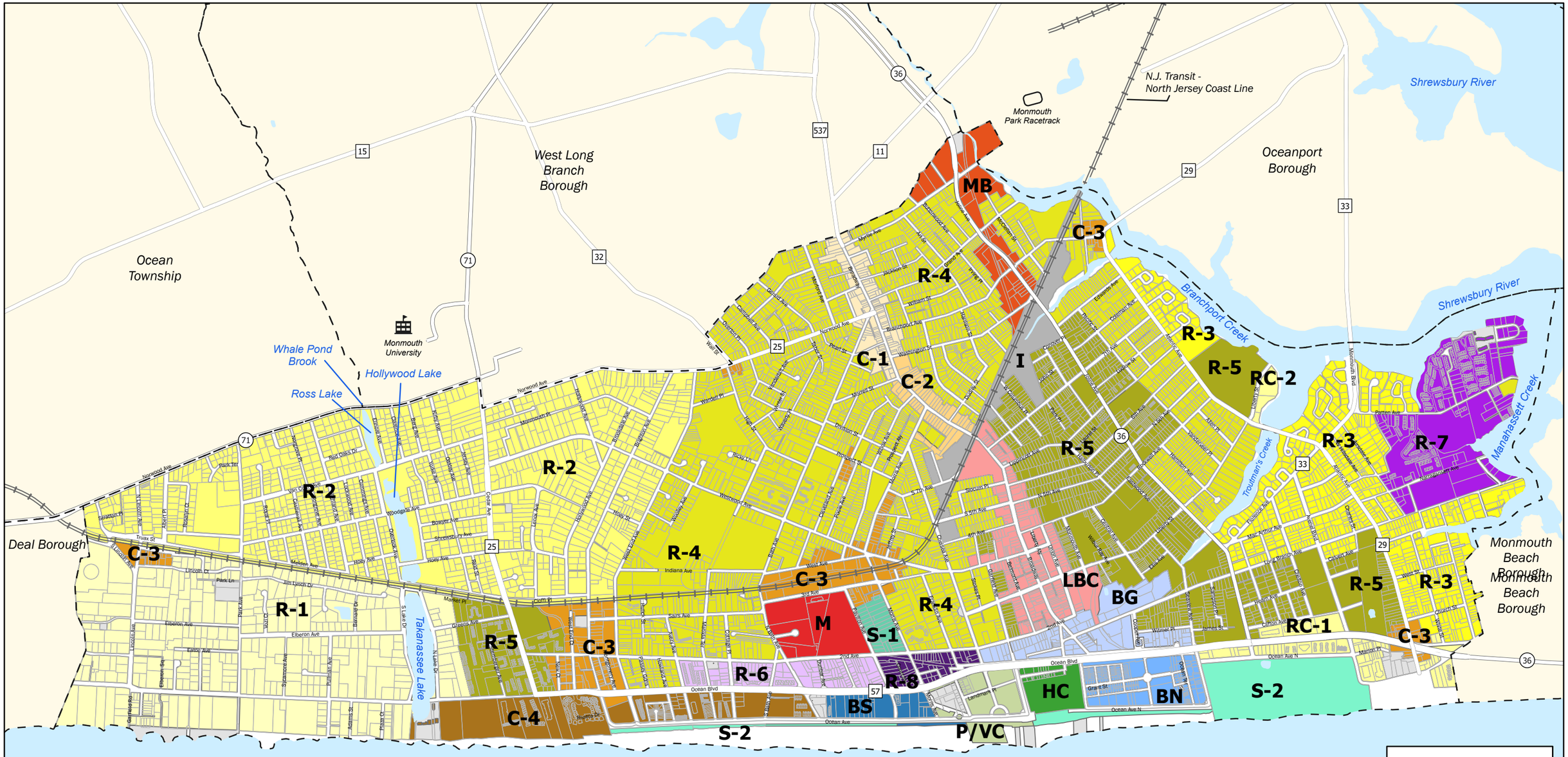
SCENIC VISTAS

2022 ENVIRONMENTAL RESOURCE INVENTORY

City of Long Branch

Monmouth County, New Jersey

August 2022



MAP 6

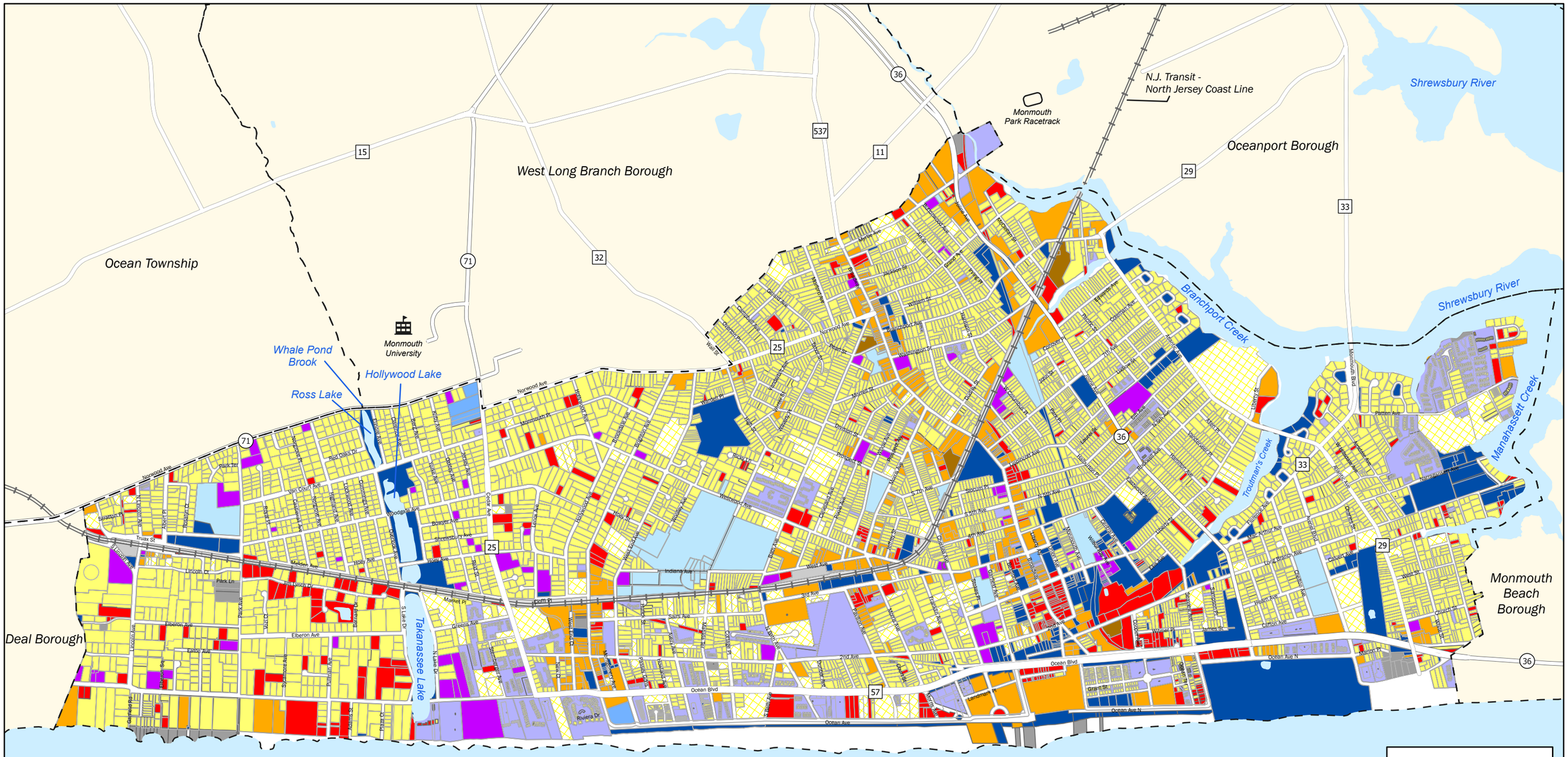
ZONING

2022 ENVIRONMENTAL RESOURCE INVENTORY

City of Long Branch

Monmouth County, New Jersey

August 2022



Legend

- Municipal Boundary
- Waterbody
- Railroad
- Parcels

Data Sources:
NJOGIS
Monmouth County GIS
NJDEP

Parcel Property Class Description

- Apartment
- Church and Charitable Property
- Class I Railroad Property
- Class II Railroad Property
- Commercial
- Industrial
- Public Property
- Public School Property
- Other School Property
- Residential (four families or less)
- Vacant Land
- Exempt properties not included in the above
- No Value

N W E S

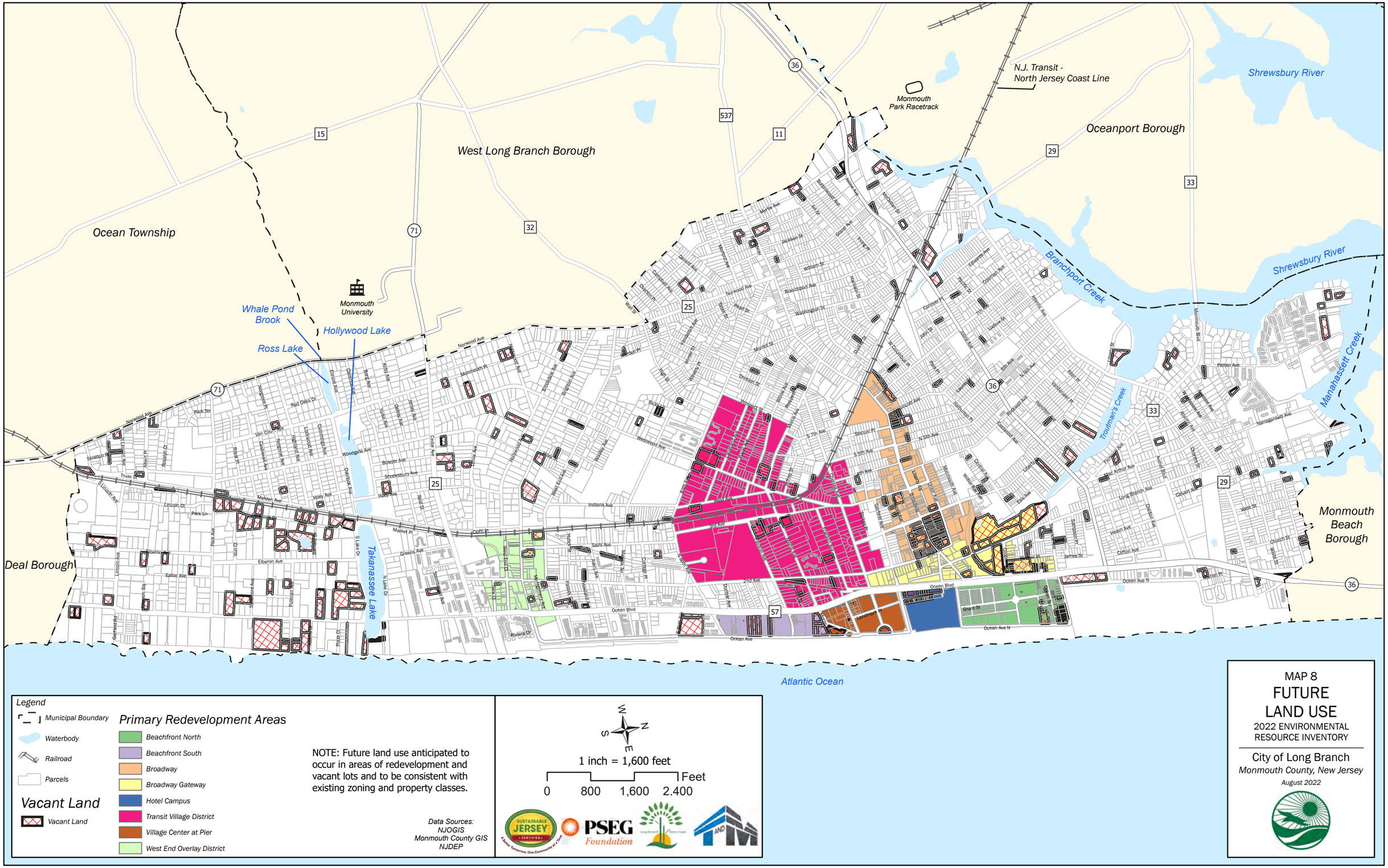
1 inch = 1,600 feet

0 800 1,600 2.400 Feet

MAP 7
EXISTING LAND USE

2022 ENVIRONMENTAL RESOURCE INVENTORY

City of Long Branch
Monmouth County, New Jersey
August 2022



Legend

- Municipal Boundary
- Waterbody
- Railroad
- Parcels

Vacant Land

- Vacant Land

Primary Redevelopment Areas

- Beachfront North
- Beachfront South
- Broadway
- Broadway Gateway
- Hotel Campus
- Transit Village District
- Village Center at Pier
- West End Overlay District

NOTE: Future land use anticipated to occur in areas of redevelopment and vacant lots and to be consistent with existing zoning and property classes.

Data Sources:
NJOGIS
Monmouth County GIS
NJDEP

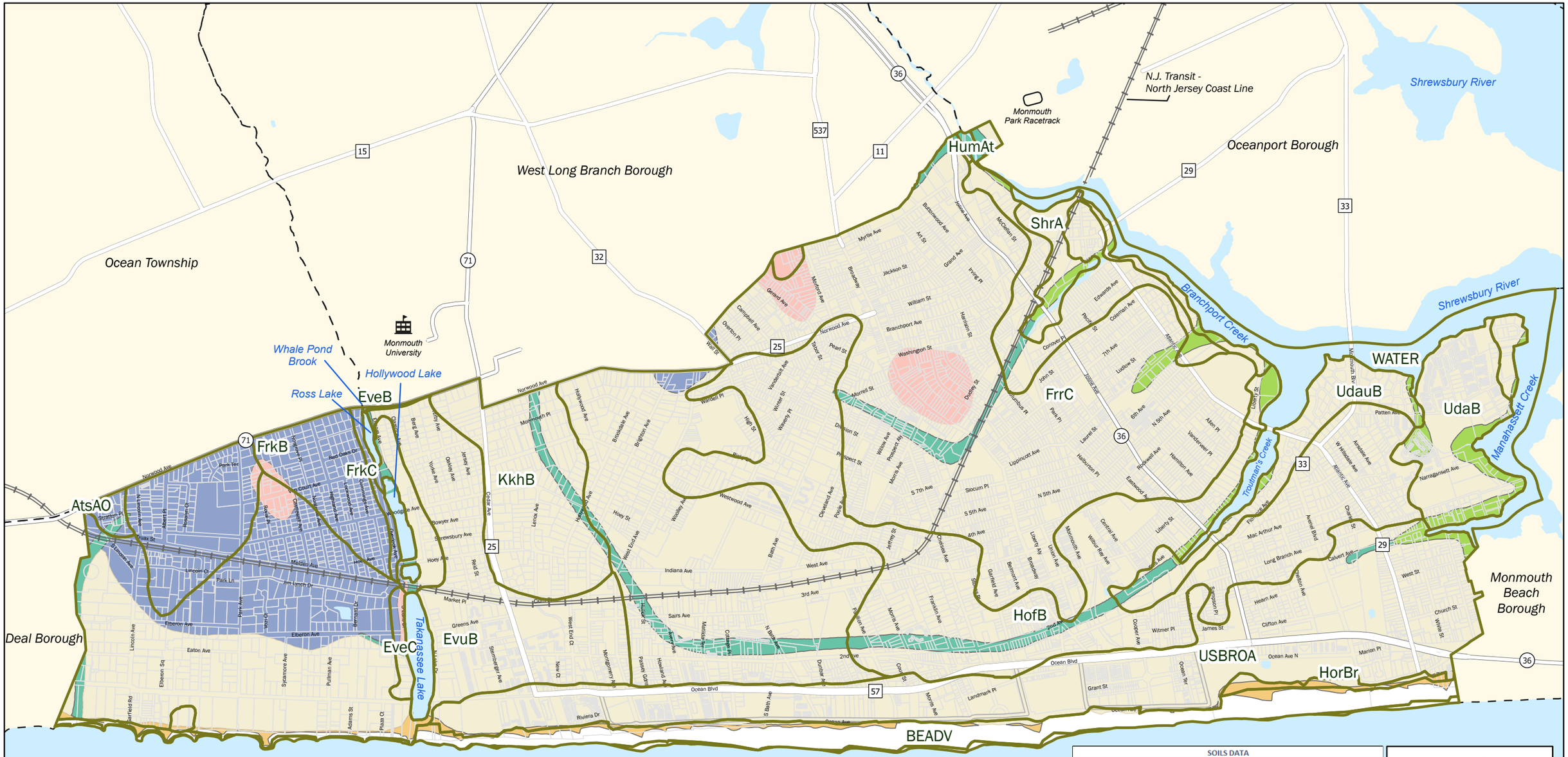
N W E S

1 inch = 1,600 feet

0	800	1,600	2,400 Feet

MAP 8
FUTURE LAND USE
2022 ENVIRONMENTAL RESOURCE INVENTORY

City of Long Branch
Monmouth County, New Jersey
August 2022



Legend

- Soils Data (SSURGO 2021)
- Municipal Boundary
- Waterbody
- Railroad
- Parcels

Surficial Geology

Formation Name

- ALLUVIUM
- BEACH AND NEARSHORE MARINE SAND
- CAPE MAY FORMATION, UNIT 1
- CAPE MAY FORMATION, UNIT 2
- SALT-MARSH AND ESTUARINE DEPOSITS
- WEATHERED COASTAL PLAIN FORMATIONS

Data Sources: NJOGIS, Monmouth County GIS, NJDEP

1 inch = 1,600 feet

0 800 1,600 2,400 Feet

SOILS DATA	
SYMBOL	DESCRIPTION
AtsAO	Atsion sand, 0 to 2 percent slopes, Northern Tidewater Area
BEADV	Beaches, 0 to 15 percent slopes, very frequently flooded
EveB	Evesboro sand, 0 to 5 percent slopes
EveC	Evesboro sand, 5 to 10 percent slopes
EvuB	Evesboro-Urban land complex, 0 to 5 percent slopes
FrkB	Freehold sandy loam, 2 to 5 percent slopes
FrkC	Freehold sandy loam, 5 to 10 percent slopes
FrrC	Freehold-Urban land complex, 0 to 10 percent slopes
HofB	Holmdel-Urban land complex, 0 to 5 percent slopes
HorBr	Hooksan sand, 0 to 5 percent slopes, rarely flooded
HumAt	Humaquepts, 0 to 3 percent slopes, frequently flooded
KkhB	Klej loamy sand-Urban land complex, 0 to 5 percent slopes
ShrA	Shrewsbury sandy loam, 0 to 2 percent slopes
UdaB	Udorthents, 0 to 8 percent slopes
UdauB	Udorthents-Urban land complex, 0 to 8 percent slopes
USBROA	Urban land-Brockatonorton complex, 0 to 2 percent slopes, occasionally flooded
WATER	Water

MAP 9A

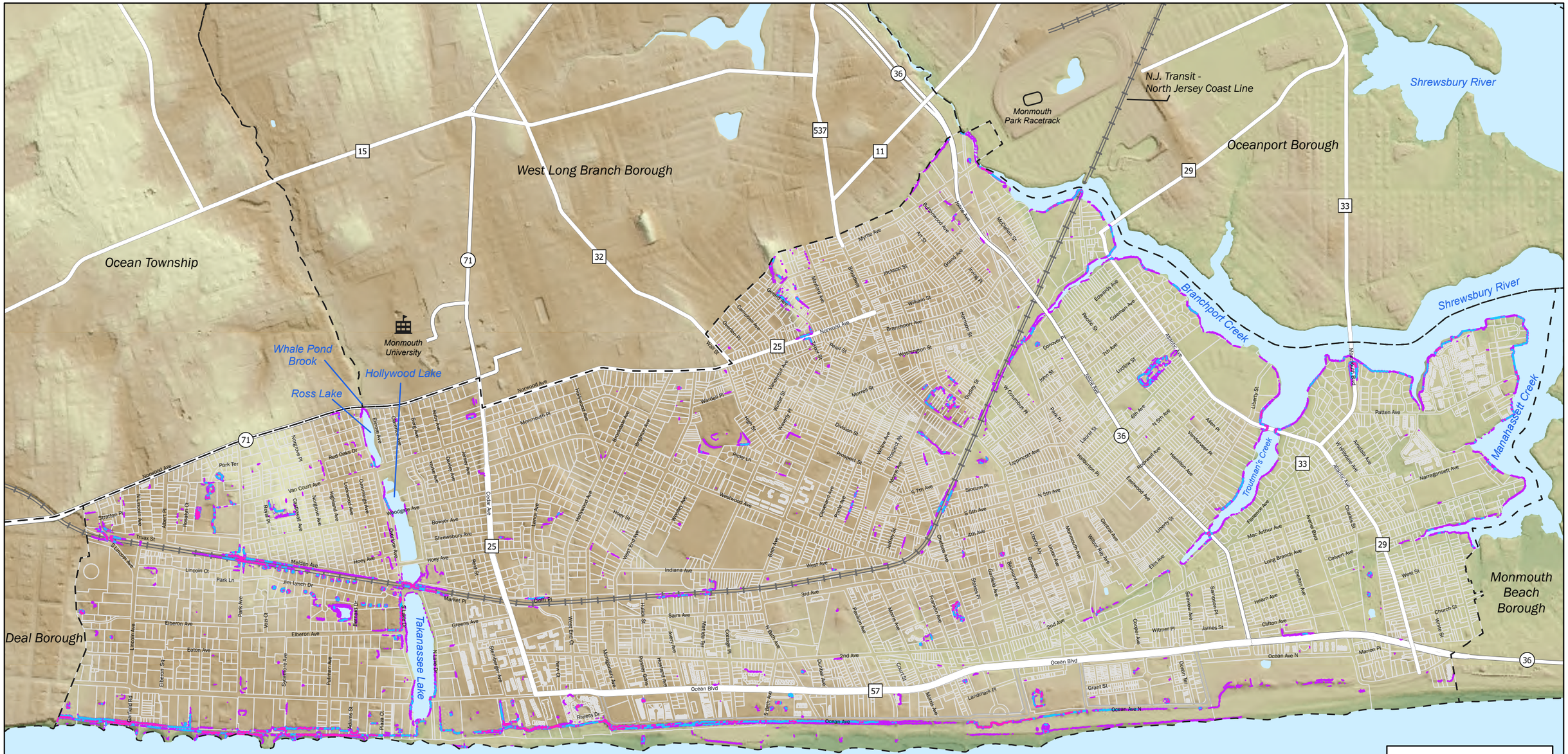
SURFACE GEOLOGY & SOILS

2022 ENVIRONMENTAL RESOURCE INVENTORY

City of Long Branch

Monmouth County, New Jersey

August 2022



Legend

- Municipal Boundary
- Railroad
- Parcels

Percent Slope

- 20%-30%
- 30%-40%
- >40%
- Waterbody

NJ DEM 10ft Elevation (Ft)

375.131

-12.7725

Hillshade Value

254

0

Data Sources:
NJOGIS
Monmouth County GIS
NJDEM

N S W E

1 inch = 1,600 feet

0 800 1,600 2,400 Feet

MAP 9B

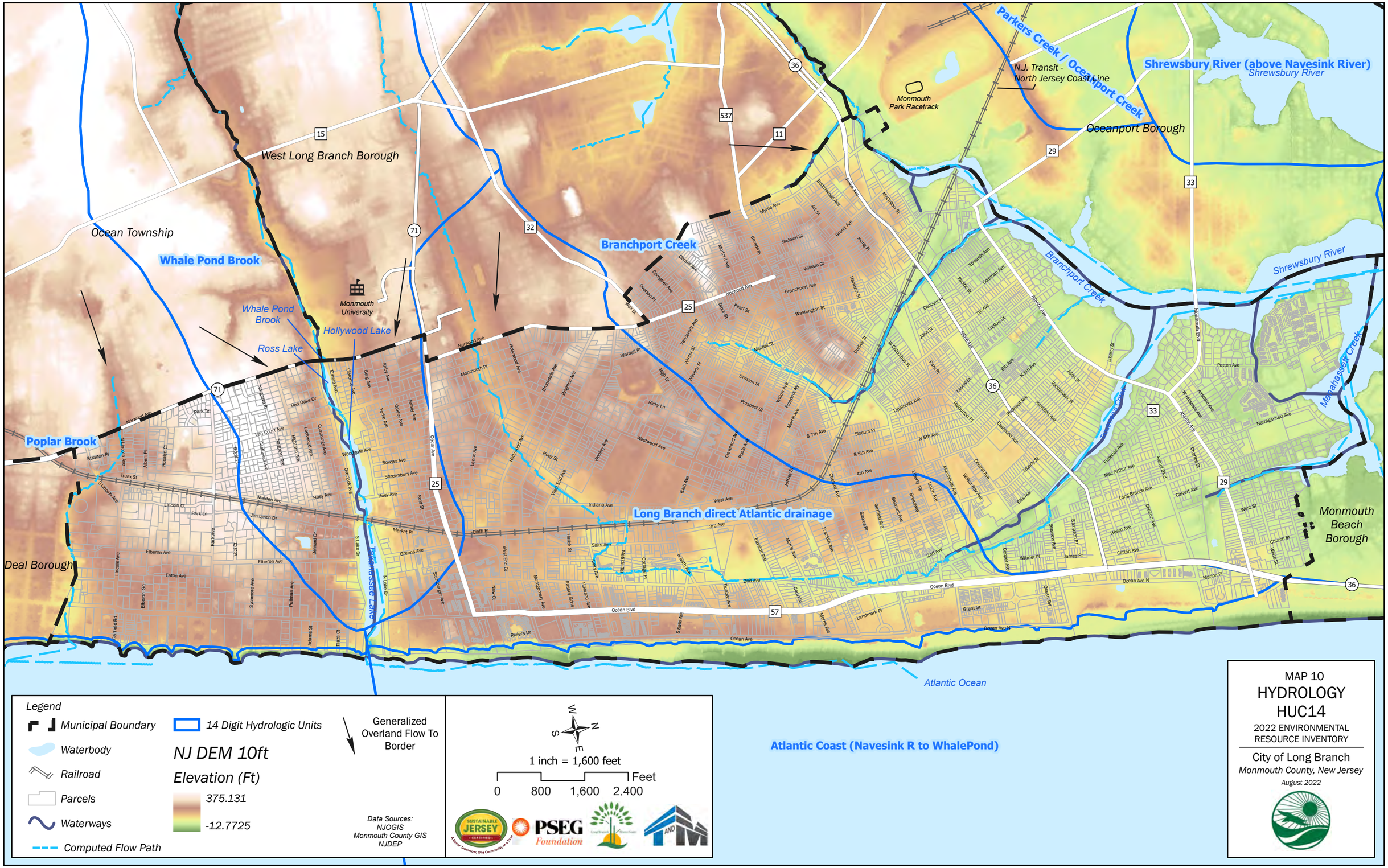
TOPOGRAPHY & STEEP SLOPE

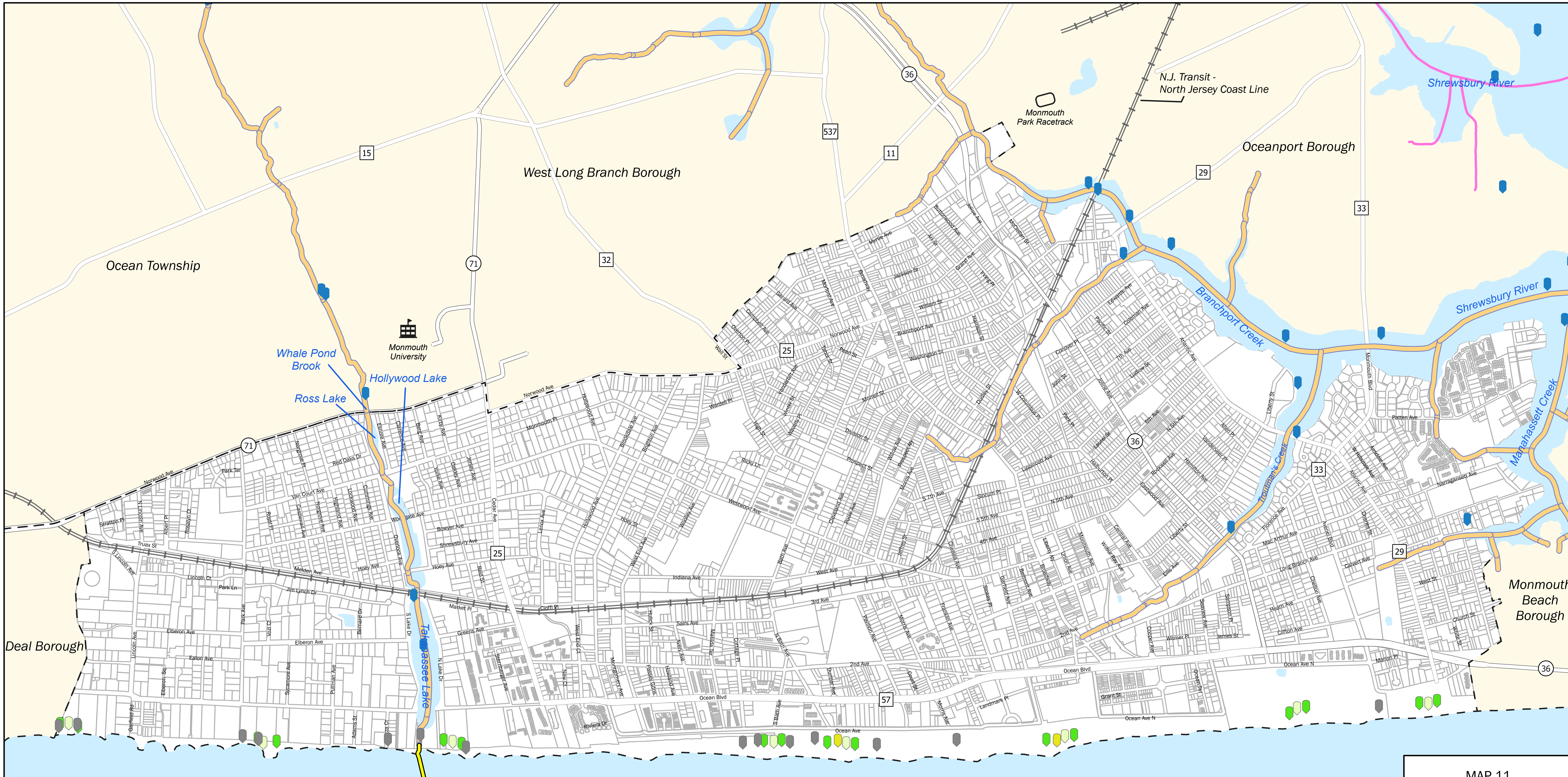
2022 ENVIRONMENTAL RESOURCE INVENTORY

City of Long Branch

Monmouth County, New Jersey

August 2022


Parkers Creek / Oceanport Creek
Shrewsbury River (above Navesink River)
Shrewsbury River
N.J. Transit - North Jersey Coast Line
Monmouth Park Racetrack
Oceanport Borough
West Long Branch Borough
Ocean Township
Whale Pond Brook
Branchport Creek
Monmouth University
Whale Pond Brook
Hollywood Lake
Ross Lake
Shrewsbury River
Manahassett Creek
Poplar Brook
Long Branch direct Atlantic drainage
Deal Borough
Takanassee Lake
Monmouth Beach Borough
Atlantic Ocean
Atlantic Coast (Navesink R to WhalePond)
Legend
Municipal Boundary
Waterbody
Railroad
Parcels
Waterways
Computed Flow Path
14 Digit Hydrologic Units
NJ DEM 10ft
Elevation (Ft)
375.131
-12.7725
Generalized Overland Flow To Border
Data Sources:
NJOGIS
Monmouth County GIS
NJDEP
1 inch = 1,600 feet
0 800 1,600 2,400 Feet
MAP 10
HYDROLOGY
HUC14
2022 ENVIRONMENTAL RESOURCE INVENTORY
City of Long Branch
Monmouth County, New Jersey
August 2022



MAP 11
WATER QUALITY
2022 ENVIRONMENTAL RESOURCE INVENTORY

City of Long Branch

Monmouth County, New Jersey

January 2023

Legend

- Municipal Boundary
- Waterbody
- Railroad
- Parcels
- WQDE Water Quality Monitoring Locations

CCMP Water Quality Monitoring Locations

% of Monitoring Weeks from 2015-2021 that Met the The New Jersey State Sanitary Code's Bathing Standards*

- 100%
- 90-99%
- < 90%
- No Data

Surface Water Quality Category

Category

- All Other Values
- FW2-NT/SE1
- SC

Note:
CCMP: Cooperative Coastal Monitoring Program
WQDE: Water Quality Data Exchange

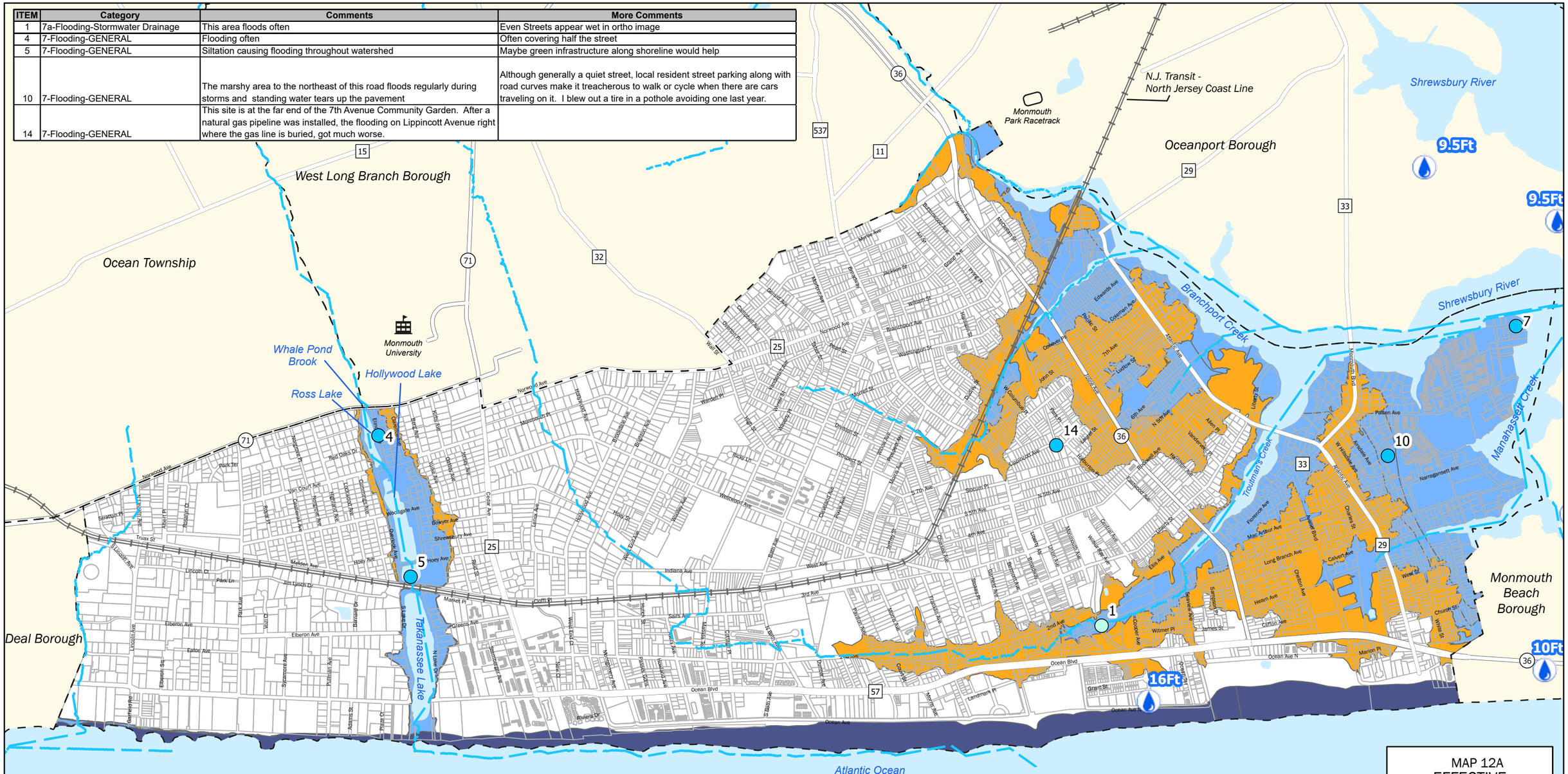
Data Sources:
NJOGIS
Monmouth County GIS
NJDEP

1 inch = 1,600 feet

0 800 1,600 2,400 Feet

* The New Jersey State Sanitary Code's water quality standard for bathing beaches is determined by the concentration of the indicator bacteria, enterococci. The standard requires that the concentration of bacteria not exceed 104 colonies of Enterococci bacteria per 100 milliliters of sample. An exceedance of the standard may indicate a pollutant impact to bathing waters.

ITEM	Category	Comments	More Comments
1	7a-Flooding-Stormwater Drainage	This area floods often	Even Streets appear wet in ortho image
4	7-Flooding-GENERAL	Flooding often	Often covering half the street
5	7-Flooding-GENERAL	Siltation causing flooding throughout watershed	Maybe green infrastructure along shoreline would help
10	7-Flooding-GENERAL	The marshy area to the northeast of this road floods regularly during storms and standing water tears up the pavement	Although generally a quiet street, local resident street parking along with road curves make it treacherous to walk or cycle when there are cars traveling on it. I blew out a tire in a pothole avoiding one last year.
14	7-Flooding-GENERAL	This site is at the far end of the 7th Avenue Community Garden. After a natural gas pipeline was installed, the flooding on Lippincott Avenue right where the gas line is buried, got much worse.	



Legend

Community Input

Category

- 7-Flooding-GENERAL
- 7a-Flooding-Stormwater Drainage
- Sandy Hi Water

- Computed Flow (1 SqMi)
- Municipal Boundary
- Railroad
- Waterbody
- Parcels

Effective Flood Hazard Areas

- AE: An area inundated by 100-year flooding, for which Base Flood Elevations (BFEs) have been determined.
- X500: An area inundated by 500-year flooding; an area inundated by 100-year flooding with average depths of less than 1 foot or with drainage areas less than 1 square mile; or an area protected by levees from 100-year flooding.
- VE: An area inundated by 100-year flooding with velocity hazard (wave action); Base Flood Elevations (BFEs) have been determined.

Data Sources: NJOGIS, Monmouth County GIS, NJDEP

N W S E

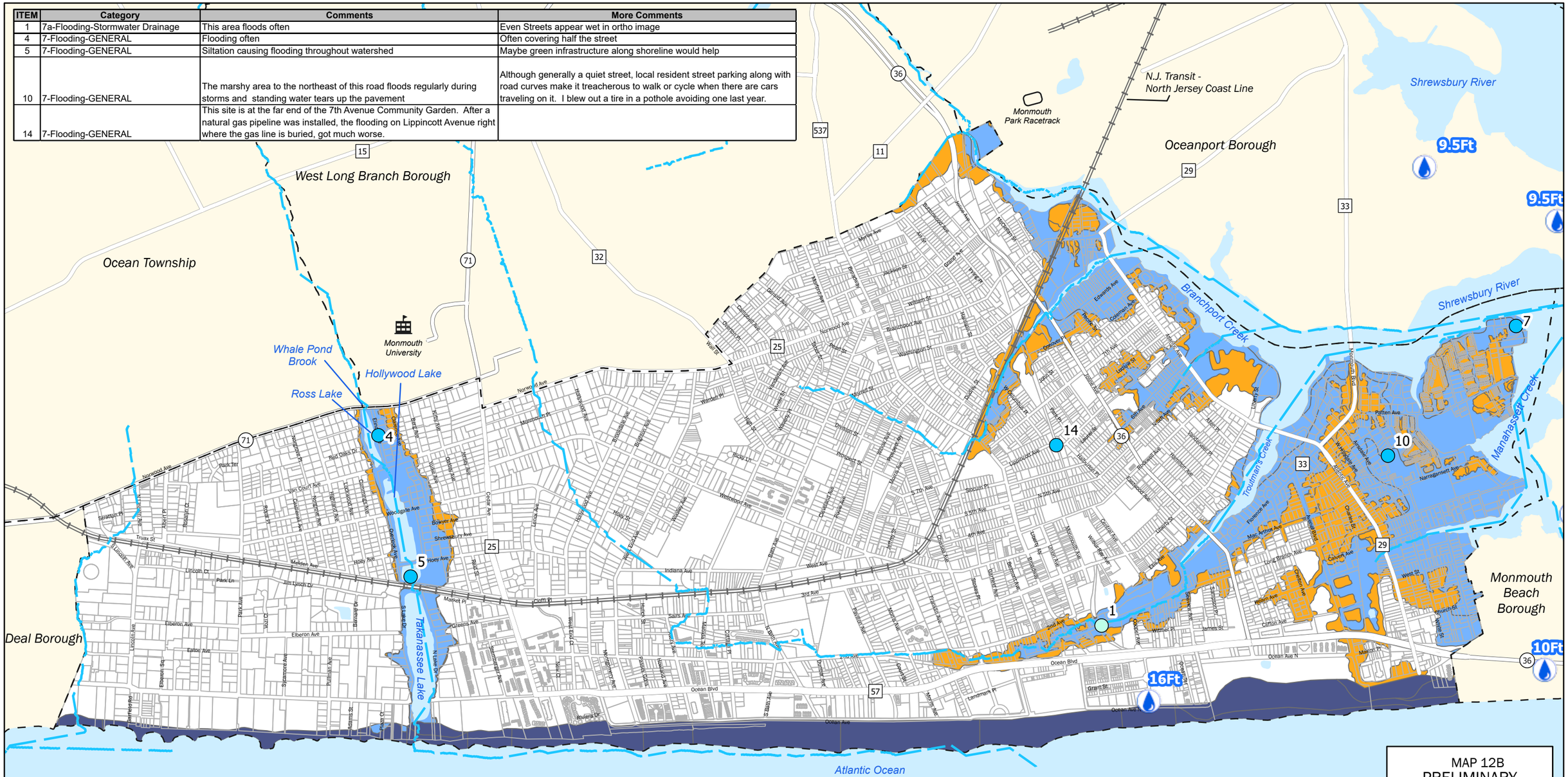
1 inch = 1,600 feet

0 800 1,600 2,400 Feet

MAP 12A
EFFECTIVE FEMA FLOOD HAZARD AREAS
2022 ENVIRONMENTAL RESOURCE INVENTORY

City of Long Branch
Monmouth County, New Jersey
August 2022

ITEM	Category	Comments	More Comments
1	7a-Flooding-Stormwater Drainage	This area floods often	Even Streets appear wet in ortho image
4	7-Flooding-GENERAL	Flooding often	Often covering half the street
5	7-Flooding-GENERAL	Siltation causing flooding throughout watershed	Maybe green infrastructure along shoreline would help
10	7-Flooding-GENERAL	The marshy area to the northeast of this road floods regularly during storms and standing water tears up the pavement	Although generally a quiet street, local resident street parking along with road curves make it treacherous to walk or cycle when there are cars traveling on it. I blew out a tire in a pothole avoiding one last year.
14	7-Flooding-GENERAL	This site is at the far end of the 7th Avenue Community Garden. After a natural gas pipeline was installed, the flooding on Lippincott Avenue right where the gas line is buried, got much worse.	



Legend

Community Input

Category

- *7-Flooding-GENERAL*
- *7a-Flooding-Stormwater Drainage*
- *Sandy Hi Water*

- *Computed Flow (1 SqMi)*
- *Municipal Boundary*
- *Railroad*
- *Waterbody*
- *Parcels*

2014/15 Preliminary Flood Hazard Areas

AE: An area inundated by 100-year flooding, for which Base Flood Elevations (BFEs) have been determined.

X500: An area inundated by 500-year flooding; an area inundated by 100-year flooding with average depths of less than 1 foot or with drainage areas less than 1 square mile; or an area protected by levees from 100-year flooding.

VE: An area inundated by 100-year flooding with velocity hazard (wave action); Base Flood Elevations (BFEs) have been determined.

Data Sources: NJOGIS Monmouth County GIS NJDEP

1 inch = 1,600 feet

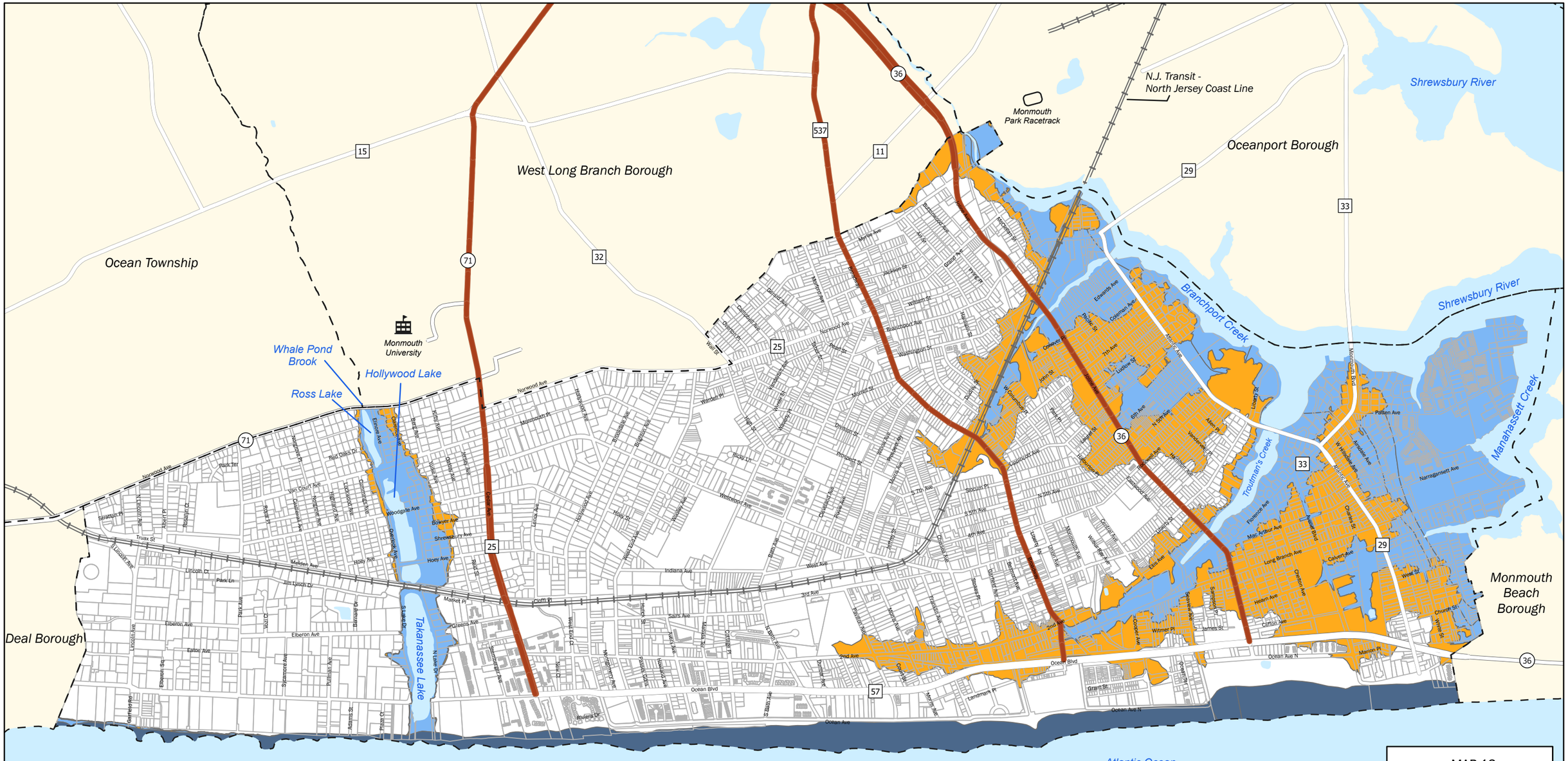
0 800 1,600 2,400 Feet

MAP 12B
PRELIMINARY FEMA FLOOD HAZARD AREAS
2022 ENVIRONMENTAL RESOURCE INVENTORY

City of Long Branch

Monmouth County, New Jersey

August 2022



Legend

- Municipal Boundary
- Long Branch Evacuation Routes
- Waterbody
- Railroad
- Parcels

2014/15 Effective Flood Hazard Areas

- AE: An area inundated by 100-year flooding, for which Base Flood Elevations (BFEs) have been determined.
- VE: An area inundated by 100-year flooding with velocity hazard (wave action); Base Flood Elevations (BFEs) have been determined.
- X500: An area inundated by 500-year flooding; an area inundated by 100-year flooding with average depths of less than 1 foot or with drainage areas less than 1 square mile; or an area protected by levees from 100-year flooding.

Data Sources:
NJOGIS
Monmouth County GIS
NJDEP

N S W E

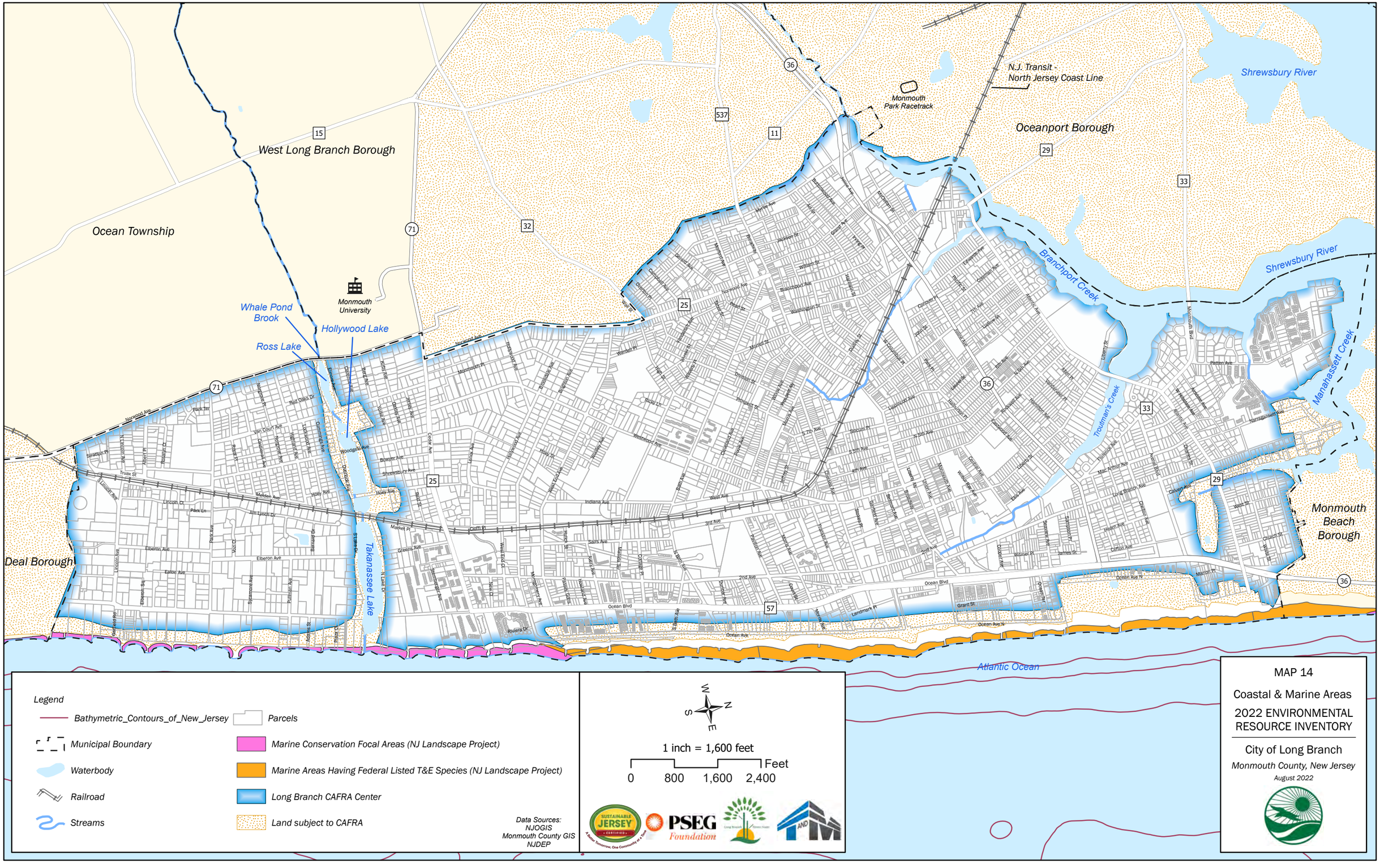
1 inch = 1,600 feet

0 800 1,600 2,400 Feet

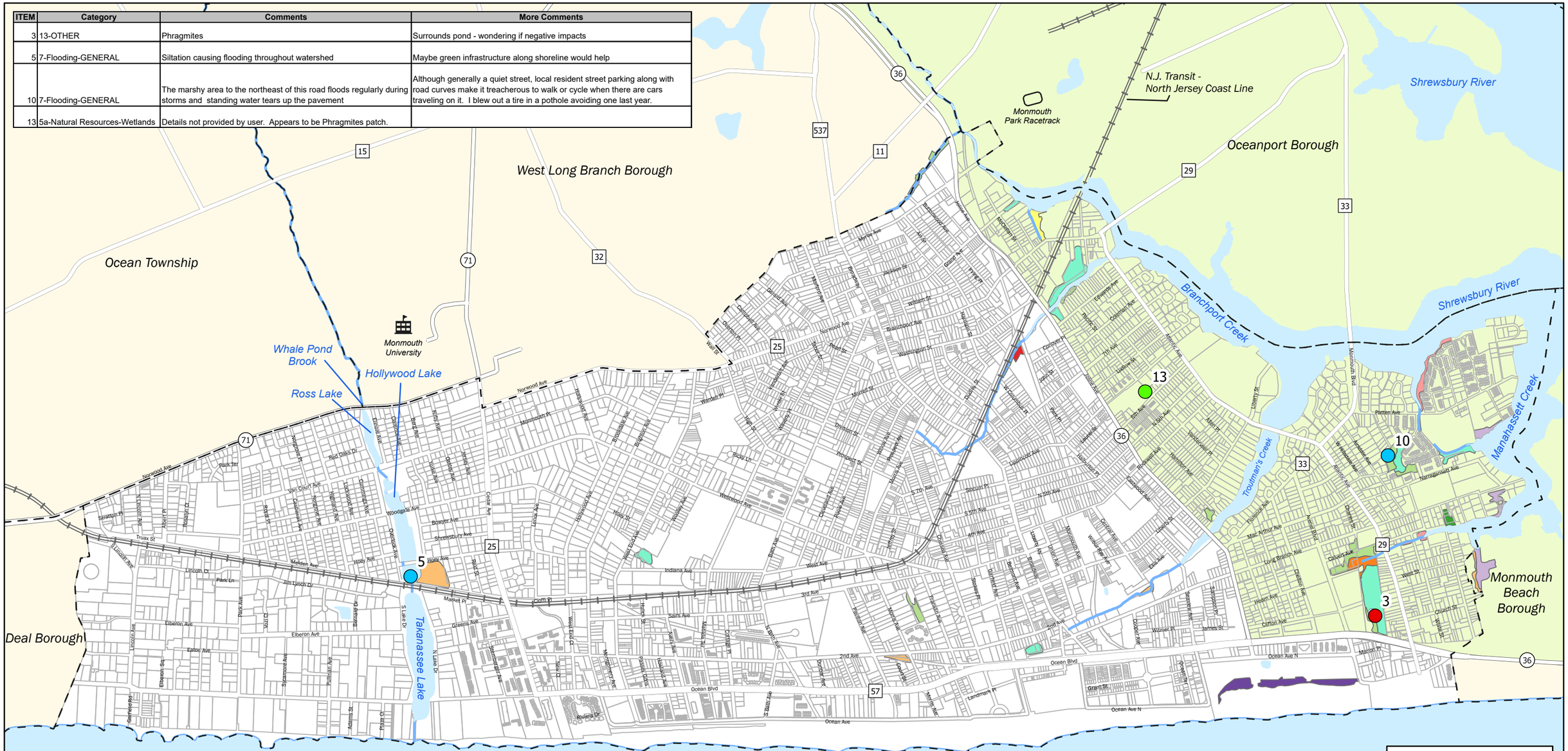
MAP 13
EVACUATION ROUTES

2022 ENVIRONMENTAL RESOURCE INVENTORY

City of Long Branch
Monmouth County, New Jersey
August 2022


West Long Branch Borough
Ocean Township
Deal Borough
Oceanport Borough
Monmouth Beach Borough
Monmouth University
Monmouth Park Racetrack
N.J. Transit - North Jersey Coast Line
Whale Pond Brook
Ross Lake
Hollywood Lake
Takanassee Lake
Shrewsbury River
Branchport Creek
Manahassett Creek
Troutman's Creek
Atlantic Ocean
Ocean Blvd
Broadway
Monmouth Blvd
Ocean Ave
Legend
Bathymetric_Contours_of_New_Jersey
Parcels
Municipal Boundary
Marine Conservation Focal Areas (NJ Landscape Project)
Waterbody
Marine Areas Having Federal Listed T&E Species (NJ Landscape Project)
Railroad
Long Branch CAFRA Center
Streams
Land subject to CAFRA
Data Sources:
NJOGIS
Monmouth County GIS
NJDEP
1 inch = 1,600 feet
0 800 1,600 2,400 Feet
MAP 14
Coastal & Marine Areas
2022 ENVIRONMENTAL RESOURCE INVENTORY
City of Long Branch
Monmouth County, New Jersey
August 2022

ITEM	Category	Comments	More Comments
3	13-OTHER	Phragmites	Surrounds pond - wondering if negative impacts
5	7-Flooding-GENERAL	Siltation causing flooding throughout watershed	Maybe green infrastructure along shoreline would help
10	7-Flooding-GENERAL	The marshy area to the northeast of this road floods regularly during storms and standing water tears up the pavement	Although generally a quiet street, local resident street parking along with road curves make it treacherous to walk or cycle when there are cars traveling on it. I blew out a tire in a pothole avoiding one last year.
13	5a-Natural Resources-Wetlands	Details not provided by user. Appears to be Phragmites patch.	



Legend

Community Input

Category

- 5a-Natural Resources-Wetlands
- 7-Flooding-GENERAL
- 13-OTHER
- Municipal Boundary
- Waterbody
- Railroad
- Streams
- Parcels

Wetland Classifications

- AGRICULTURAL WETLANDS (MODIFIED)
- DECIDUOUS SCRUB/SHRUB WETLANDS
- DECIDUOUS WOODED WETLANDS
- DISTURBED WETLANDS (MODIFIED)
- HERBACEOUS WETLANDS
- MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA
- MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE
- PHRAGMITES DOMINATE INTERIOR WETLANDS
- SALINE MARSH (HIGH MARSH)
- VEGETATED DUNE COMMUNITIES
- US EPA Priority Wetlands Area

Data Sources:
NJOGIS
Monmouth County GIS
NJDEP

1 inch = 1,600 feet

0 800 1,600 2,400 Feet

2015 LAND USE LABEL	COUNT	ACRES
AGRICULTURAL WETLANDS (MODIFIED)	1	1.3
DECIDUOUS SCRUB/SHRUB WETLANDS	10	16.7
DECIDUOUS WOODED WETLANDS	10	8.9
DISTURBED WETLANDS (MODIFIED)	1	0.7
HERBACEOUS WETLANDS	2	2.4
MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	1	0.5
MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	4	4.8
PHRAGMITES DOMINATE INTERIOR WETLANDS	1	1.9
SALINE MARSH (HIGH MARSH)	3	2.2
VEGETATED DUNE COMMUNITIES	3	5.2
Total Wetland Acres		44.6
Long Branch Total Acres		3372.0
Wetlands Percent of Long Branch		***1.3%***

MAP 15

WETLANDS

2022 ENVIRONMENTAL RESOURCE INVENTORY

City of Long Branch

Monmouth County, New Jersey

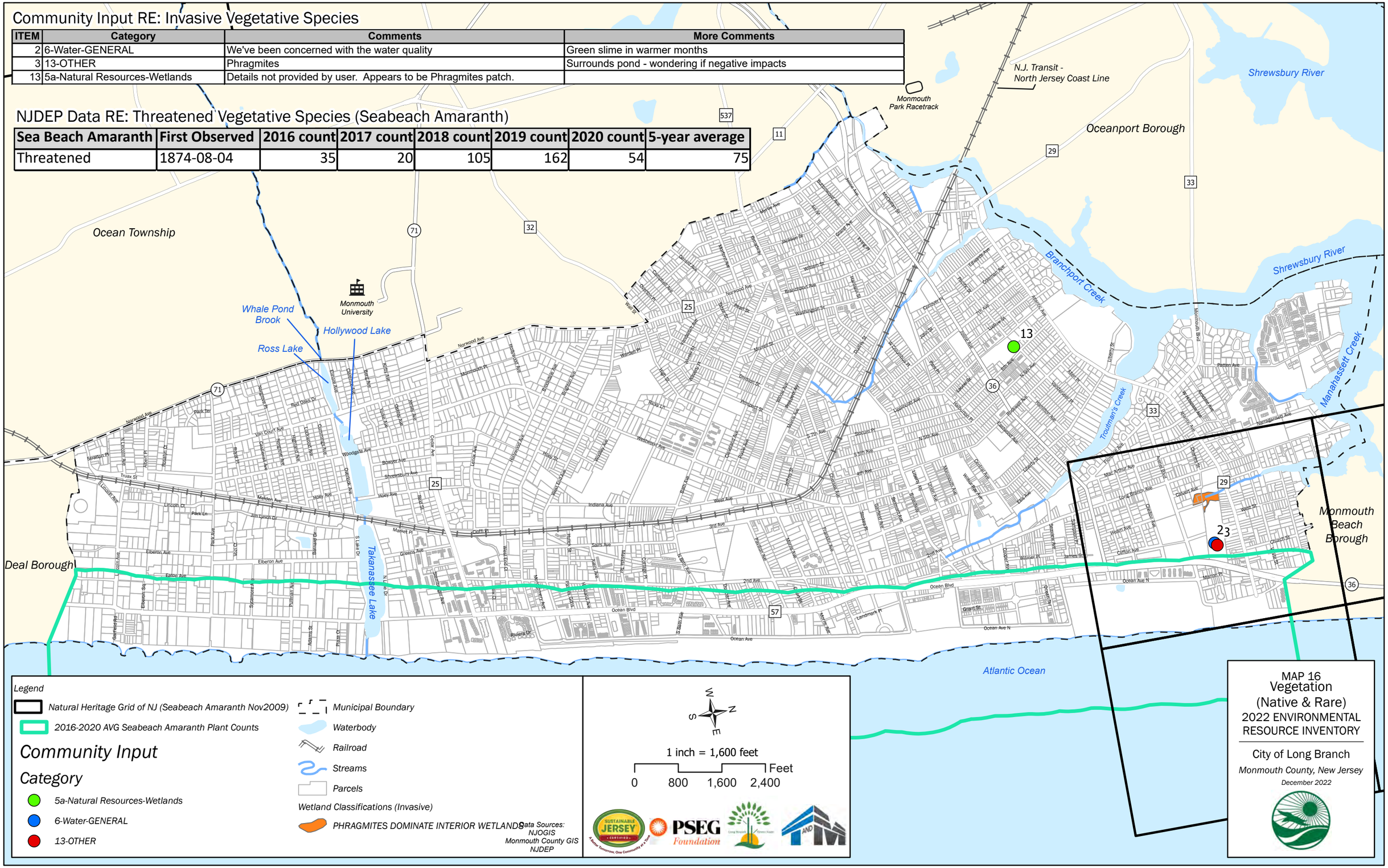
August 2022

Community Input RE: Invasive Vegetative Species

ITEM	Category	Comments	More Comments
2	6-Water-GENERAL	We've been concerned with the water quality	Green slime in warmer months
3	13-OTHER	Phragmites	Surrounds pond - wondering if negative impacts
13	5a-Natural Resources-Wetlands	Details not provided by user. Appears to be Phragmites patch.	

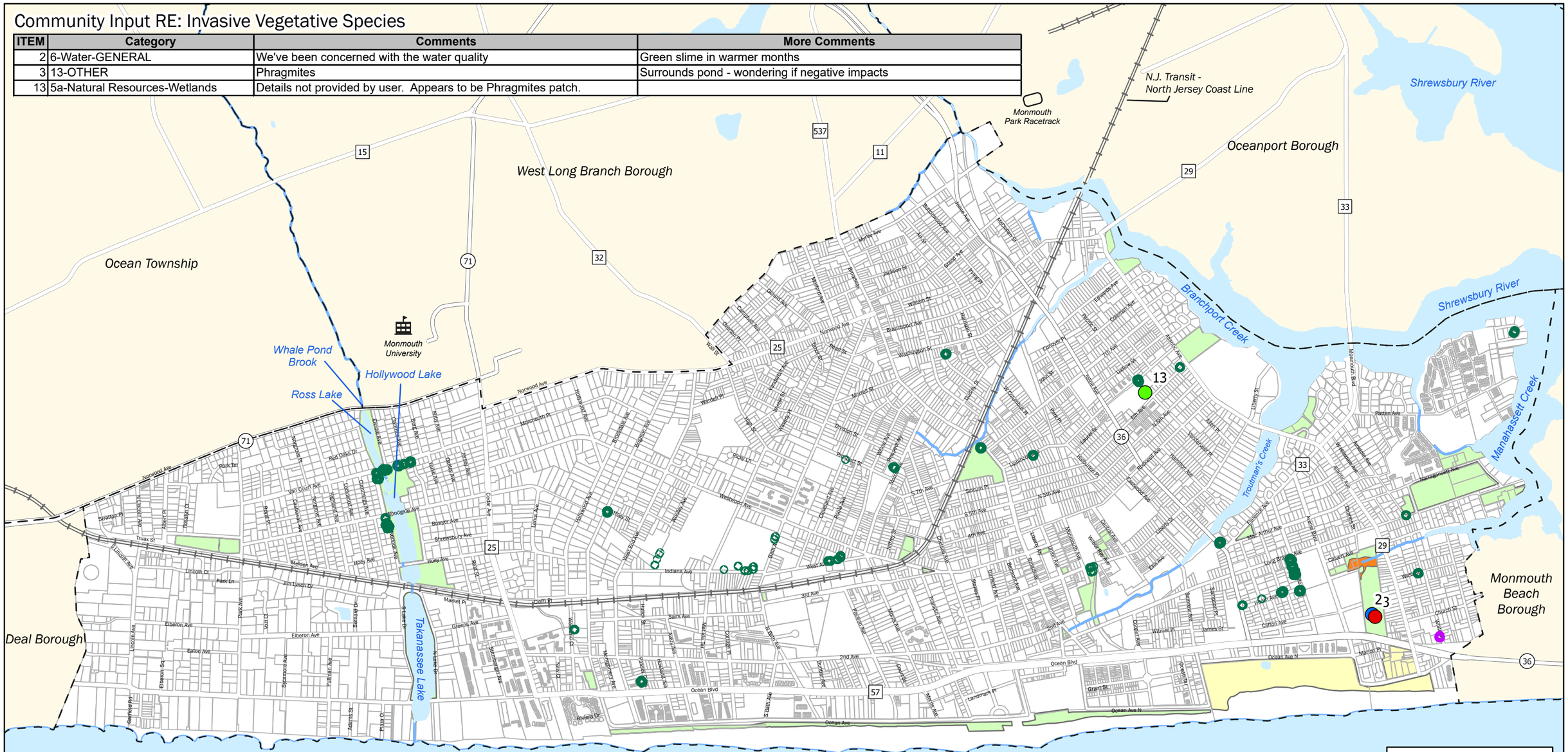
NJDEP Data RE: Threatened Vegetative Species (Seabeach Amaranth)

Sea Beach Amaranth	First Observed	2016 count	2017 count	2018 count	2019 count	2020 count	5-year average
Threatened	1874-08-04	35	20	105	162	54	75



Community Input RE: Invasive Vegetative Species

ITEM	Category	Comments	More Comments
2	6-Water-GENERAL	We've been concerned with the water quality	Green slime in warmer months
3	13-OTHER	Phragmites	Surrounds pond - wondering if negative impacts
13	5a-Natural Resources-Wetlands	Details not provided by user. Appears to be Phragmites patch.	



Legend

Community Input

Category

- 5a-Natural Resources-Wetlands
- 6-Water-GENERAL
- 13-OTHER

LiDAR-Based Trees

Tree Type

- Ash (Vulnerable)
- Bamboo (Prolific)

- Municipal Boundary

Highways

ROADCLASS

- 2
- 4
- oceanave_Dissolve
- Waterbody
- Monmouth_Waterbody
- Railroad
- Streams

- Parcels

NJ Landuse Class

Wetland Classifications (Invasive)

- PHRAGMITES DOMINATE INTERIOR WETLANDS

Long Branch Open Space

Ownership

- County
- Municipal

Data Sources:
NJOGIS
Monmouth County GIS
NJDEP

N
W E
S

1 inch = 1,600 feet

0 800 1,600 2,400 Feet

MAP 17
Vegetation
(Invasive & Non-Invasive)
2022 ENVIRONMENTAL RESOURCE INVENTORY

City of Long Branch

Monmouth County, New Jersey

December 2022

Notes:

1.) Most recent & publicly-available LiDAR (Post-Sandy by NOAA).
2.) LiDAR points did not have classified above-ground; two (2) methods of classification were performed
   A.) Utilizing ESRI 3D-Analyst Point Classification Tools and,
   B.) ESRI 3D-Analyst Deep Learning Tree Point Classification.
3.) Both methods produce outputs that include misclassifications however, semi-automated and manual edits performed to reduce inaccuracies.
4.) Results should be viewed as a range in which reality likely exists between the reported scenarios.
5.) Methods employed and scenarios developed leverage industry-standard methods of LiDAR-generated Tree Canopy Height Raster Model and Lidar-based Forest Canopy Analyses (Andrew Plowright, 2021-09-10).
6.) Further GPS/GIS-based projects can be designed in the future to distinguish between evergreen and deciduous (or) assign species to individual sticks or vegetative clusters.

Legend

- Municipal Boundary
- LiDAR-Based High Vegetation Cover
- Waterbody
- Railroad
- Parcels

Open Space

- County
- Municipal

Data Sources:
NJOGIS
Monmouth County GIS
NJDEP
NOAA

N E S W

1 inch = 1,600 feet

0 800 1,600 2,400 Feet

Scenario	Total Land Area - City of Long Branch		LiDAR-Based Vegetated Area		Percent Area Vegetated with Canopy Cover
	Acres (Ac)	Square Miles (SqMi)	Acres (Ac)	Square Miles (SqMi)	
Medium & High Vegetation Cover	3276.8	5.12	578.33	0.90	18%
Mid-Average			481.73	0.75	15%
High Vegetation Cover			385.13	0.60	12%

MAP 18

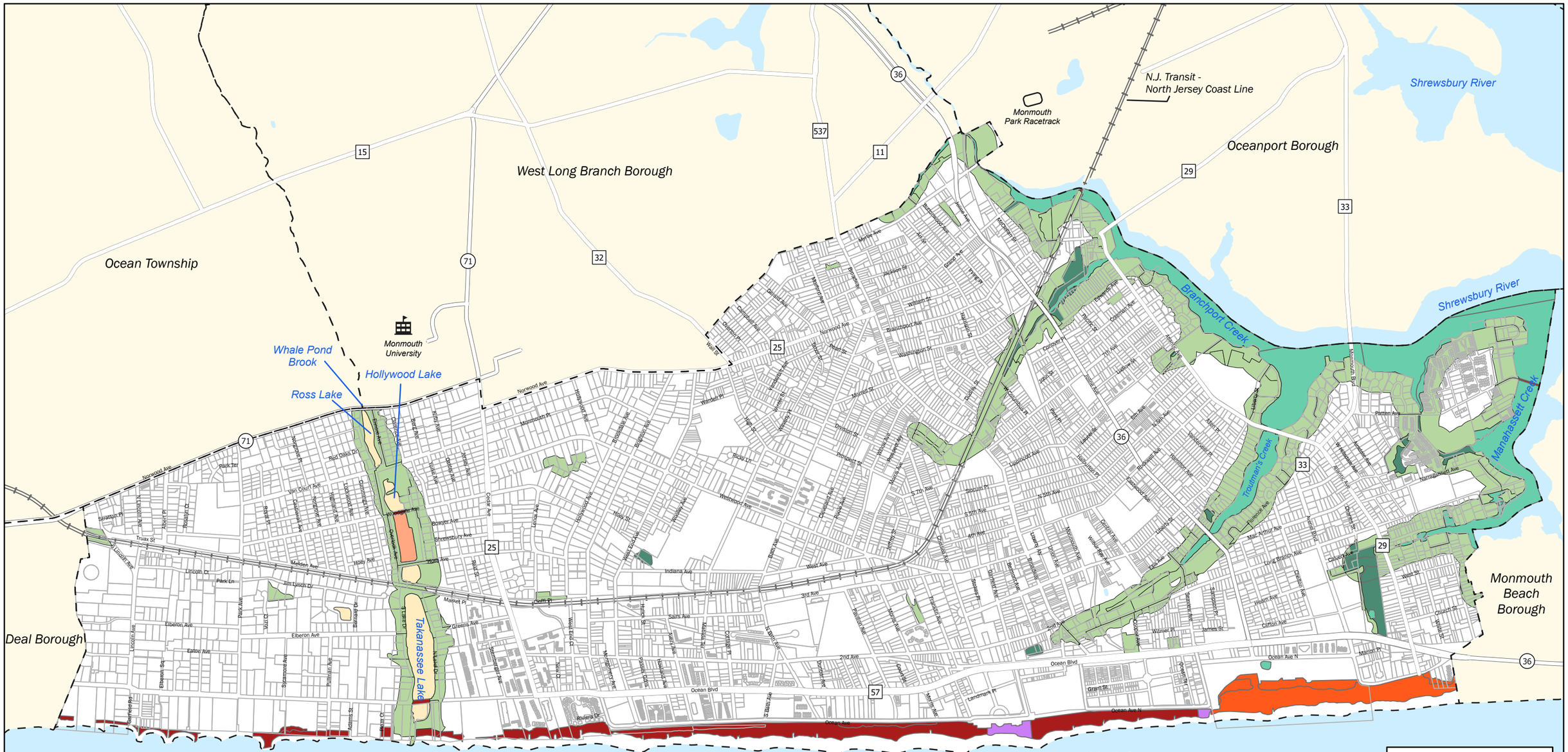
Trees & Canopy

2022 ENVIRONMENTAL RESOURCE INVENTORY

City of Long Branch

Monmouth County, New Jersey

January 2023



Legend

- Municipal Boundary
- Parcels
- Waterbody
- Railroad

Long Branch Wildlife Habitats (NJDEP 2017)

- Great Blue Heron (Special Concern)
- Fowler's Toad (Special Concern)
- American Oystercatcher (Special Concern)
- Common Tern (Special Concern)
- Osprey (State Threatened)
- Black-crowned Night-heron (State Threatened)
- Least Tern (State Endangered)
- Other Habitats Containing Stable or Undetermined Species

Data Sources:
NJOGIS
Monmouth County GIS
NJDEP

N S E W

1 inch = 1,600 feet

0 800 1,600 2.400 Feet

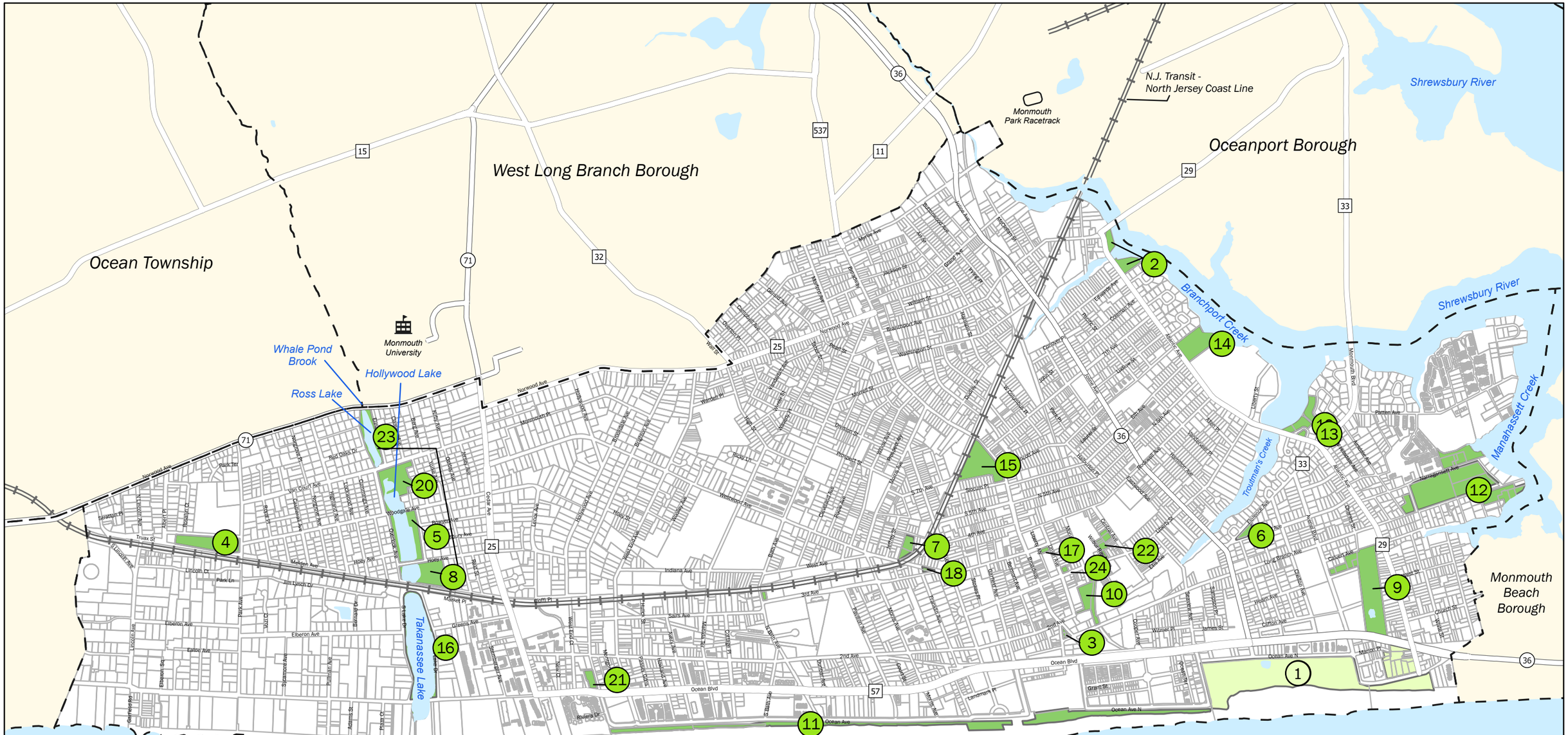
MAP 19
WILDLIFE HABITATS

2022 ENVIRONMENTAL RESOURCE INVENTORY

City of Long Branch

Monmouth County, New Jersey

February 2022



Legend

- Municipal Boundary
- Waterbody
- Railroad
- Parcels

Ownership

- County
- Municipal

Data Sources:
NJOGIS
Monmouth County GIS
NJDEP

1 inch = 1,600 feet

0 800 1,600 2.400 Feet

County Park		Municipal Park		Municipal Park	
Label ID	Name	Label ID	Name	Label ID	Name
1	Seven Presidents Park	8	Hoey Avenue Park	18	Third Avenue Triangle
Municipal Park		9	Jackson Woods	19	Troutmans Greenway
Label ID	Name	10	Jerry Morgan Park	20	Van Court Park
1	Bath Avenue Park	11	Long Branch Beach	21	West End Park
2	Branchport Park	12	Manahassett Park	22	Wilbur Ray Avenue Park
3	Broadway Park	13	MLK Memorial	23	Ross Lake Park
4	Elberon Park	14	Pleasure Bay Park	24	Liberty Park
5	Firemans Park	15	Slocum Park		
6	Florence Ave	16	Takanassee Lake		
7	George Naylor Park	17	Third Avenue Park		

MAP 20

OPEN SPACE

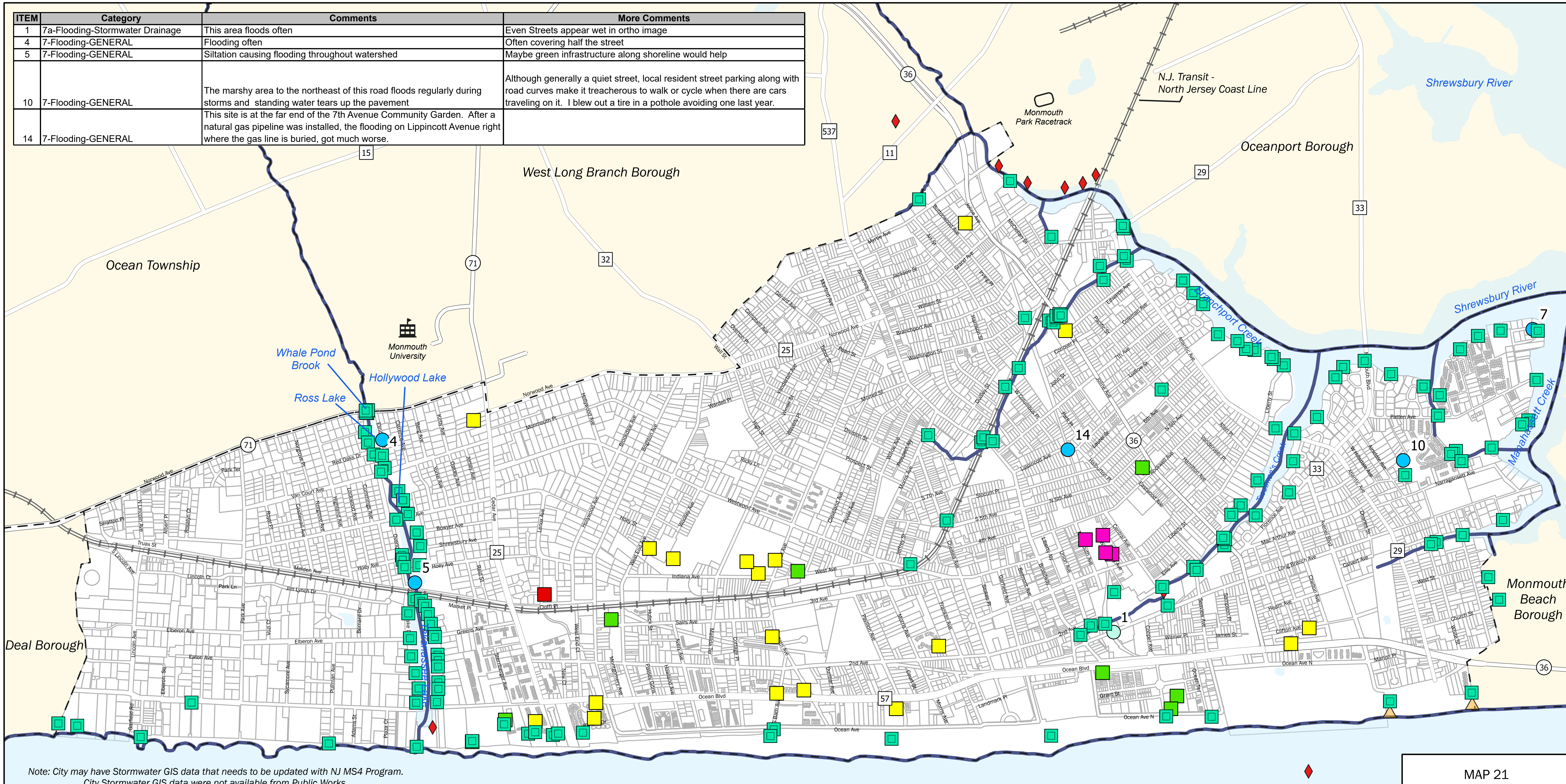
2022 ENVIRONMENTAL RESOURCE INVENTORY

City of Long Branch

Monmouth County, New Jersey

February 2023

ITEM	Category	Comments	More Comments
1	7a-Flooding-Stormwater Drainage	This area floods often	Even Streets appear wet in ortho image
4	7-Flooding-GENERAL	Flooding often	Often covering half the street
5	7-Flooding-GENERAL	Siltation causing flooding throughout watershed	Maybe green infrastructure along shoreline would help
10	7-Flooding-GENERAL	The marshy area to the northeast of this road floods regularly during storms and standing water tears up the pavement	Although generally a quiet street, local resident street parking along with road curves make it treacherous to walk or cycle when there are cars traveling on it. I blew out a tire in a pothole avoiding one last year.
14	7-Flooding-GENERAL	This site is at the far end of the 7th Avenue Community Garden. After a natural gas pipeline was installed, the flooding on Lippincott Avenue right where the gas line is buried, got much worse.	



Note: City may have Stormwater GIS data that needs to be updated with NJ MS4 Program.
City Stormwater GIS data were not available from Public Works.

Legend

Community Input
Category
- 7-Flooding-GENERAL
- 7a-Flooding-Stormwater Drainage
- Municipal Boundary
- Waterways
- Waterbody
- Railroad
- Parcels

Storm Basin (NJHMD)
- Detention
- Infiltration
- Infiltration \ Detention
- Retention \ Wet Pond
- Surface Water Discharges (NJPDES)
- Stormwater Outfalls NJ MS4 Data
- 2019 City Outfall Map

1 inch = 1,600 feet

0 800 1,600 2,400 Feet

Data Sources:
NJ Hydrologic Modeling Database
NJOGIS
Monmouth County GIS
NJDEP
LB Public Works (2019 Outfalls Map)

MAP 21

STORM WATER

2022 ENVIRONMENTAL RESOURCE INVENTORY

City of Long Branch
Monmouth County, New Jersey
August 2022

Legend

- *Municipal Boundary*
- *Parcels*
- *Waterbody*
- *Evacuation Routes*
- *NJ Transit - North Jersey Coast Line*
- *NJ Transit Rail Stations*

NJ Transit Bus Stops (NJTPA, Oct 2021)

- *Route 831*
- *Route 837*

NJ Transit Bus Routes (NJTPA, Oct 2021)

- *Route 831*
- *Route 837*

Academy Bus Stops (Academy Bus, 2022)

- *Route 36 to Port Authority*
- *Shore Points to Port Authority*

Academy Bus Lines (Academy Bus, 2022)

- *Route 36 to Port Authority*
- *Shore Points to Port Authority*

- *Rail Stations 1/4 Mile Walking Distance*
- *Transit Village 1/2 Mile Walking Distance*

Data Sources:
NJOGIS
Monmouth County GIS
NJDEP
NJTPA & Academy Bus

N S E W

1 inch = 1,600 feet

0	800	1,600	2,400 Feet

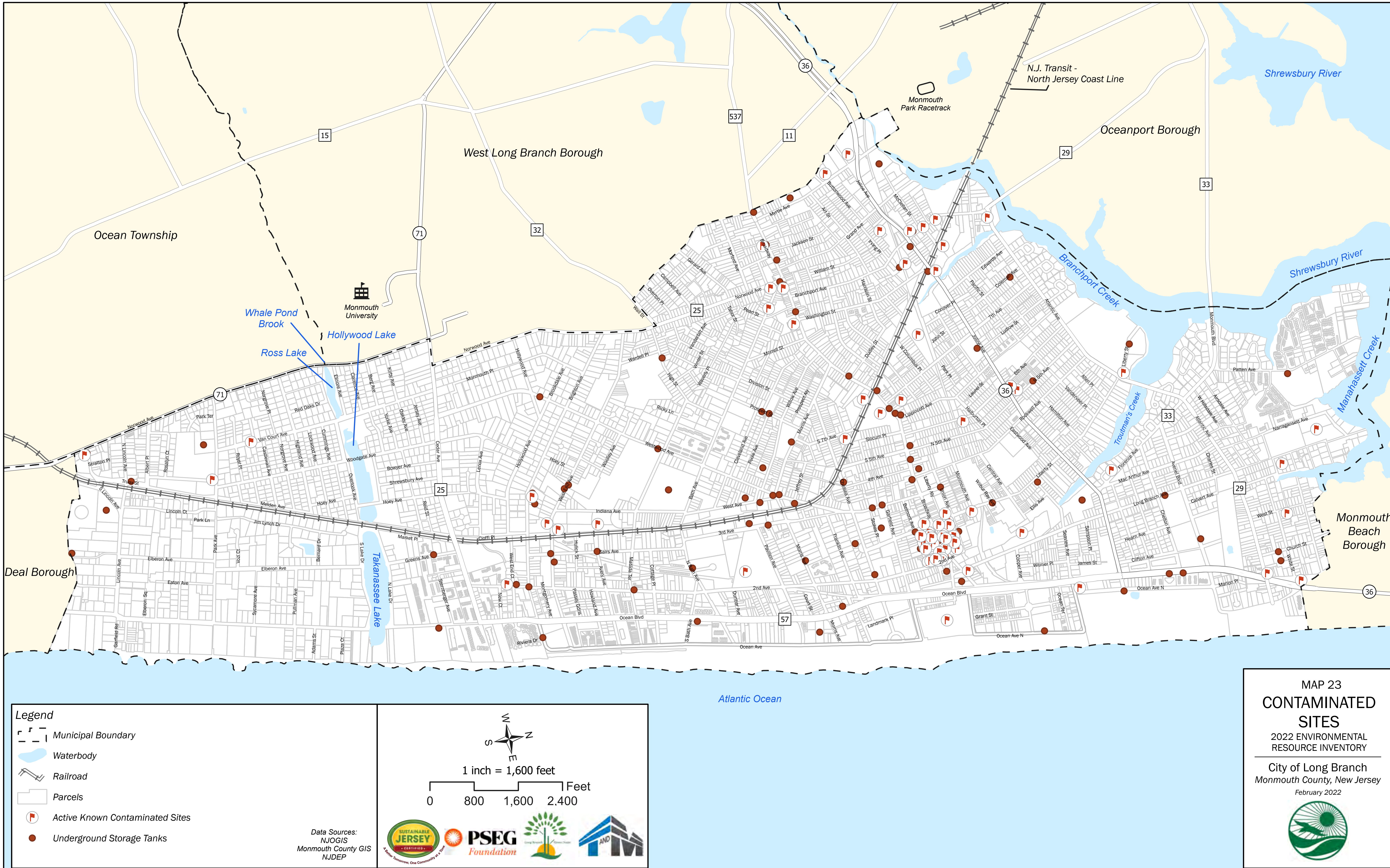
MAP 22

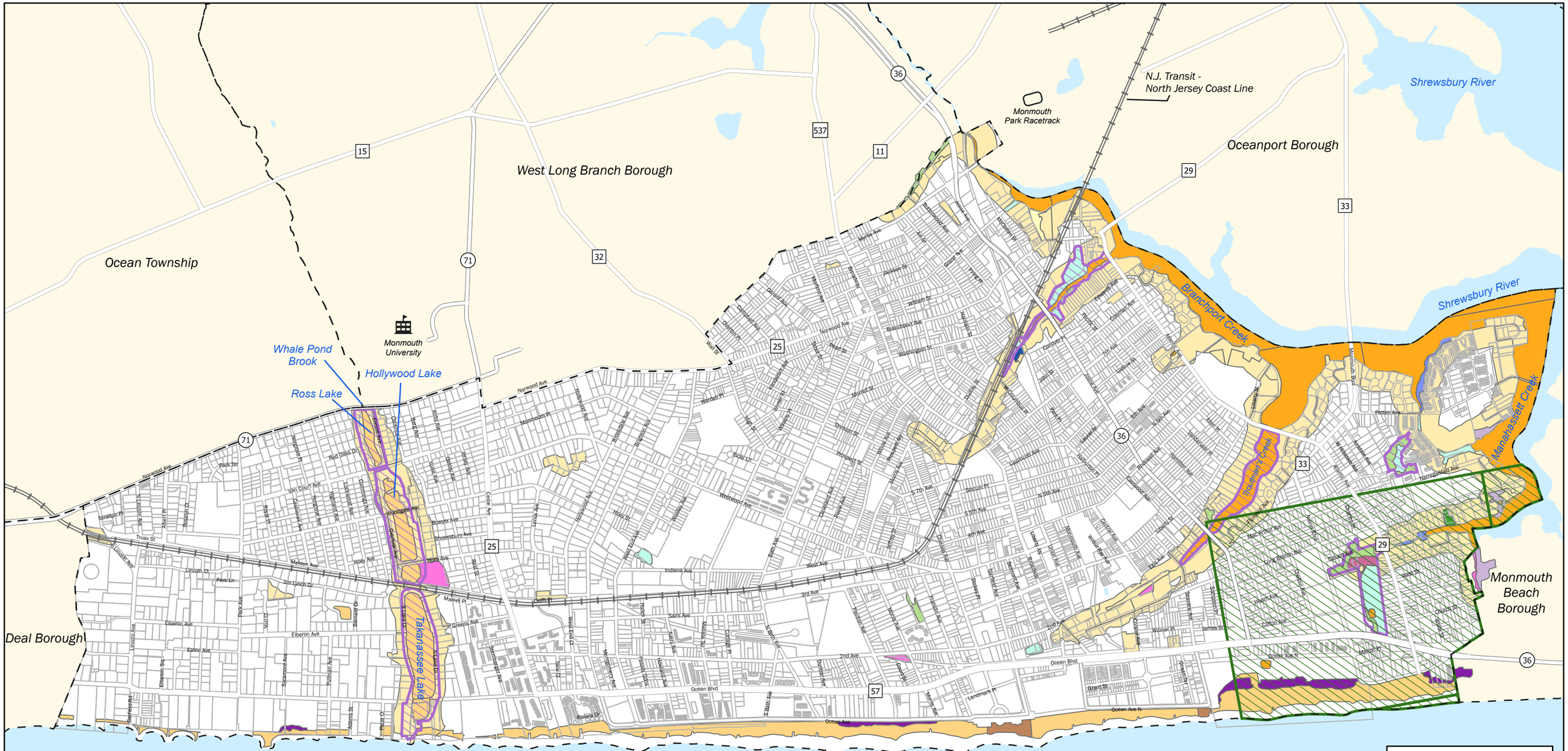
TRANSPORTATION
2022 ENVIRONMENTAL RESOURCE INVENTORY

City of Long Branch

Monmouth County, New Jersey

February 2022


MAP 23
CONTAMINATED SITES
2022 ENVIRONMENTAL RESOURCE INVENTORY
City of Long Branch
Monmouth County, New Jersey
February 2022
Legend
Municipal Boundary
Waterbody
Railroad
Parcels
Active Known Contaminated Sites
Underground Storage Tanks
Data Sources:
NJOGIS
Monmouth County GIS
NJDEP
1 inch = 1,600 feet
0
800
1,600
2,400
Feet
N
S
E
W
West Long Branch Borough
Ocean Township
Oceanport Borough
Monmouth Beach Borough
Deal Borough
Atlantic Ocean
Shrewsbury River
Branchport Creek
Manahassett Creek
Troutman's Creek
Takanassee Lake
Whale Pond Brook
Hollywood Lake
Ross Lake
Monmouth University
Monmouth Park Racetrack
N.J. Transit -
North Jersey Coast Line
Ocean Blvd
Ocean Ave
SUSTAINABLE JERSEY CERTIFIED
PSEG Foundation



Legend

- *Municipal Boundary*
- *Waterbody*
- *Railroad*
- *Parcels*
- *Critical Environmental Sites (NJGIN 2021) **
- *Rare Plant Species Location (Seabeach Amaranth)*

* Sites of historic, cultural, scenic, or environmental sensitivity according to the 2001 New Jersey State Plan

Wetlands (NJDEP, 2012)

- *AGRICULTURAL WETLANDS (MODIFIED)*
- *DECIDUOUS SCRUB/SHRUB WETLANDS*
- *DECIDUOUS WOODED WETLANDS*
- *DISTURBED WETLANDS (MODIFIED)*
- *HERBACEOUS WETLANDS*
- *MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA*
- *MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE*
- *PHRAGMITES DOMINATE INTERIOR WETLANDS*
- *SALINE MARSH (HIGH MARSH)*
- *VEGETATED DUNE COMMUNITIES*

Critical Wildlife Habitats (NJDEP, 2017)

- *Stable or Undetermined Species*
- *Special Concern*
- *State Threatened*
- *State Endangered*

Data Sources:
NJOGIS
Monmouth County GIS
NJGIN & NJDEP

1 inch = 1,600 feet

0 800 1,600 2,400 Feet

MAP 24
CRITICAL ENVIRONMENTAL AREAS

2022 ENVIRONMENTAL RESOURCE INVENTORY

City of Long Branch

Monmouth County, New Jersey

February 2022