

COASTAL VULNERABILITY ASSESSMENT FOR THE WILDWOODS MUNICIPALITIES, NJ

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1. PURPOSE

The goal of this Coastal Vulnerabilities Assessment (CVA) is to analyze and summarize the possible impacts of different flooding scenarios in four neighboring New Jersey municipalities: the City of Wildwood, the Borough of Wildwood Crest, the Borough of West Wildwood, and the City of North Wildwood (hereafter “Wildwoods”). Using various tools and documents, members of the Rutgers-NJ Climate Resilience Corps (hereafter “Rutgers”) have identified current vulnerabilities associated with housing, local economies, public assets and natural resources, among other social and physical Wildwoods assets.

The information in this report may be used to support the requirements of the New Jersey Office of Planning Advocacy (NJOPA) Plan Endorsement process, which aims to ensure that municipalities comply with state regulations and policies in their planning efforts. The information in this report may also be used to partially support the requirements of the New Jersey Municipal Land Use Law (Section 19 of P.L. 1975 c.291 C.40:55D-28) for municipalities to incorporate a Climate Change Related Hazard Vulnerability Assessment (CCRHVA) into the land use plan element adopted as part of municipal master plan updates.

The Rutgers flood exposure analysis provided in this document is for neighborhood-level planning and potential exposure identification. These data should not be relied upon to analyze monetary losses from a specific event on individual properties or parcels. The datasets used in this CVA do not replace property-specific flood hazard modeling and engineering studies that consider detailed building elevations and hydrodynamic conditions. Rather, this CVA provides a regional sense of flooding to inform future planning or assessment efforts.

2. INTRODUCTION AND METHODOLOGY OF ANALYSIS

Water Levels

Due to Wildwoods' location, situated along a low-lying coastal bay area, its shoreline is subject to nuisance flooding, as well as flooding during storm events. Nuisance flooding in this case refers to flooding that occurs on a daily basis and is commonly associated with high tide.

Rutgers assessed the impact of flooding scenarios for water levels 2-, 3-, 5-, and 7-feet above 2000 Mean Higher High Water levels (MHHW). MHHW is the tidal elevation determined by averaging the higher of each day's two high tides at a given tide station for the period between 1983 and 2001.¹ A 2-foot MHHW scenario thus indicates there are two additional feet of water above the local MHHW level. In other words, the ocean's surface will be two feet higher than the "imaginary" line that marks the MHHW's elevation². These increases in sea level can occur during an extreme weather event which causes a storm surge. During a storm surge, water levels are pushed higher than expected due to the impacts of local wind stress and a change in barometric pressure. In the future, the same water levels that occur during storm surge floods today may appear as high-tide floods during sunny days, because of sea-level rise.

The four flooding scenarios used in this CVA follow the NJDEP recommendations to "utilize 2100 as a planning horizon". Each of the flooding scenarios is within the likely range of impacts projected for 2100, meaning that there is at least a 66% chance that sea-level rise will occur between 2 to 5 feet in 2100.³ Moreover, the 2-foot MHHW is a water level that NOAA has determined to be the threshold for high-tide flooding (HTF) in this area.⁴

Collectively, these four water levels should be thought of as NJDEP's planning benchmarks: NJDEP's Sea-Level Rise Guidance for New Jersey recommends that planners analyze (1) 2 feet of sea-level rise that is likely unavoidable, (2) 5.1 feet of sea-level rise sufficient to plan for most activities in a community, and (3) a high-end estimate of 6.9 feet for those critical activities for which damages would have debilitating effects on public health and safety.⁵

In addition, NJOPA's Municipal Plan Endorsement guidelines require that "Communities assess flood risks that at a minimum identifies areas within the municipality that are subject to exposure to 3-, 5-, and 7-foot of sea-level rise and the 1% (100-year) and 0.2% (500- year) storms as part of the Municipal Self-Assessment."⁶

Sources of Data

Rutgers conducted this analysis using ArcMap, a GIS software that allows users to work with maps and geographic information, using publicly available data. ArcMap data is commonly available as a shapefile (*i.e.*, a series of unique points, lines, or polygons which store information

¹ https://tidesandcurrents.noaa.gov/datum_options.html

² <https://noaanhc.wordpress.com/2016/01/29/the-alphabet-soup-of-vertical-datums-why-mhhw-is-mmm-mmm-good/>

³ Table 1 on page 13, in <https://www.nj.gov/dep/bcrp/resilientnj/docs/dep-guidance-on-sea-level-rise-2021.pdf>

⁴ https://tidesandcurrents.noaa.gov/HighTideFlooding_AnnualOutlook.html At the Cape May tide gauge, the HTF threshold is 0.566 meters, roughly 1.9 feet.

⁵ <https://www.nj.gov/dep/bcrp/resilientnj/docs/dep-guidance-on-sea-level-rise-2021.pdf>

⁶ <https://nj.gov/state/planning/assets/docs/pe-docs/plan-endorsement-guidelines-2020-10-01.pdf>

about a given area or object) or raster (*i.e.*, continuous data that can be overlaid on top of a given area). The following resources were used for this CVA and mapped on the “NAD_1983_Stateplane_New_Jersey_FIPS_2900_Feet” coordinate system:

- New Jersey Municipal Boundaries shapefile. Source https://njogis-newjersey.opendata.arcgis.com/datasets/3d5d1db8a1b34b418c331f4ce1fd0fef_2.
- Mean Higher-High Water level raster files provided in 2017. Source: New Jersey Department of Environmental Protection (NJDEP).
- Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map and Flood Zones shapefile. Source: FEMA.
- MOD-IV Statewide Parcels shapefile. Source: The statewide composite of parcels data for New Jersey was developed during the Parcels Normalization Project in 2008-2014 by the NJ Office of Information Technology, Office of GIS (NJOGIS).
- Overburdened communities under the New Jersey Environmental Justice Law, Edition 2020.04.30. Source: NJDEP.
- 2015 Land Use and Land Cover shapefile. Source: Aerial Information Systems, Inc., Redlands, CA under the direction of the New Jersey Department of Environmental Protection. <https://gisdata-njdep.opendata.arcgis.com/documents/6f76b90deda34cc98aec255e2defdb45/about>
- New Jersey 2018 Social Vulnerabilities Index shapefile. Source: Center for Disease Control and Prevention (CDC).

The resources listed above provide information regarding:

- The location of Wildwoods.
- The extent and depth of flood inundation, for different MHHW levels (2-, 3-, 5-, and 7-feet).
- The FEMA flood zone for each Wildwoods property.
- Wildwoods’ MOD-IV information. MOD-IV is the New Jersey Property Tax System so this dataset provides information regarding where each property is located in Wildwoods, the property’s class (*e.g.*, whether the property is residential, commercial, etc.), the net value⁷ of each property, and other relevant information.
- The location of overburdened communities in Wildwoods. An “overburdened community,” as designated by the NJDEP,⁸ refers to any census block group, as determined from the 2010 United States census⁹, in which:
 - at least 35% of the households qualify as low-income households; And how this connects with existing information published by Wildwoods
 - at least 40% of the residents identify as a minority or as members of a State recognized tribal community; or
 - at least 40% of the households have limited English proficiency.

⁷ Net value here is equivalent to the appraised value determined by the NJ MOD-IV taxation database. The net value is the sum of the appraised value of the land and improvements to the property (*e.g.*, the value of the building). A net value is not, and should not be interpreted as, the replacement value of a structure destroyed or damaged by a flooding event.

⁸ <https://www.nj.gov/dep/ej/communities.html>

⁹ Another metric for identifying overburdened communities are Low and Moderate Income Areas (hereafter Low/Mod income areas), based on census blocks, as per an analysis performed by the U.S. Department of Housing and Urban Development (HUD). HUD defines Low/Mod income areas as areas where at least 51% of households have incomes at or below 80% of the area’s median income. (<https://www.hudexchange.info/programs/acs-low-mod-summary-data/>). These data are not included in this CVA.

- The location of any land classified as “urban” in Wildwoods.
- The CDC’s Social Vulnerability Index created by the Geospatial Research, Analysis Services Program (GRASP) aimed at helping public health officials and emergency response planners to identify and map the communities that will most likely need support before, during, and after a hazardous event. 2018 ACS data is mapped onto 2010 Census Tract geographies.
 - Please note that census tracts within Wildwoods do not consistently correspond to municipalities. Census Tract 214 contains both the entire Borough of West Wildwood and a portion of the City of Wildwood. Census tract 215 contains the remaining region of the City of Wildwood. Nonetheless, Census tracts 213 and 216 contain all of the City of North Wildwood, and all of the Borough of Wildwood Crest, respectively. See Figure H for a map of the census tracts of the Wildwoods municipalities.

Consideration of Social Vulnerability

The range of assets evaluated in this report highlight the intersectionality of disaster events and reflect the fact that flooding may trigger cascading and compounding effects in socially vulnerable coastal communities. This is especially true for socially vulnerable and/or overburdened individuals and communities. For instance, the structural impacts of floods, which include damage to homes and displacement of residents, could also aggregate existing health issues for certain communities when mold grows under carpets after flooding events. These negative impacts to health can compound especially for the disabled, elderly, or others with existing medical conditions and/or without the means to address health concerns when they arise.

Physical flooding damage may also: deteriorate mental health from the stresses of repetitive loss and prolonged recovery; enable the outbreak of waterborne disease; cause residential displacement that ruptures the social safety networks of families, friends and neighbors. Potential physical effects of flooding include disruptions and structural damage to coastal assets such as buildings, water and sewer utilities; power and electricity outages, and local transportation systems. Any or all of these may impede the efficiency of rescue efforts and slow post-disaster recovery. Economically, flooding may inhibit businesses reopening for an extended period of time, which could also lead to social and health complications for community members.¹⁰

¹⁰ See pp.4-6 in Flanagan, Gregory, Hallisey, Heitgerd, & Lewis (2011). “[A Social Vulnerability Index for Disaster Management](#).” *Journal of Homeland Security and Emergency Management*, Vol 8, Issue 1.

3. HOW TO INTERPRET MAPS

Following the methodology outlined in the previous introductory section, Rutgers has created maps for the following areas:

- (1) The overall area comprising the four Wildwoods municipalities (Figures 1-7)
- (2) The entire Borough of West Wildwood (Figures 8-14)
- (3) The western part of the City of North Wildwood (Figures 15-21)
- (4) The northern part of the City of North Wildwood (Figures 22-28)
- (5) The northern part of the City of Wildwood (Figures 29-35)
- (6) The northeastern corner of the Borough of Wildwood Crest (Figures 36-42)

Rutgers created three types of flood hazard maps for each geographic area. The remainder of this section is dedicated to helping readers understand how to interpret each of the three kinds of maps. The maps themselves can be found in Appendix A on page 20 of this CVA.

Map Type 1 – First Flood Level Exposure

The first series of maps represent the lowest, and thus the first, floodwater levels to reach the center of each lot (parcel of real property) in Wildwoods. In other words, these maps show what level of MHHW analyzed (two-, three-, five- or seven-feet above MHHW) will first impact the centermost point of a given parcel. This is represented by four colored dots (see Figure A below). Note that, depending on the topography of a given parcel, the outer edges of a parcel may be impacted before the center of the parcel, such that the edges of a property may be inundated at a lower MHHW than Type 1 maps indicate.

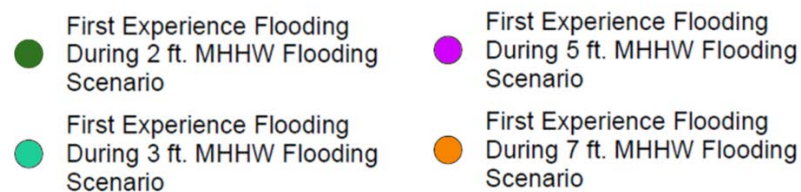


Figure A. The color coding assigned to Type 1 figures found in Appendix A.

The cooler dark green and teal colors (used to represent 2ft and 3ft flood scenarios, respectively) reflect the lower extremes of these predicted scenarios. However, it is important to note that flooding at these heights are also the most likely to occur, therefore making them the most dangerous scenarios in this analysis due to the higher frequencies of disruption. The warmer pink and orange colors represent the 5ft and 7ft flood scenarios, and were chosen to reflect the higher severity of the flooding at these levels, although they are less likely to occur. As such, flooding in these scenarios are also dangerous, but in terms of magnitude, rather than in frequency. As an illustrative example, flood scenarios are presented for Post Creek Bay, City of Wildwood. The first four panels in Figure B, below, represent flood inundation scenarios for the NJDEP-recommended water levels (i.e., 2-, 3-, 5-, and 7-foot MHHW). In each of these panels,

darker shades represent more intense flooding. The five parcels experiencing flooding during the 2ft MHHW flooding scenario are located along the water's edge, including the small island parcel that is fully inundated. These have a parcel centroid dot (as shown in the last panel of Figure B) that is green. The 3ft MHHW scenario shows inundation of four additional parcels marked by aqua centroids dots, while the 5ft MHHW scenario shows inundation of most of the parcels further inland, hence the numerous purple centroids. Two final parcels are inundated at the 7ft MHHW scenario, marked by orange-colored centroids in the lower left corner of the fifth panel.

When interpreting this map, bear in mind that the color of the centroid dot represents the **first** MHHW scenario which impacts the centroid of the parcel. In other words, the color is *not* intended to indicate the *only* MHHW scenario which impacts the property; a green centroid dot therefore indicates that its parcel would be inundated by the 2-, 3-, 5-, and 7-foot scenarios, while a purple dot indicates that its parcel would be inundated by the 5- and 7-foot scenarios.



Figure B. Displays how the four different flooding scenarios analyzed in this CVA can impact a given parcel based on the elevation of the property.

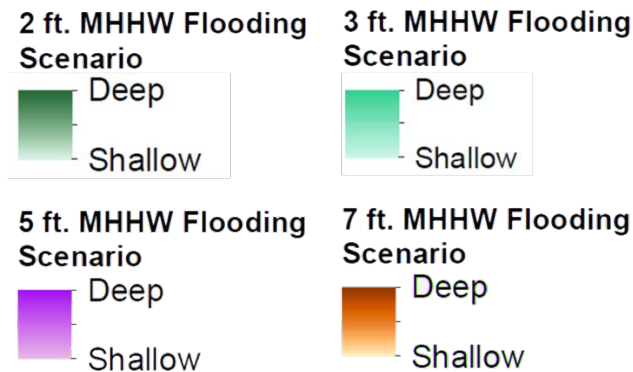
In summary, in Appendix A's Figures 2, 9, 16, 23, 30, and 36, if a parcel has a:

- Green dot ●, the center of the property will first experience flooding during the 2-foot MHHW flooding scenario;
- Blue dot ●, the center of the property will first experience flooding during the 3-foot MHHW flooding scenario;
- Magenta dot ●, the center of the property will first experience flooding during the 5-foot MHHW flooding scenario;
- Orange dot ●, the center of the property will first experience flooding during the 7-foot MHHW flooding scenario.

Map Type 2 – Spatial Extent of Flooding Scenarios

The second type of maps are more detailed than Type 1 maps and display the spatial extent of our four different MHHW scenarios (two-, three-, five- and seven-feet MHHW flooding scenarios). These Type 2 maps also show the property classification of each parcel (e.g., residential, commercial, etc.).

Each map in this category has a unique color coding that represents a given MHHW scenario, indicated below. Note that the darker shade in any given MHHW scenario represents deeper water at that specific location.



In each flooding scenario, unshaded areas are those areas that do not experience flooding under the specified flooding scenario.

Because these maps show some areas that are continuously under water (e.g. the ocean), some parts of the map have a water level greater than the inundation depth, to a maximum of 4.9 feet. Thus, for the 2-foot scenario, the color scale represents the range of depths from 6.9' (Deep) to 0' (Shallow) depth. Likewise, for the 7-foot scenario, the color scale represents 11.9' (Deep) to 0' (Shallow).

When referencing the classification of each parcel, please note that the classification "Public Property" refers to land that is owned by local, state, or federal entities for any purpose, including recreation, and/or space for critical infrastructure (e.g., water towers, police stations, municipal administration buildings).

Map Type 3 – FEMA Flood Zones in Area

The third type of map displays the spatial extent of flood zones along the coast, designated by the Federal Emergency Management Agency (FEMA). FEMA prepares Flood Insurance Rate Maps (FIRMs) illustrating the extent of flood hazards in flood-prone communities for flood insurance and risk assessment purposes.¹¹ To generate these maps, FEMA conducted engineering studies referred to as Flood Insurance Studies.

Using the information gathered in these studies, FEMA engineers and cartographers delineate Special Flood Hazard Areas (SFHAs) on flood maps. SFHAs are subject to inundation by floods that have a 1% or greater chance of being equaled or exceeded during any given year. This type of flood is commonly referred to as the 100-year flood, or the base flood. Areas inundated by these floods are identified on the FIRMs as Zones A, AE, AH, AO, AR, V, VE, B, and C. (An additional identified zone, X, is also mapped but is not part of the SFHA as it has a lower annual chance threshold of only 0.2%.) Only three of these zones are present in the Wildwoods, but all zones' descriptions are provided below for reference and ease of comparison.

¹¹ <https://www.fema.gov/sites/default/files/2020-07/how-to-read-flood-insurance-rate-map-tutorial.txt>

While these SFHAs regulate local, state, and federal management of coastal land development, the engineering studies upon which they are based may not have been updated to account for more recent research into climate change-related flood hazards. Therefore, the FEMA Flood Zone maps are meant to complement the maps of Water Levels above MHHW.

It is important to note a 100-year flood is not a flood that occurs once every 100 years. In fact, the 100-year flood has a 26 percent chance of occurring during a 30-year period. The 100-year flood is a regulatory standard used by Federal agencies and most states to administer floodplain management programs. The 100-year flood is used by the National Flood Insurance Program (NFIP) as the basis for insurance requirements nationwide.

The FEMA Flood Zone types are listed below. Only the **bolded Zones** are present within the Wildwoods:

- Zone A – The flood insurance rate zone that corresponds to the 100-year floodplains that is determined in the Flood Insurance Study by approximate methods. In these areas, detailed hydraulic analyses are not performed.
- **Zone AE - The flood insurance rate zone that corresponds to the 100-year floodplains that is determined in the Flood Insurance Study by detailed methods.**
- Zone AH - The flood insurance rate zone that corresponds to the areas of the 100-year shallow flooding with a constant water-surface elevation (usually areas of ponding) where average depths are between 1 and 3 feet.
- Zone AO - The flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet.
- Zone AR - The flood insurance rate zone that results from the decertification of a previously accepted flood protection system that is being restored to provide protection from the 100-year or greater flood event.
- Zone V - The flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Approximate hydraulic analyses are performed for such areas.
- **Zone VE - The flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Detailed hydraulic analyses are performed in this zone.**
- **Zones X – The flood insurance rate zones that correspond to areas outside the 100-year floodplains, areas of 100-year sheet flow flooding where average depths are less than 1 foot, areas of 100-year stream flooding where the contributing drainage area is less than 1 square mile, or areas protected from the 100-year flood by levees. Please note that Zone X is not an SFHA designated flood zone.**

The maps of Wildwoods provided in this document also make a distinction within SFHA's AE zones. AE is listed as either "AE: 1% annual flood chance" or "AE: Floodway." The "AE: 1% annual flood chance" zone is consistent with the AE description listed above, while "AE: Floodway" is specific to areas that a riverine floodplain depends on to carry deeper, faster moving water.¹² The distinction between these two types of AE zones is made clearer by the following explanation of an AE Floodway zone: "Buildings, structures, and other development activities –

¹² https://www.fema.gov/pdf/floodplain/nfip_sg_unit_5.pdf

such as fill – placed within [an AE Floodway] are more likely to obstruct flood flows, causing the water to slow down and back up, resulting in higher flooding [conditions].” An AE Floodway is also described as the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.¹³

For additional clarity, please note the “AE: 1% Annual Flood Chance” areas represent areas likely to experience a 100-year flood, while the “X zone” represents areas likely to experience a 500-year flood, which therefore are less prone to flooding.

In this analysis, the X zone is further categorized into “**X-minimal**” which is used for minimal flood hazard areas outside of the 0.2%-annual-chance (500-year) floodplain, and “**X-500 year**” for moderate flood hazard areas between the limits of the base flooding level and 500-year flood. Mandatory flood insurance is not required for either of the two X zone categories.¹²

¹³ <https://rrnm.gov/DocumentCenter/View/66104/FEMAInfo-LearnAboutSFHAs?bidId=>

COASTAL VULNERABILITIES ASSESSMENT

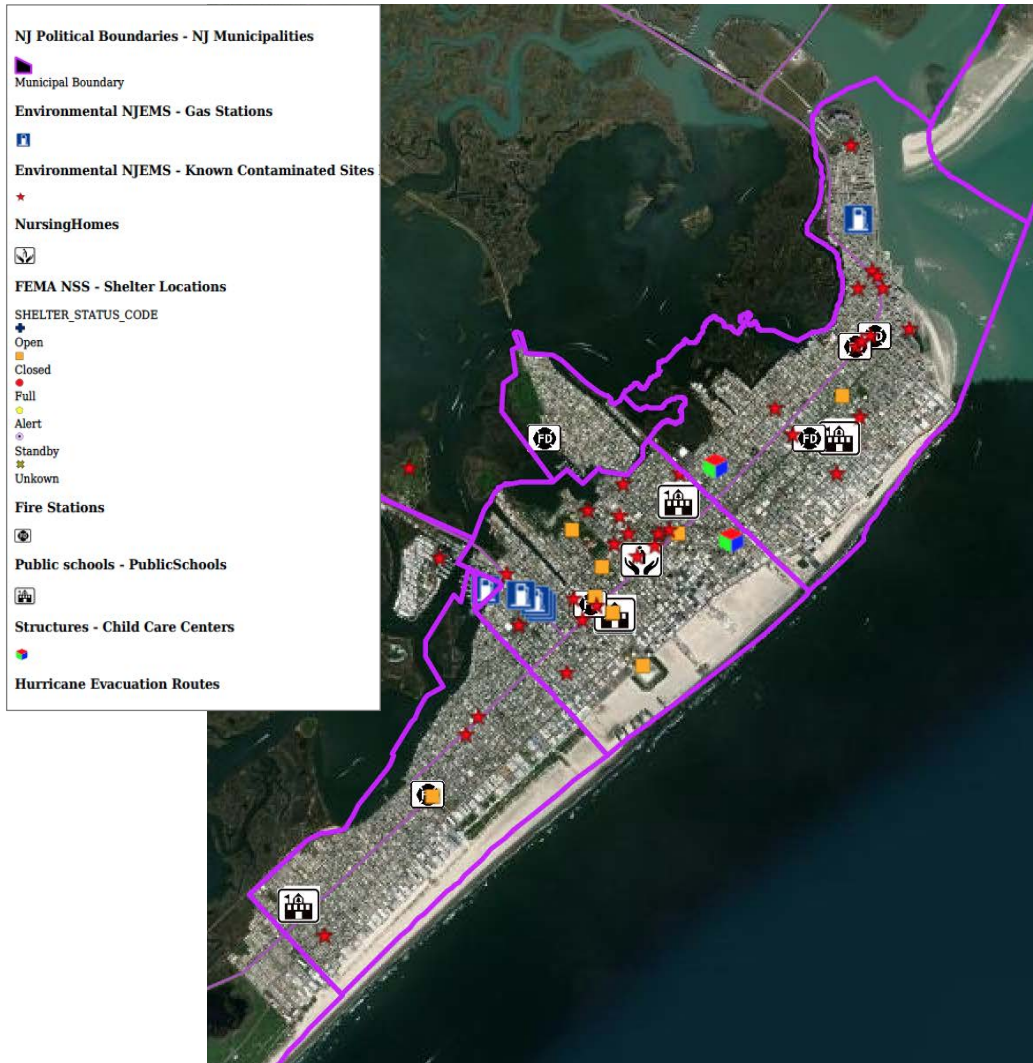


Figure C. Various facilities of the Wildwoods that will be discussed in this Physical Vulnerability section. Map generated through NJ Flood Mapper (<https://www.njfloodmapper.org/>).

Identified Exposures Summary

This assessment reveals patterns of flooding and its impacts on people and property at regional, municipal and neighborhood scales. At a regional spatial scale, three underlying patterns were observed:

- (1) Inundation begins bayside (closest to the wetland area and furthest from the coast) across all Wildwoods communities and spreads beachside with increasing MHHW (Figure 2).
- (2) Residential parcels are the most inundated property type across the Wildwoods (Figures 3 – 6), therefore a special emphasis is placed on residential properties in the sections below. Furthermore, non-residential parcels are scattered throughout each Municipality, except for the City of Wildwood which has a concentration of commercial parcels in the southern, beachside half. Residential areas are also important to consider in this analysis as they often serve as networks of mutual aid.¹⁴
- (3) There are only two areas that are expected to remain dry at the 7ft MHHW flood height. The first is the tip of North Wildwood City. A second area, much larger, is a strip of land in Wildwood Crest Borough's southeastern section. This area spans approximately 19 blocks in length and 3 blocks in width and contains a number of parks and green spaces (Sunrise at Rambler Road Park, Centennial Park, Higbee Field, and Scoop Taylor Park). It is also highly commercialized compared to the rest of the Municipality with many businesses operating in the tourism and hospitality sectors.

In addition to the regional Wildwoods inundation and property classification maps (Figures 1 – 7), Appendix A contains five close-up maps of areas of interest (AOI) consisting of: Borough of West Wildwood (Figure 8 – 14), the northwestern (Figures 15 – 21) and northeastern section of North Wildwood City (Figures 22 – 28), the northern section of Wildwood City (Figures 29 – 35), and the northeastern section of Wildwood Crest Borough (Figures 36 – 42).

All areas of interest were selected because properties located here were shown to be inundated in a 2ft MHHW flood scenario, and thus at most-immediate risk. The Borough of West Wildwood differs from the other Areas of Interest as the entire municipality was selected as an area of interest, as opposed to a section. This is because our analysis shows it is almost entirely inundated at the lowest (and most likely to occur) MHHW flood scenario of 2ft, compared to the other Wildwoods municipalities which are only partially/minimally inundated at this flood height. Additionally, the Borough of West Wildwood is home to the highest percentage of vulnerable populations (Figure F).

¹⁴ Research indicates this may be vital in disaster scenarios: Linda Cheshire (2015), [‘Know your neighbours’: disaster resilience and the normative practices of neighbouring in an urban context](#). *Environment and Planning*, Vol 47, Iss 5.

Physical Exposure & Vulnerability

a. Risk to Properties and Residential Neighborhoods

In all four Wildwood municipalities, properties classified as residential are disproportionately affected across the different flood scenarios compared to other property classifications (46% of total affected properties at 7ft MHHW, **Table 1a**). The most vulnerable residential areas are located in the Borough of West Wildwood, which is almost fully inundated in a 2ft flood scenario and has the highest proportion of affected residential properties at this flood height (73% of total affected properties, **Table 1a**).

Moving south, the baysides of the City of North Wildwood, the City of Wildwood, and the Borough of Wildwood Crest are also susceptible to inundation at 2ft and 3ft MHHW flood scenarios. Flooding appears to impact the bayside of Wildwoods first before expanding beachside in the higher MHHW flood event scenarios. As such, all properties bayside of New Jersey Avenue, which runs horizontally across Wildwoods, are especially vulnerable to flooding (area contains 40% of total properties). Out of 5,216 properties located in this high-risk region of Wildwoods, 83% are residential, 7.1% are vacant land, 4.4% are commercial and 3.3% are public property.

b. Affected Residential Areas by Municipality

The residential properties are concentrated in the eastern half of the Borough of West Wildwood, and the rest is vacant and developable land. Though the streets have been raised since the 1990s due to flooding, roads and the properties nearby are still subject to flooding with manholes that sit on pilings, which are about 6 inches above the roadway. Most residential properties in the borough are fully inundated under a 2-foot MHHW flooding scenario (Figures 10).

Most of the properties in the City of North Wildwood are residential. The bayside of the municipality experiences flooding at a 2-foot MHHW scenario. The residential properties built upon the low-lying area between 19th and 26th Avenue are most vulnerable to flooding (Figures 17). There are no bulkheads along the bayside between Mud Creek and Beach Creek (east of Otters Basin), and so the residential neighborhood is especially vulnerable to rising sea levels. The properties situated along Beach Creek are also vulnerable to flooding (Figures 23, Figure 24). Under the 5-foot MHHW scenario (Figure 26), properties east of New Jersey Avenue facing the beachside start to see flooding, and 2,137 properties out of 2,838 are likely to be submerged.

The City of Wildwood's residential properties are concentrated on the bayside of the municipality. The residential areas adjacent to Ottens Harbor have the greatest flood exposure. Out of 1,751 properties, 1,474 are inundated in a 5-foot MHHW

scenario. All residential properties are completely submerged in a 7-foot MHHW scenario.

The Borough of Wildwood Crest, on the other hand, starts to see distinct flooding in a 3-foot MHHW scenario. The residential properties along Lake Road, which is in the northern section of the borough, experience the most flooding exposure (Figures 36 - 42). The properties near West Washington Avenue on the east section of the borough also start to experience flooding in a 5-foot MHHW scenario. The flooding spreads from those two neighborhoods towards the beachside with rising sea levels.

c. Economic Corridors & Commercial Areas

Largely geared towards tourism, major attractions in Wildwoods mostly concentrated in the City of Wildwood and consist of: The Wildwood Boardwalk, Doo Wop Experience Museum, Morey's Piers and Beachfront Water Parks, Ocean Oasis Water Park + Beach Club and Gateway 26. Hereford Inland Lighthouse is also a major tourist attraction. All of these businesses and attractions would be partially inundated in a 3ft flooding scenario and fully inundated under a 5ft MHHW scenario. Generally businesses in the City of Wildwood fan out from New Jersey Avenue towards the south and along the beachside.

Most of the commercial areas in the City of Wildwood are vulnerable to flooding and the City's has the highest number and proportion of at-risk commercial properties across all MHHW flooding scenarios. At 2, 3, 5, and 7ft scenarios, the proportion of properties affected on parcels designated as commercial are 6.8%, 4%, 6.0% and 9.5%, respectively (Table 1a). Local businesses along the coast in the City of Wildwood and a few recreational centers are impacted in a 3-foot MHHW scenario. The majority of commercially designated parcels are located in the City of Wildwood and would start to see major inundation under a 5ft MHHW scenario. All commercial entities in West Wildwood are inundated under a 2ft flood scenario. The bayside of Wildwoods experiences greater inundation than the beachside of Wildwoods under all flooding scenarios. At a 5ft MWWH scenario or greater, businesses along the coast, the majority of which operate in hospitality, are likely to be inundated.

Furthermore, estimates of the net values and number of properties impacted by the various flooding scenarios (i.e., 2-, 3-, 5-, and 7-foot MHHW flooding events) are outlined in Table 3 of Appendix A (found on page 76 of this assessment). Of note from Table 3 is a 2-foot MHHW flooding event could impact Wildwoods properties with a net value of over \$16 million (affecting 36 parcels). The majority of these properties that are likely to experience damage are located in the City of Wildwood with \$12 million of property at-risk. Wildwood Crest, the Borough of West Wildwood and the City of North Wildwood each contain \$1.0 million, \$1.6 million, and \$1.4 million, respectively, in properties at-risk. A 7-foot MHHW flooding

scenario could impact properties with a net value over \$659 million (affecting 705 parcels).

Please note that exposures in this analysis are not the same as estimated damages that might occur from a flood event. There are two important caveats to this exposure analysis which are also important to keep in mind when viewing tables 1a, 1b, 2a, and 2b in Appendix A.

1. **Property values may not reflect market rate transactions.** Economic exposure values are based on New Jersey's MOD-IV taxation database, and do not reflect the current property real estate transaction values of residential properties. The net values used in this assessment were published in 2014-2018 by the NJ Office of Information Technology's Parcels Normalization Project and most recently updated in July of 2019.
2. **Exposures are not estimates of damage.** Exposures indicate that water covers the estimated ground surface at the center of a parcel during a given flood event. The Rutgers analysis does not consider housing elevations using pilings or other structural flood mitigation actions that could substantially reduce residential damages. More detailed and site-specific hazard modeling is required to estimate event-based damages.

d. Critical Infrastructure

Critical infrastructure for the purposes of this analysis consists of assets that are crucial to the day-to-day functioning of the municipality as well as during extreme weather events. The critical infrastructure such as shelters are largely concentrated in the City of Wildwood, followed by the City of North Wildwood (Figure C). The location of this infrastructure is prone to flooding at the 2ft and 3ft MHHW levels and would be fully inundated at a 7ft MHHW. At a 3ft MHHW the majority of fire stations are also at risk of being inundated, with the exception of two stations, one of which is located in the City of Wildwood and the other in Wildwood Crest. Two of the City of North Wildwood's fire stations would be fully inundated and the third partially, while the sole fire station located in West Wildwood would be fully inundated.

Gas Stations are concentrated in the northeast section of City of Wildwood in close proximity to Route 47 and one in the City of North Wildwood. At a 3ft MHHW all gas stations in the Wildwoods would be inundated. Furthermore, all hurricane evacuation routes, save for Route 47 connecting to the City of Wildwood and Route 147 connecting to the City of North Wildwood will be below water at 2ft MHHW. Under a 7ft MHHW scenario, only Route 147 will be accessible though with shallow, partial inundation along the path.

e. Natural Resources

Before the modern-day development of Wildwoods as a resort town, the area was known for its natural beauty, hence the area's current name. Marshes, tidelands and wetlands still remain and dominate the back bay region between the four municipalities and the Garden State Parkway.

Because the Wildwoods municipalities' collective jurisdiction is geographically limited to the barrier island itself, most of the back bay wetlands are the jurisdiction of Lower Township and Middle Township. Nevertheless, the Wildwoods include the following wetlands¹⁵:

- Ephiram Island -- within the Borough of Wildwood Crest.
- Unnamed wetland between W Andrews Ave, Mediterranean Ave, and Rte 47-Wildwood Blvd -- in City of Wildwood.
- Drum Creek wetlands and adjacent wetlands along the margins of Post Creek Basin -- in Borough of West Wildwood.
- Wildwood Canal wetlands -- in West Wildwood.
- Mud Creek wetlands -- in West Wildwood and City of North Wildwood.
- Wetlands at the southern part of Anglesea Marsh, between Ottens Basin, Oyster Creek, and Hoffman Canal -- in City of North Wildwood.

As shown in Figure D below, these wetlands do not greatly overlap or impede existing development, therefore state and federal regulations for protecting wetlands are not an immediate development issue for most land and home-owners. However, considering that majority of flood inundation is predicted to occur on the bayside of the four municipalities, it is worth exploring the uses of blue-green infrastructure solutions and targeted habitat restoration to minimize flood risk through natural water retention and absorption. Due to the flood hazard impacts on the Wildwood communities, a combination of green infrastructure (i.e. oyster breakwater reefs, marsh grass restoration), gray infrastructure (i.e. pervious pavement and roads, levees), and policy infrastructure (i.e. managed retreat and property elevation mandated through floodplain ordinances and supported by funding programs) may be considered, as one approach alone may not be effective enough in minimizing disaster risks and/or increasing the adaptive ability of the communities against future disaster events.

¹⁵ Identified from the National Wetlands Inventory interactive map <<https://www.fws.gov/wetlands/data/mapper.html>> published by the US Fish & Wildlife Service.

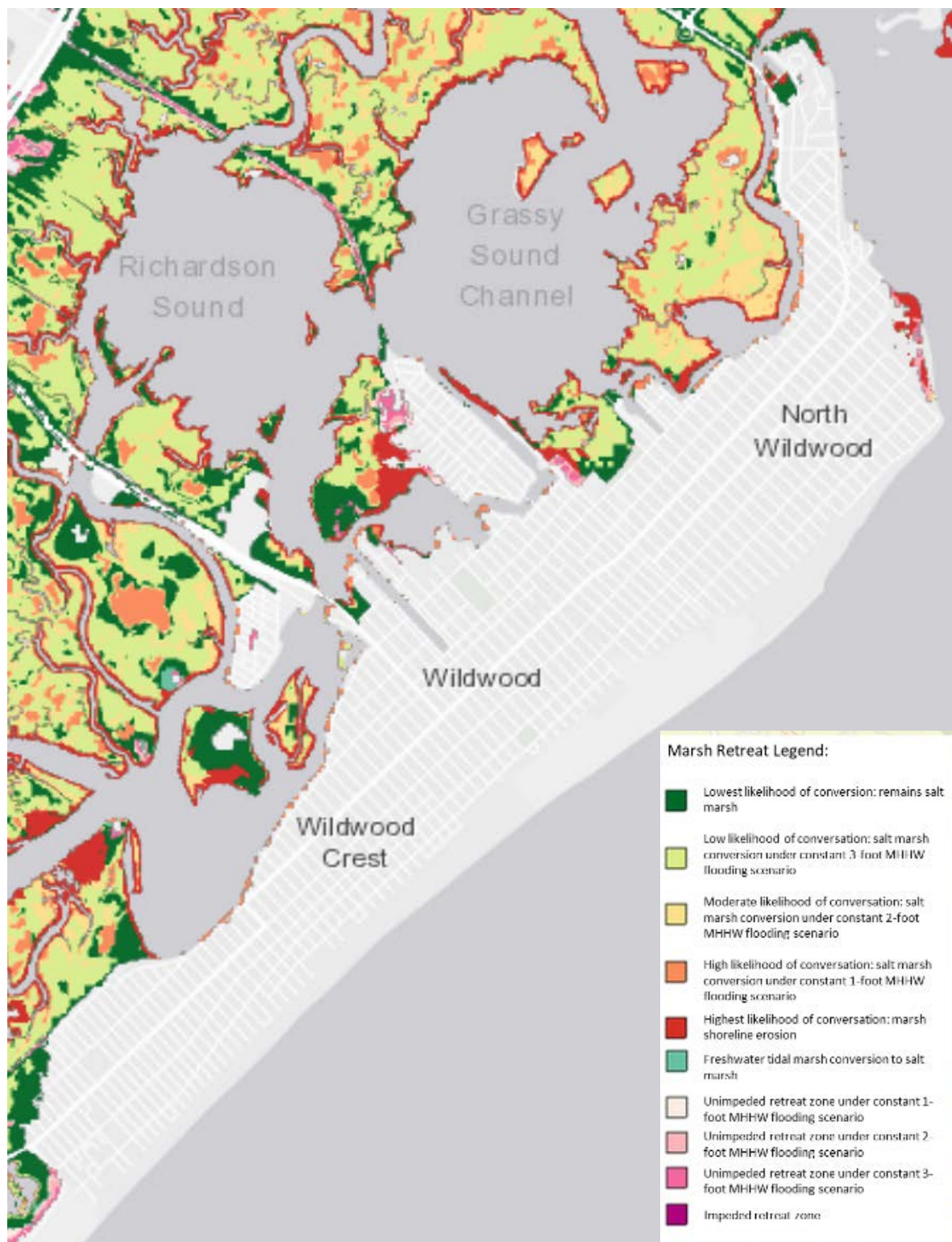


Figure D. A modified map generated using NJFloodMapper.org displays how coastal land cover is expected to change as a result of prolonged floodwater inundation in the coastal zone.

Social Exposure & Vulnerability

a. Minority Status & Communication Barriers

Minority Status and Language is one of the domains that serve as the basis of the Social Vulnerability Index (SVI), comprising of race, ethnicity, and English language proficiency variables.¹⁶ Certain racial and ethnic groups are usually more vulnerable to flooding as they are socially and economically marginalized.¹⁷ For instance, disaster communication becomes a challenge to those with limited English proficiency, making them more vulnerable to flooding.

Individuals with minority status in Wildwoods are all somewhat vulnerable to flooding, while those in the City of Wildwood and Borough of West Wildwood are the most impacted. Out of 5,449 individuals in the City of Wildwood and Borough of West Wildwood, 1,433 individuals with minority status are vulnerable to flooding (see Table 4).

b. Households & Mobility

Household Composition and Disability is another domain that form the basis of the SVI that comprises of age, single parenting, and disability variables. Those aged 65 years and older, children less than 18 years of age, single-parent households, and people with disabilities are usually the groups more vulnerable to disasters and require more financial support, medical care, or assistance with activities of daily living.

North Wildwood City and the Borough of Wildwood Crest are identified with the largest number of elderly populations exposed to flooding events. In the City of North Wildwood, 1,518 individuals aged 65 or Older are vulnerable to flooding out of 3,849 individuals. In the Borough of Wildwood Crest, 1,133 individuals aged 65 or older out of 3,131 are exposed to flood events. The elderly population (aged 65 or older) in the City of North Wildwood are especially vulnerable to flooding; 121 individuals experience flooding in a 2ft MHHW scenario, and 364 experience flooding in a 3ft MHHW scenario in the City of North Wildwood, whereas in the

¹⁶ <https://svi.cdc.gov/A%20Social%20Vulnerability%20Index%20for%20Disaster%20Management.pdf>; all explanations of the domains – Minority Status and Communication Barriers, Households and Mobility, and Socioeconomic Status, are cited from the study “A Social Vulnerability Index for Disaster Management.”

¹⁷ Throughout this section, the City of Wildwood and Borough of West Wildwood will be considered as a single unit of analysis due to how the census tracts are delineated in the study area of Wildwoods. Census tract 214 encompasses both the City of Wildwood and Borough of West Wildwood and Census tract 215 covers a portion of City of Wildwood. Hence, an aggregate number of individuals in both City of Wildwood and Borough of West Wildwood is examined in this section.

Borough of Wildwood Crest, 13 individuals and 65 individuals experience flooding in a 2ft- and 3ft MHHW scenario respectively (see Table 4).

Moreover, Housing and Transportation, which comprises of housing structure, crowding, and vehicle access variables, also contributes to the SVI. When evaluating disaster vulnerability, housing quality is an important factor as it closely relates to personal wealth. In other words, those who live in mobile homes or poorly constructed houses are especially vulnerable to flooding events. Also, multi-unit housing in urban areas that are density populated poses more risk for tenants.

All four municipalities in Wildwoods are not particularly vulnerable to flooding due to housing type and transportation variables. City of North Wildwood show the highest number of multi-unit structures and mobile homes constructed with 794 of multi-unit structures and 15 mobile homes, of which 7% of the multi-unit structures are inundated in a 2-ft MHHW scenario and 75% are inundated under a 7-ft MHHW scenario (see Table 4).

c. Socio-Economic Status

Socioeconomic Status contributes to the basis of the SVI through evaluating the variables related to income, poverty, employment, and education. Those who are below the poverty rate, unemployed, and with no high school diploma are identified in this section. Economically disadvantaged populations are severely affected by disasters such as flooding events and they have less of the capacity to prepare for disaster events nor recover from them. The relationship between vulnerability to disaster and education is less explicit. However, education is understood as being associated with income and poverty; those with lower educational attainment have limited access to information to prepare and recover from disaster events.

The City of Wildwood and Borough of West Wildwood have the largest number of individuals below poverty and low educational attainment (with no high school diploma) exposed to flood events. Out of 5,449 individuals, 1,273 are identified to be below the poverty line and 562 individuals have no high school diploma (see Table 4).¹⁸

¹⁸ The number of individuals under the poverty line in Census Tract 214, encompassing both the Borough of West Wildwood and City of Wildwood, was significantly larger than those in Census Tract 215 that includes a portion of the City of Wildwood. There were 989 individuals who were below the poverty line in Census Tract 214, whereas in Census Tract, 215, there were 294 individuals below poverty.

d. Health Impacts

Overall health impacts of flooding include but are not limited to poor mental health, increased risk of waterborne and mosquito-borne disease, mold, and injury. Routes of exposure include dermal, oral, and inhalation. Potential hazardous sources might include debris, exposed soil, contaminated drinking water or tap water, and air pollution that contains heavy metal, *E. coli*, etc. The elderly and children are the most vulnerable populations. Poorer residents may also lack health coverage to seek medical attention after a flooding event and are, therefore, also vulnerable.

In Wildwoods, there are 560 properties in areas that are classified as low-income and minority households across all four municipalities via the 5-year ACS Data 2015 to 2019: this is a type of overburdened community. Under a 2-foot MHHW flooding scenario 0.18% of properties are inundated while under a 7-foot MHHW flooding scenario 98.75% of properties are inundated (Table. 3). Special attention should be paid to these properties to ensure residents are aware of the health and financial resources available to them after a flooding event.

e. Social & Cultural Spaces

Social infrastructure includes all public and quasi-public space that provides services to the community or improves social cohesion. Small businesses, parks and open space, schools, places of worship, senior centers, health care facilities, and historical structures are examples of social infrastructure found in Wildwoods.

The open field stadium associated with Byrne Community Center in the City of Wildwood is also partially inundated under a 2-foot MHHW scenario and fully submerged under a 5-foot MHHW scenario. The open spaces along the beachside start to see flooding in a 5-foot MHHW flooding scenario. During the 7-foot MHHW scenario, parks and open spaces in the City of North Wildwood and the City of Wildwood are mostly inundated, and the ones in the Borough of Wildwood Crest are partially impacted.

Several Wildwoods community facilities are vulnerable to flooding. For instance, as mentioned earlier, the Byrne Community Center and the Wildwood recreation Center are located near the bayside of the City of Wildwood, which is subject to flooding in a 2-MHHW scenario. Other community facilities nearer to the beachside of the Borough of Wildwood Crest and the City of Wildwood —namely, the Crest Pier Community Center and Greater Wildwood Jaycees—are also vulnerable under a 3-foot MHHW flooding scenario.

Most open spaces are concentrated along the beachside of Wildwoods and a few in the bayside of the City of Wildwood and the City of North Wildwood. Open spaces along the bayside start to see flooding at a 2-foot flooding scenario. In the City of North Wildwood, Allen Recreational Park and Allen Memorial Park are in low-lying areas and are completely submerged under a 5-foot MHHW scenario.

Furthermore, regarding historic preservation sites, Wildwoods has many contributing properties, all of which are somewhat vulnerable to the coastal flooding scenarios analyzed in this report.¹⁹ Amongst the historic places in Wildwoods, five are listed in the National Register of Historic Places: J.Thompson Baker House and Marine National Bank in the City of Wildwood, Chateau Bleu Motel and Hereford Lighthouse in the City of North Wildwood, and Caribbean Motel in the Borough of Wildwood Crest. All five historic sites are located closer to the beachside of Wildwoods and are impacted during either 3- or 5-foot MHHW flooding scenarios.

Generally, properties within the linear “Wildwoods Shore Resort Historic District”²⁰ are exposed at 7 feet MHHW -- or just below it (and thus classified as being impacted at 5 feet MHHW). Property exposure to flooding is not distributed evenly throughout the District; instead, it is tightly concentrated at the northeast end of this Historic District between Andrews Ave and Buttercup Road, and also loosely concentrated at the southwest end between Stockton Rd and Topeka Ave.²¹

¹⁹ <http://wildwoodnjhistory.com/>

²⁰ bounded approximately by E Andrews Ave, Atlantic Ave, & the boardwalk/Beach Ave

²¹ See Figure 3 in O’Lear (2022), [Historic Preservation and Climate Change](#)



Figure E. This map shows Overburdened Communities (OBC) at the geographic level of census Block Group. All five of the City of Wildwood's block groups meet one or two criteria for OBC, while the City of North Wildwood, the Borough of Wildwood Crest, and the Borough of West Wildwood have respectively two, one, and zero block groups meeting the criteria. This map is copied from the [New Jersey Environmental Justice Mapping Tool](https://www.nj.gov/dep/ej/communities.html). See <https://www.nj.gov/dep/ej/communities.html> for more information on OBC criteria.

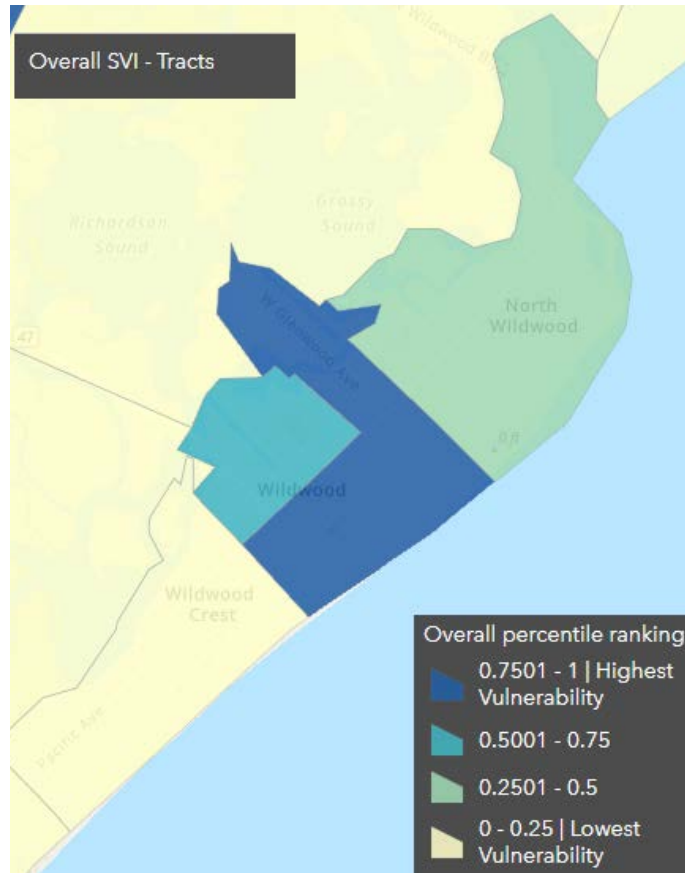


Figure F. This map, derived from [census bureau 2018 ACS data](#), is for illustrative purposes only and shows the percentile ranking of social vulnerability index scores by census tract.

For additional information regarding these social vulnerability indicators within Wildwoods, please refer to **Figure G** which illustrates a breakdown of each Social Vulnerability Indicator theme (Socioeconomic, Household Composition/Disability, Minority/Language and Housing/Transportation) at the scale of census tracts. **Table 4** provides an estimated demographic breakdown of the number of individuals, households, or counts impacted by a 2-, 3-, 5-, and 7-foot flooding event in urban areas of Wildwoods utilizing 2018 CDC Social Vulnerability Index data. For example, Census Tract 213 encompassing the City of North Wildwood has the lowest number of single parent households (14) that would be affected at a 7ft MHHW flooding scenario, whereas the highest number of affected single parent households (97) are in Census Tract 214 which covers all the Borough of West Wildwood and part of the City of Wildwood. Furthermore, within Census Tract 213 - North Wildwood, the largest number of individuals who would be affected by flooding in a 2ft MHHW scenario are the elderly (aged 65 years and older) with 122 individuals affected. Within Census Tract 214, individuals living below the poverty line (141) would be the hardest impacted in the same 2ft MHHW flooding scenario. At a 7ft MHHW flood scenario most census tracts are inundated in Wildwoods at a 2ft MHHW scenario certain demographics are more likely to be affected by flooding than others. Table 4 provides a more in depth overview of the data and socially vulnerable groups at each flood height scenario within each census tract.

APPENDIX A:

Wildwoods Flooding Hazard Maps and Data

Map Series List:

All Four Wildwoods (Figure 1 through Figure 7)

Detailed Maps:

Borough of West Wildwood (Figure 8 through Figure 14)

Western part of North Wildwood City (Figure 15 through Figure 21)

Northeastern corner of North Wildwood City (Figure 22 through Figure 28)

Northern section of Wildwood City (Figure 29 through Figure 35)

Northeastern corner of Wildwood Crest Borough (Figure 36 through Figure 42)

Tables List:

Table 1a. Net Number of Properties Affected by 2-, 3-, 5-, and 7-Foot Flood Hazard Levels

Table 1b. Net Value of Properties Affected by 2-, 3-, 5-, and 7-Foot Flood Hazard Levels

Table 2a. Net Number of Properties within FEMA Flood Zones

Table 2b. Net Values of Properties within FEMA Flood Zones

Table 3. Overburdened Communities by Municipality

Table 4. Socially Vulnerable Communities by Themes and Census Tract

All Four Wildwoods (Figure 1 through Figure 7)



Figure 1a. Reference map to help readers orient themselves to Figures 2 through 7.

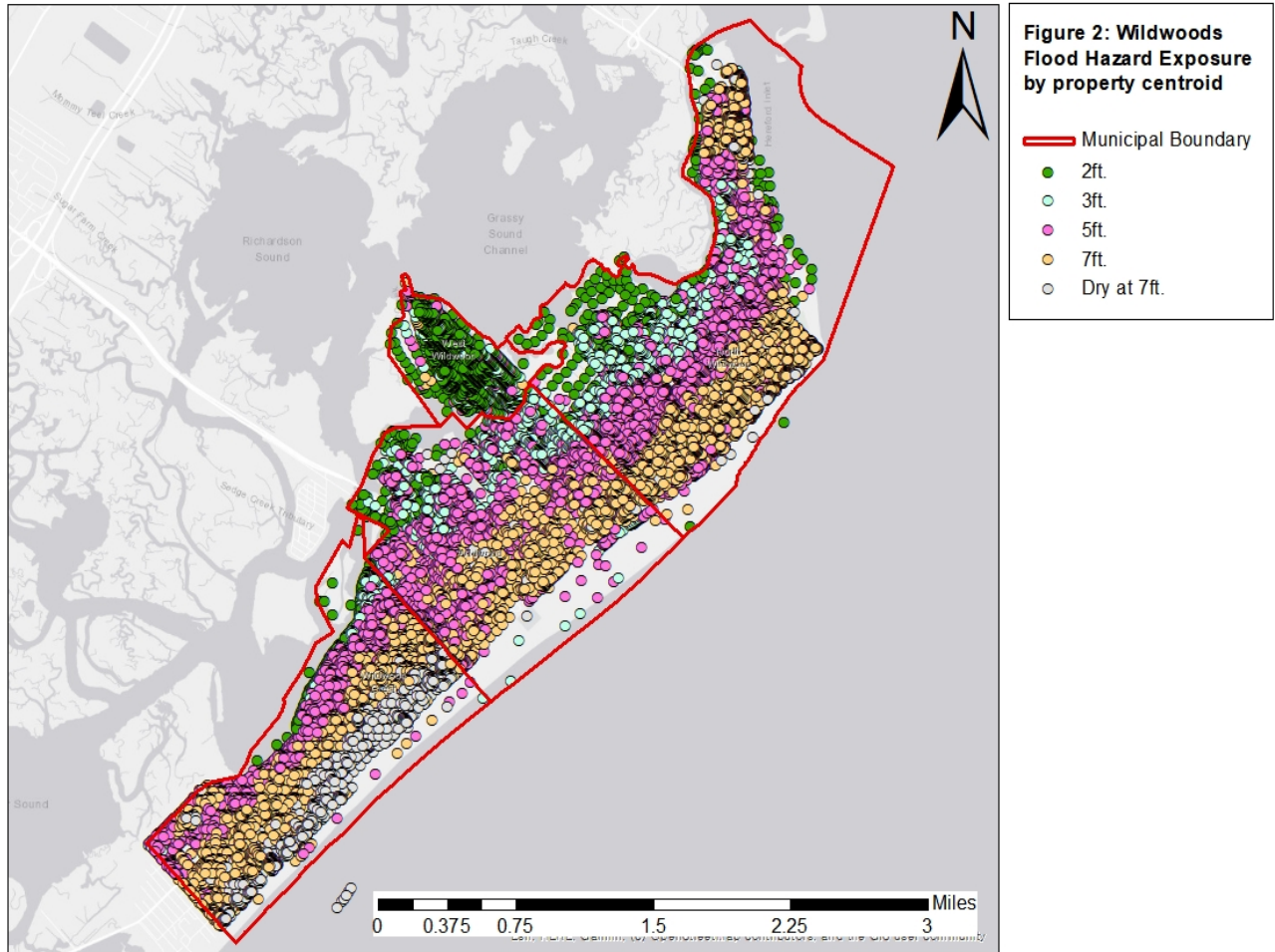


Figure 2. Wildwoods Flood hazard exposure.

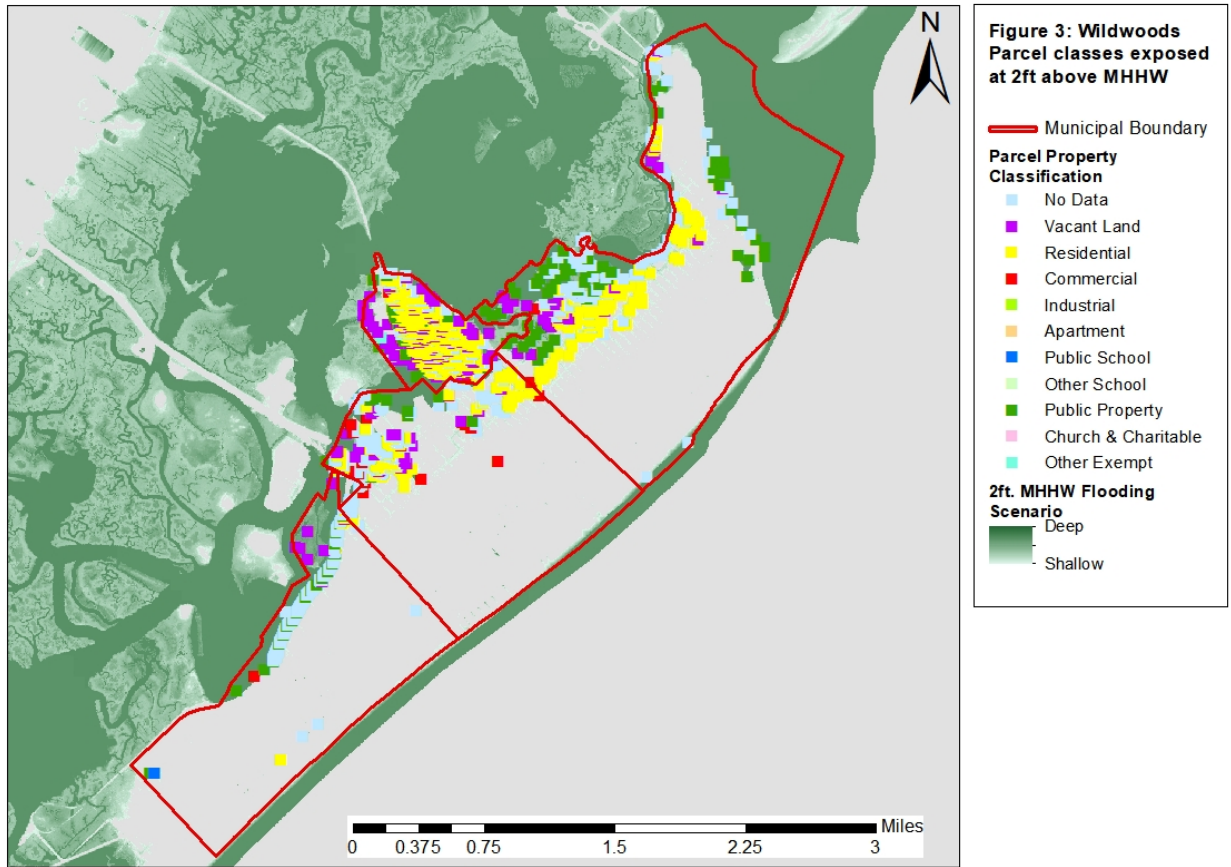


Figure 3. Coastal Flooding vulnerability under 2-foot MHHW flooding scenario.

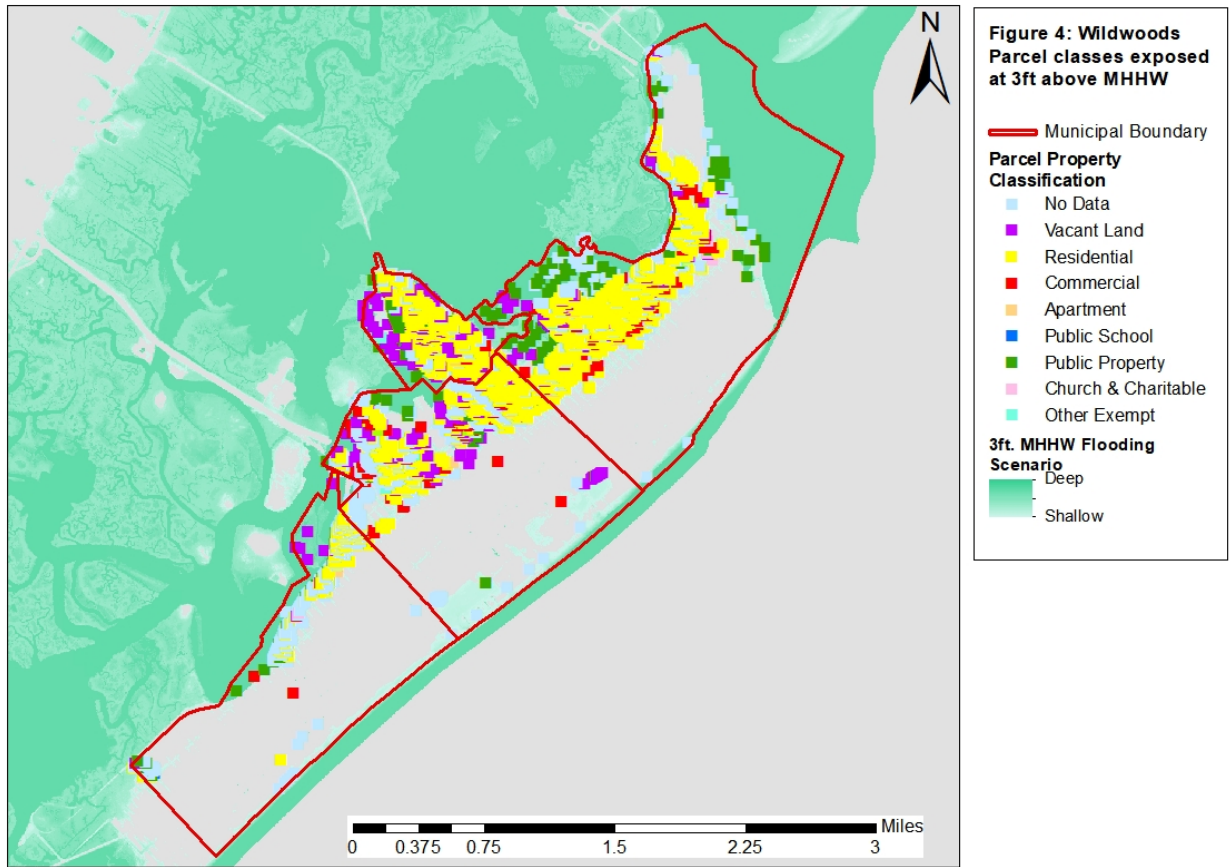


Figure 4. Coastal flooding vulnerability under 3-foot MHHW flooding scenario.

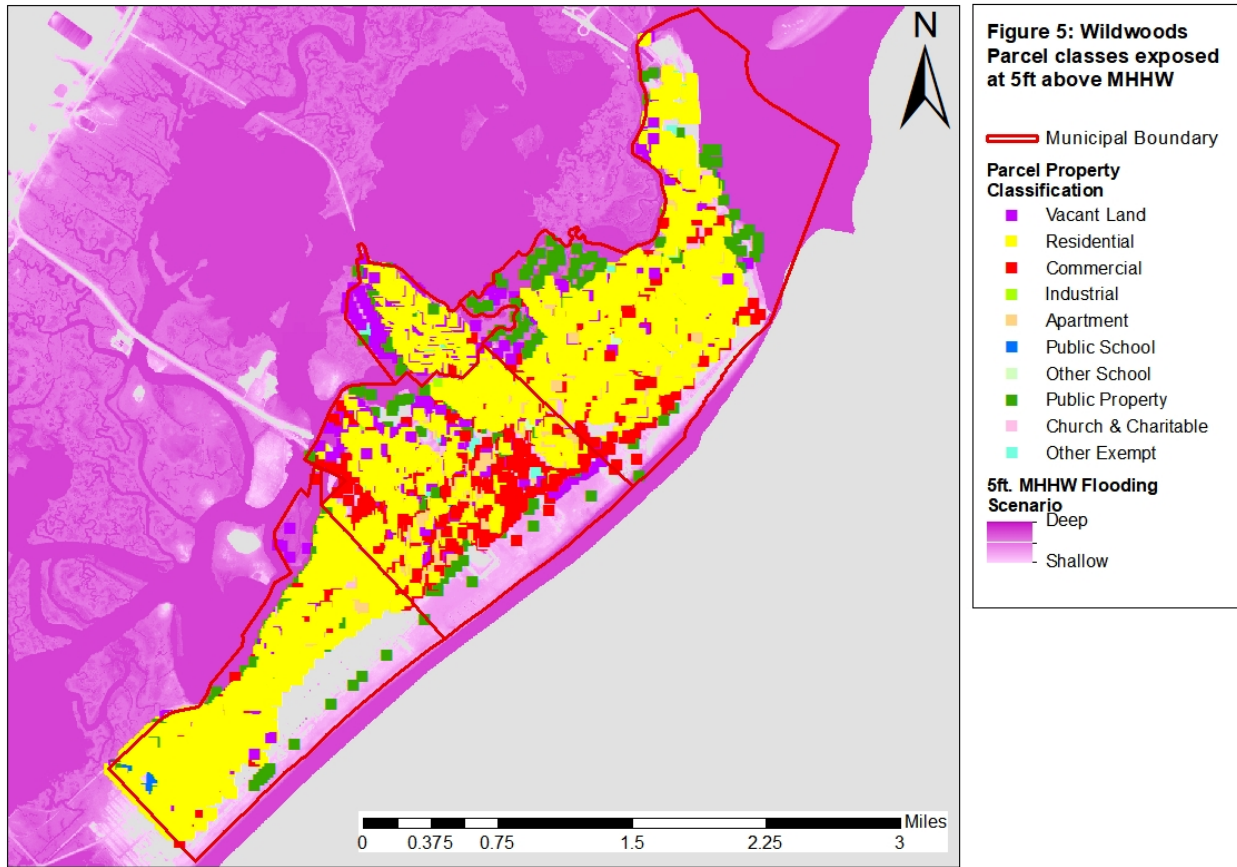


Figure 5. Coastal flooding vulnerability under 5-foot MHHW flooding scenario.

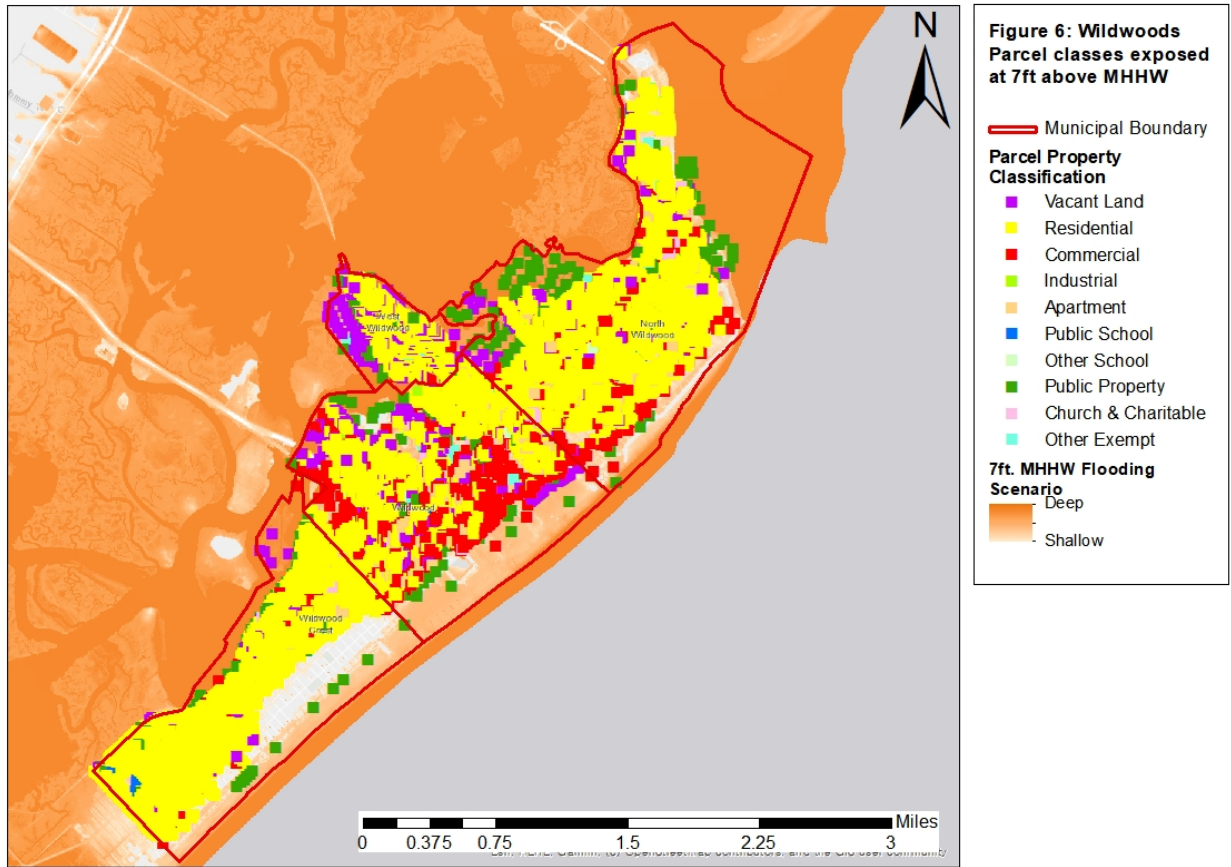


Figure 6. Coastal flooding vulnerability under 7-foot MHHW flooding scenario.

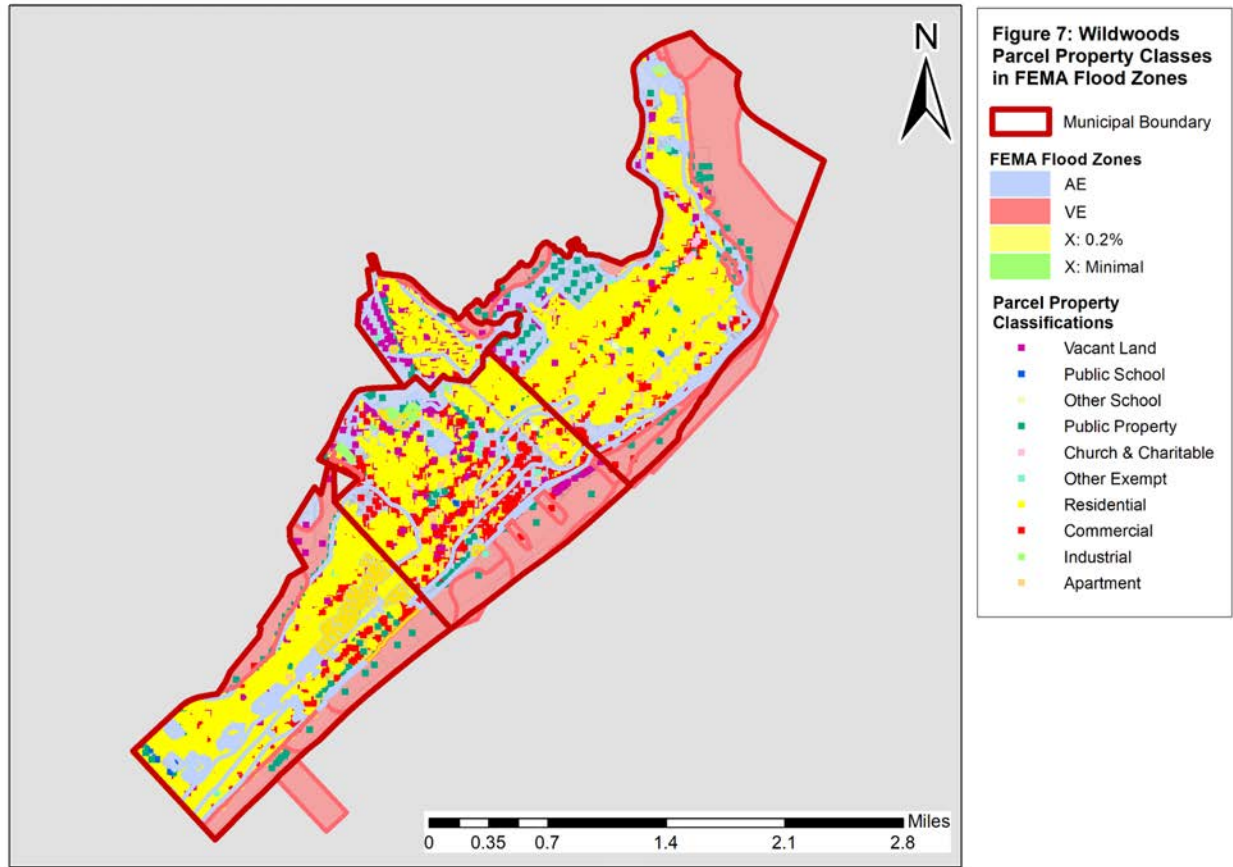


Figure 7. Wildwoods Parcel Property Classes within FEMA Flood Zones

West Wildwood Borough (Figure 8 through Figure 14)



Figure 8. Reference map courtesy of Google Maps for Figures 9 through 14. The purpose of this map is to help readers orient themselves to Figures 9 through 14 which do not have labeled landmarks.

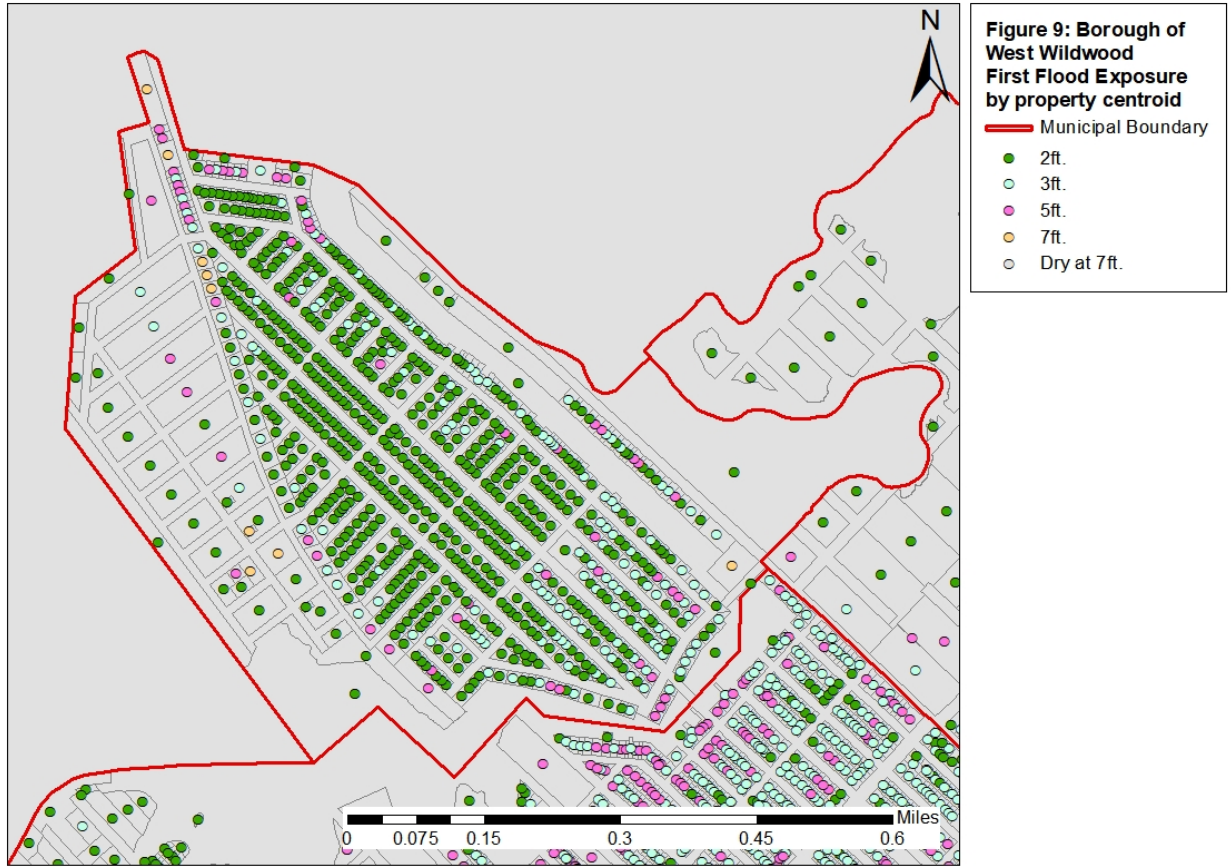


Figure 9. Planning benchmarks for inundation in West Wildwood Borough

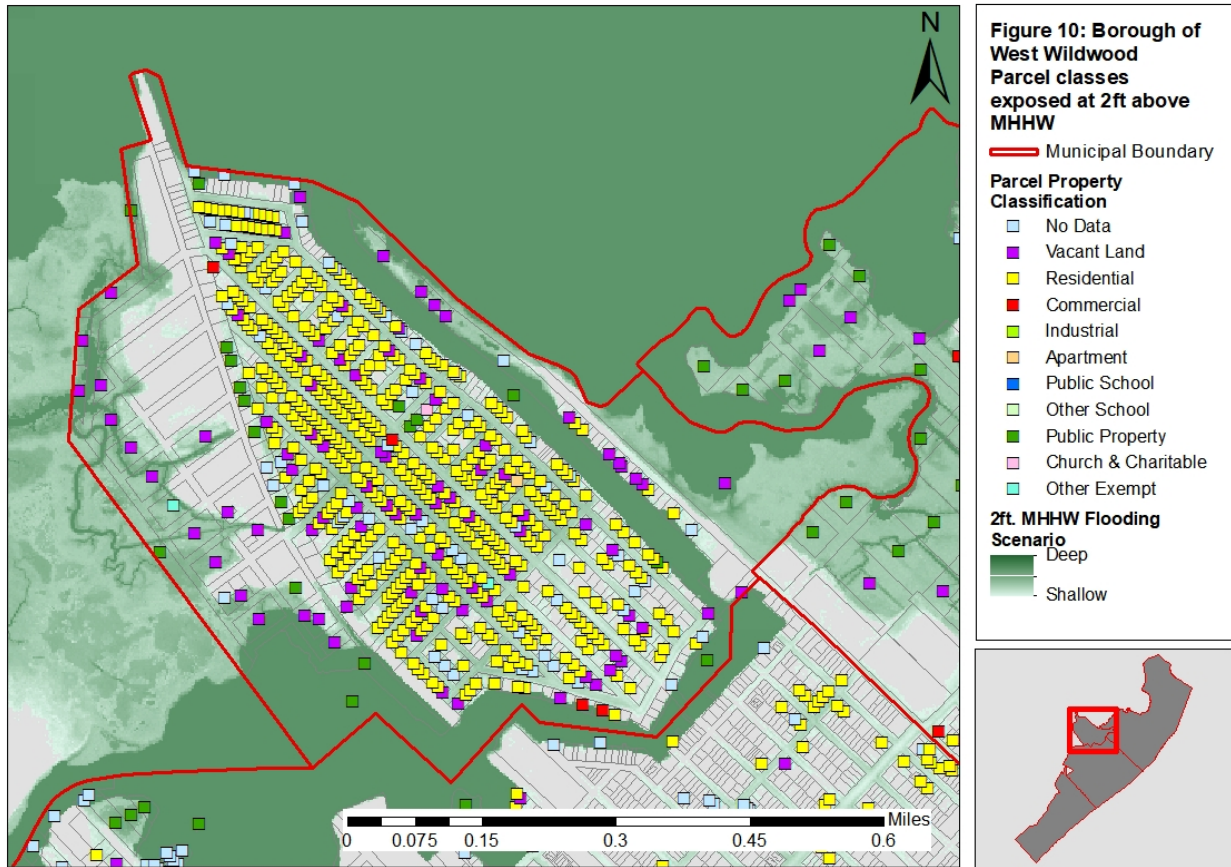


Figure 10. West Wildwood Borough Vulnerability Under 2-Foot MHHW Flooding Scenario. (Note: Out of 885 properties, 671 get submerged in a 2-foot MHHW flooding scenario in West Wildwood Borough.)

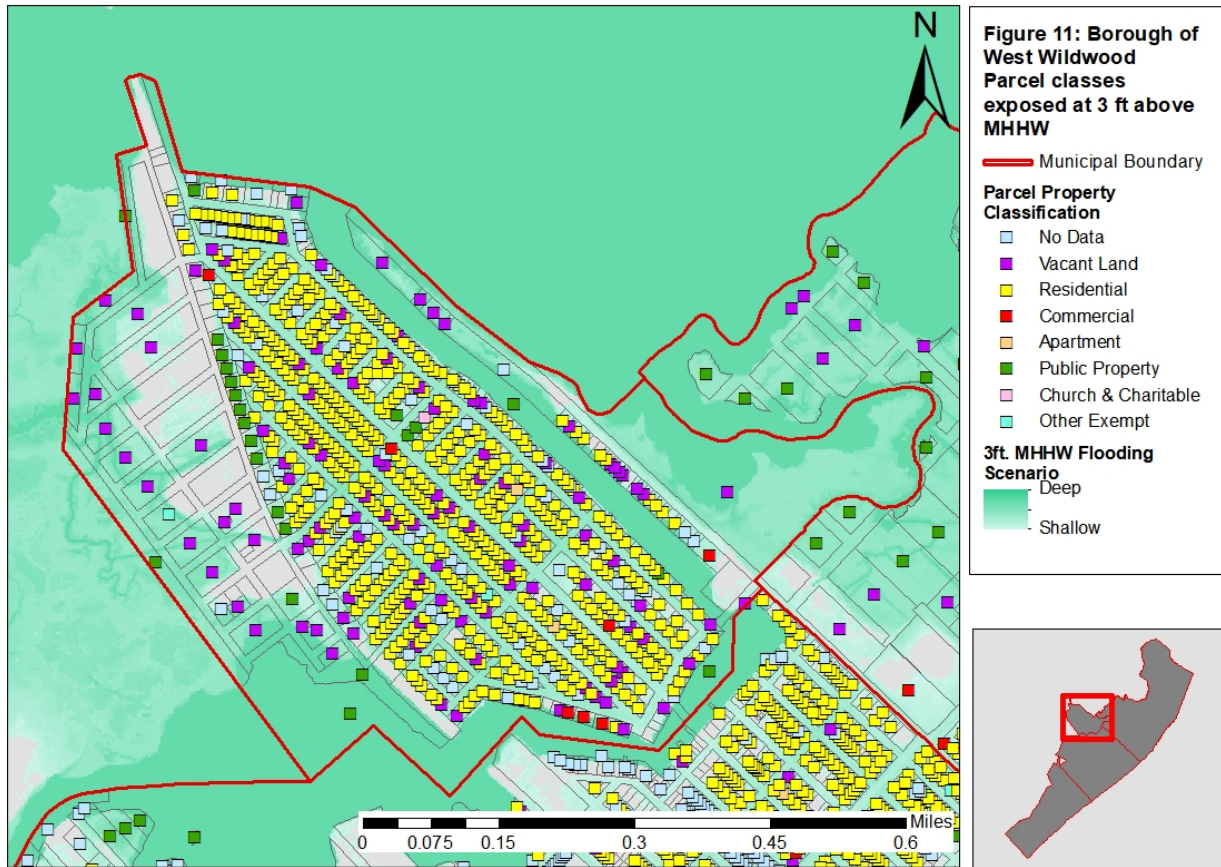


Figure 11. West Wildwood Borough Vulnerability Under 3-Foot MHHW Flooding Scenario

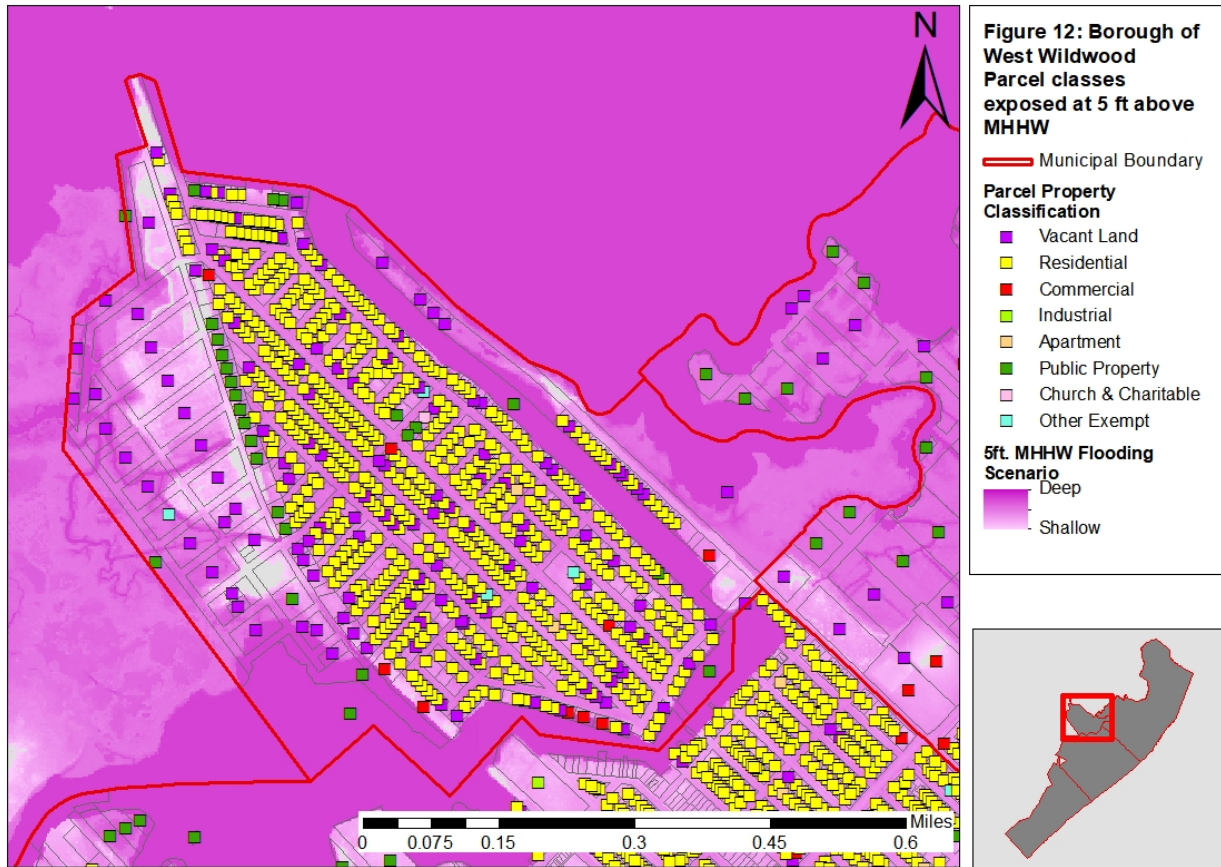


Figure 12. West Wildwood Borough Vulnerability Under 5-Foot MHHW Flooding Scenario

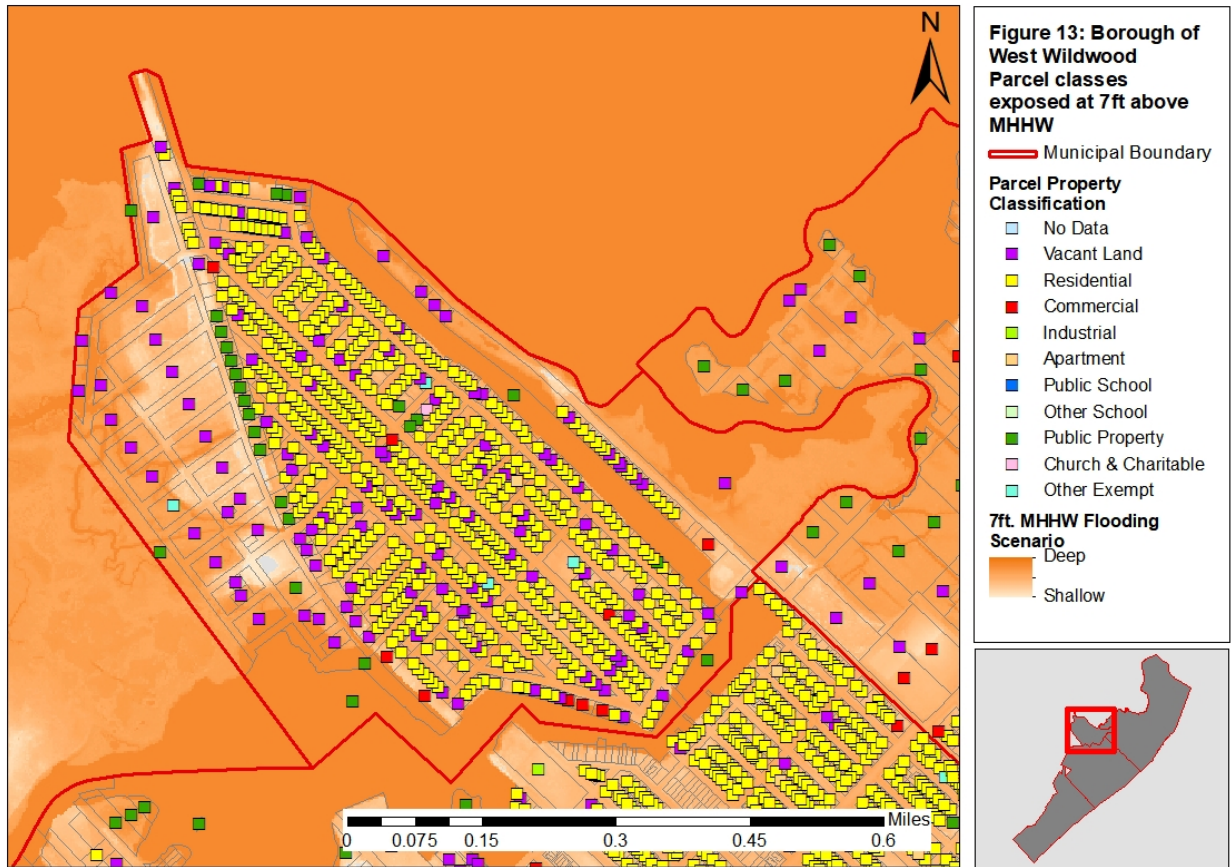


Figure 13. West Wildwood Borough Vulnerability Under 7-Foot MHHW Flooding Scenario

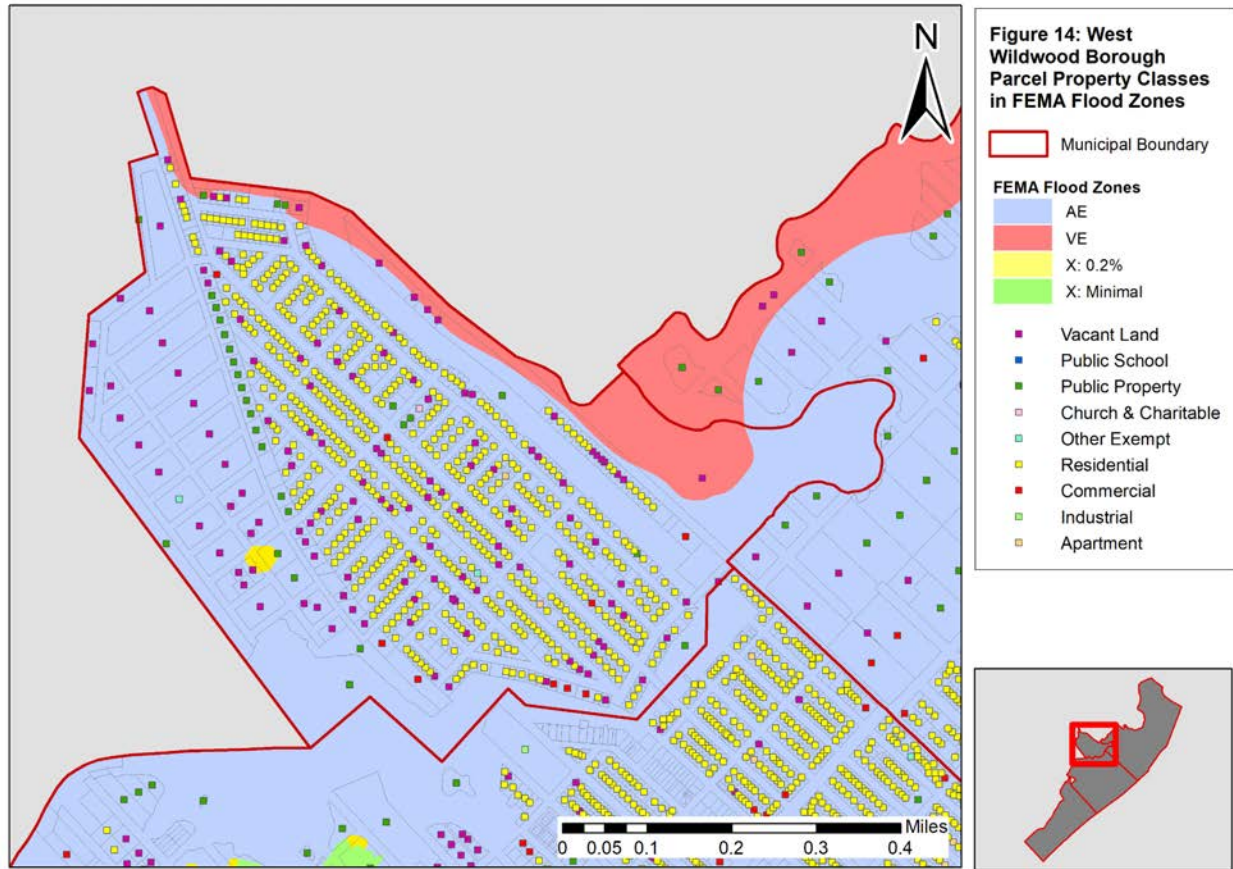


Figure 14. West Wildwood Borough parcel property classes within FEMA Flood Zones

Western part of North Wildwood City (Figure 15 through Figure 21)



Figure 15. Reference map courtesy of Google Maps for Figures 16 through 21. The purpose of this map is to help readers orient themselves to Figures 16 through 21 which do not have labeled landmarks.

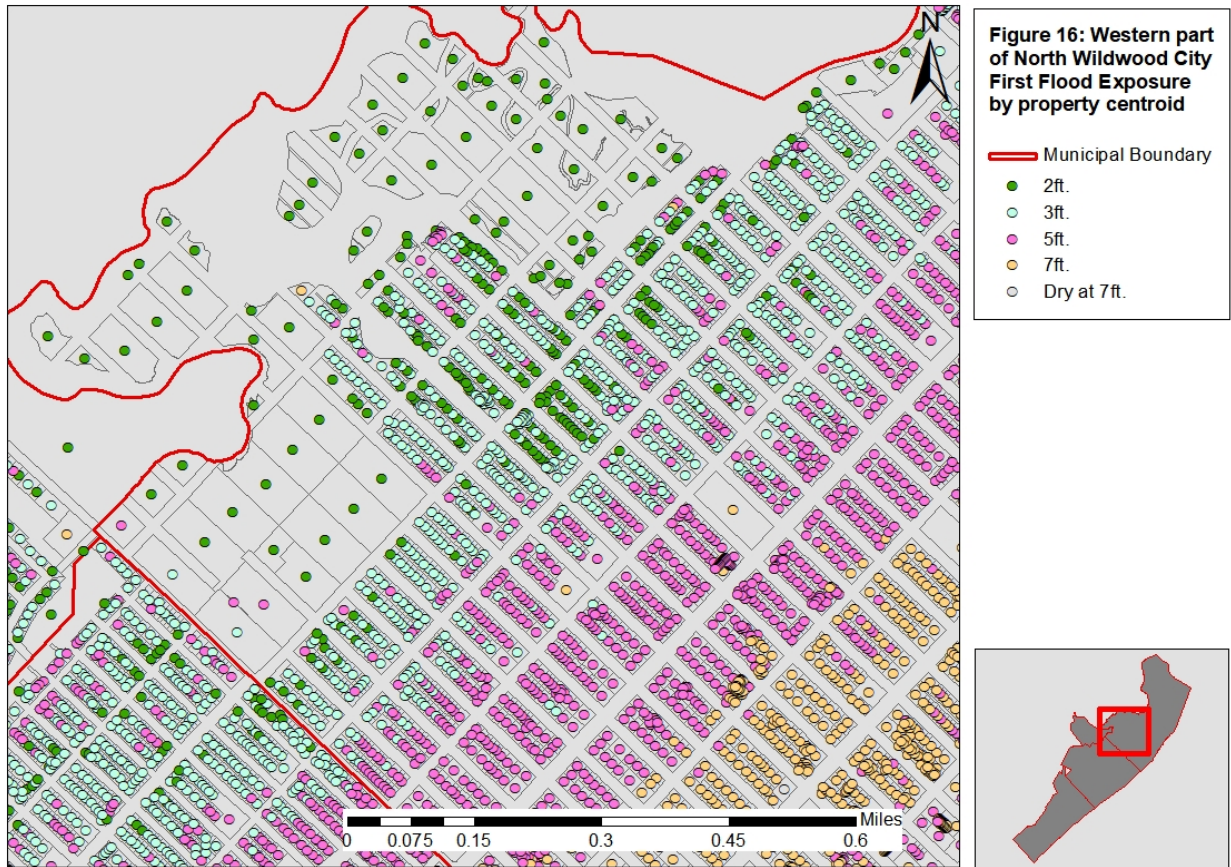


Figure 16. Planning benchmarks for inundation, at the Northwest corner of North Wildwood City

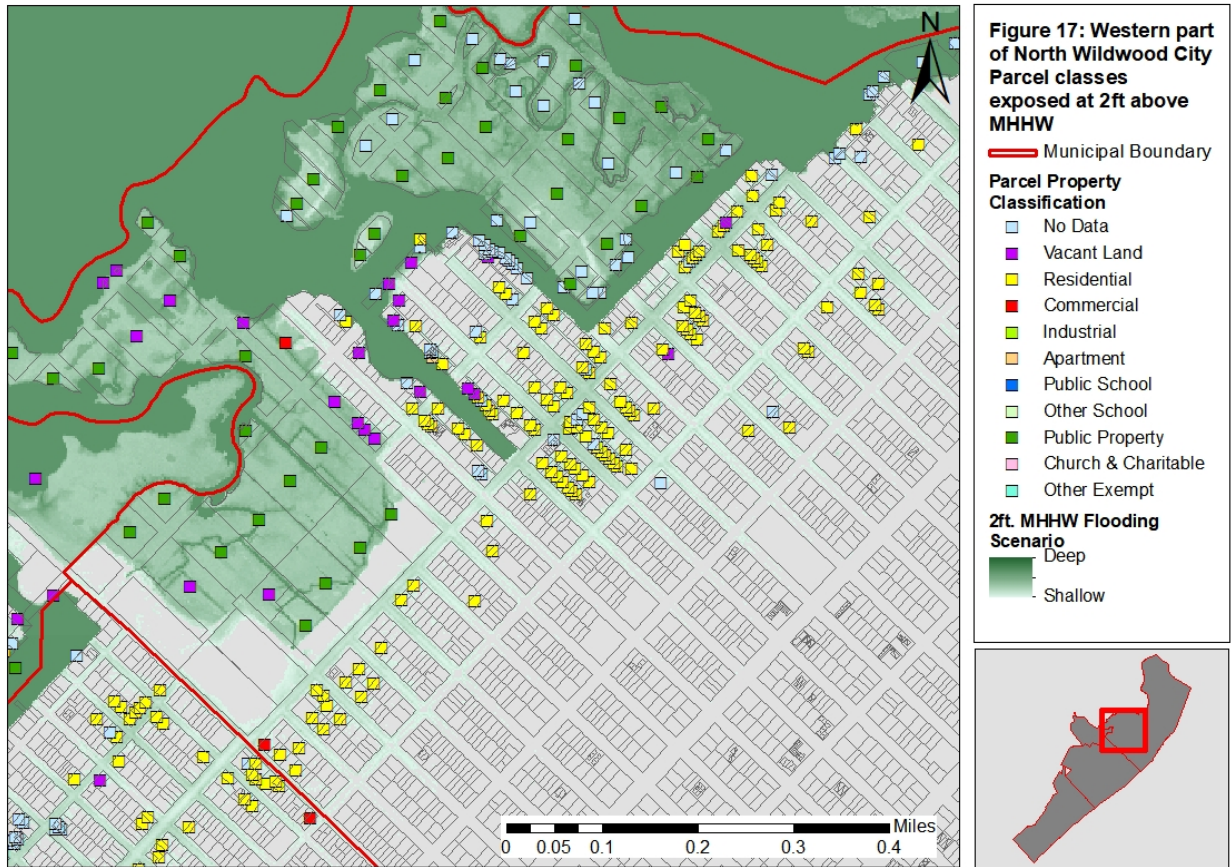


Figure 17. Northwest corner of North Wildwood City Vulnerability Under 2-Foot MHHW Flooding Scenario

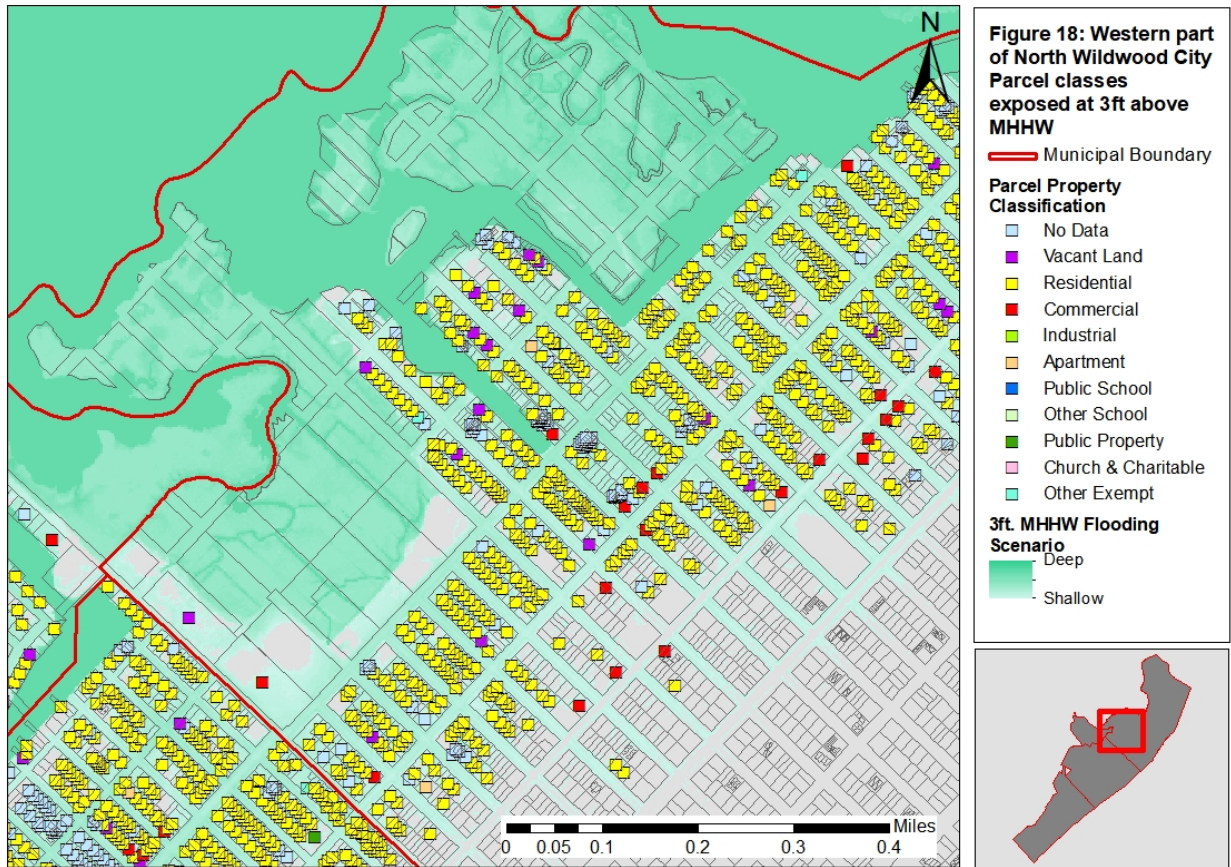


Figure 18. Northwest corner of North Wildwood City Vulnerability Under 3-Foot MHHW Flooding Scenario

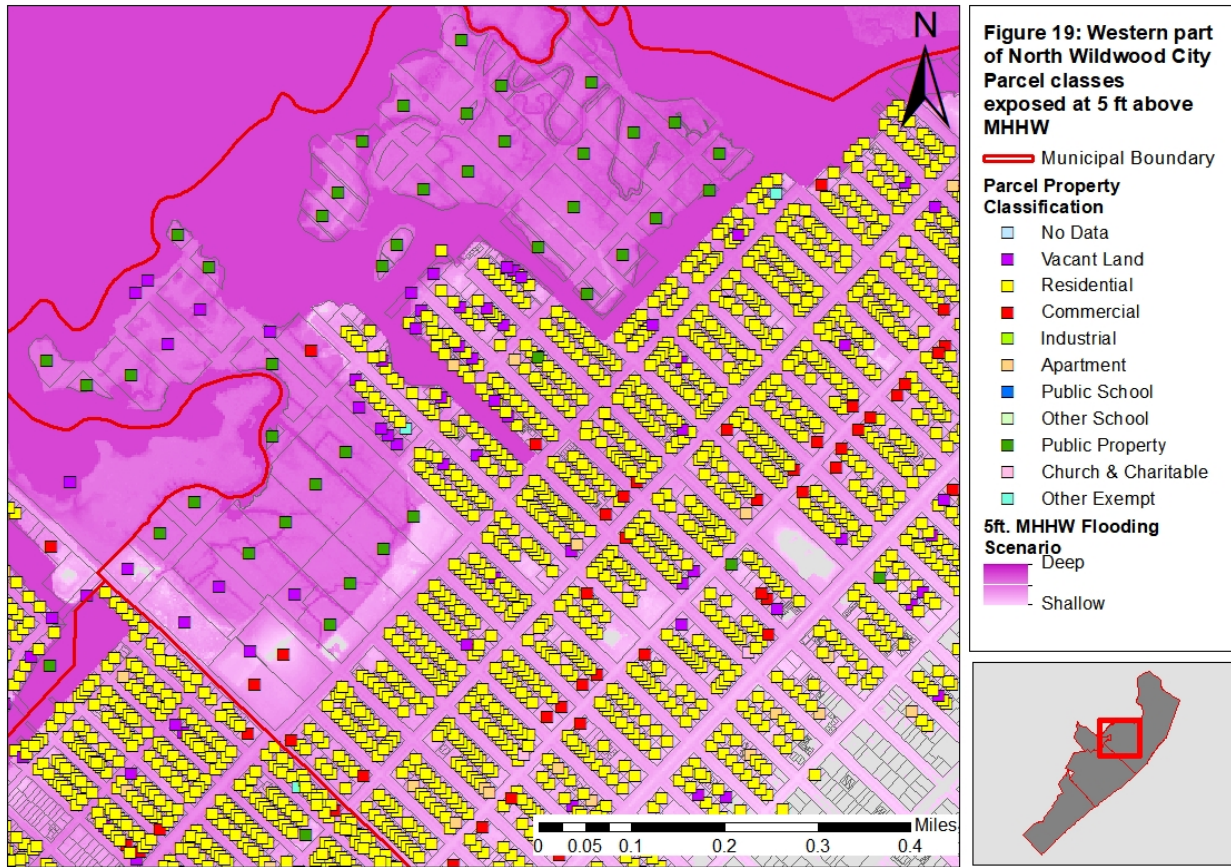


Figure 19. Northwest corner of North Wildwood City Vulnerability Under 5-Foot MHHW Flooding Scenario

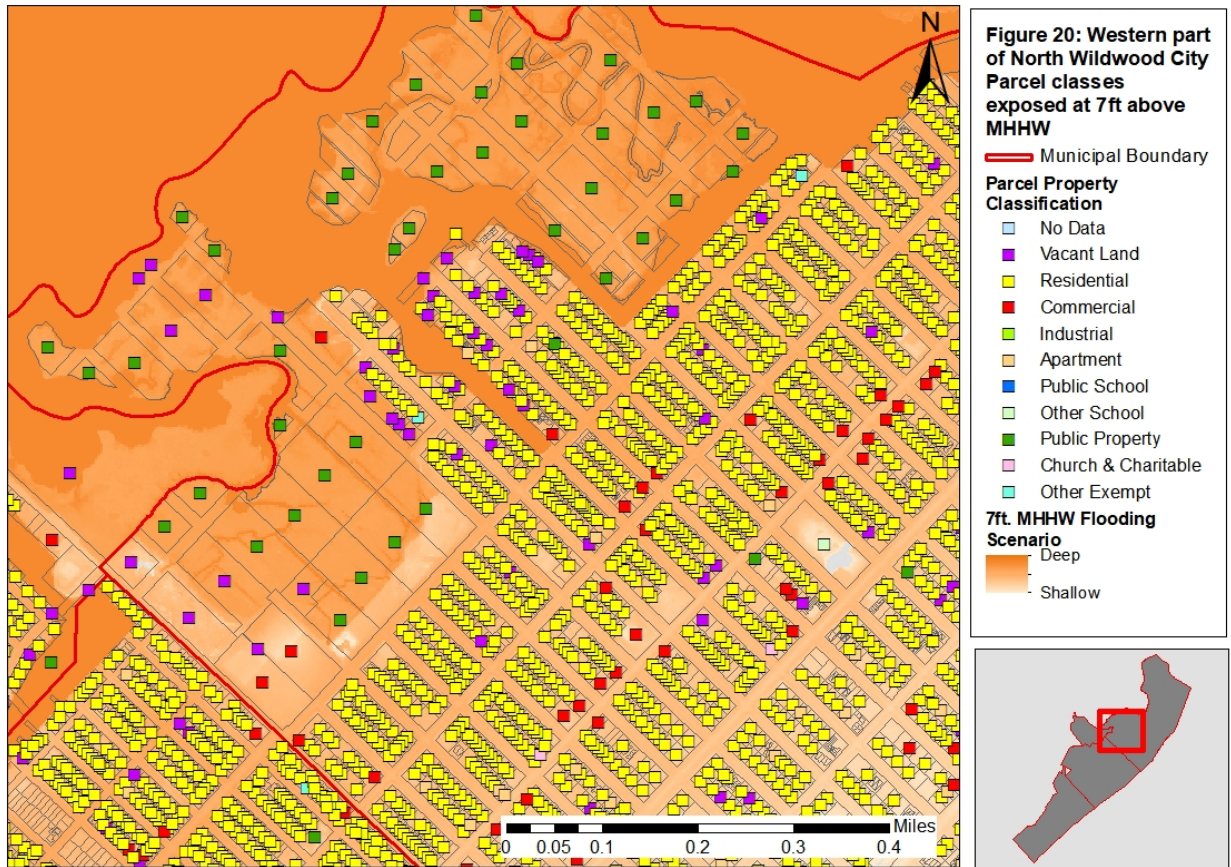


Figure 20. Northwest corner of North Wildwood City Vulnerability Under 7-Foot MHHW Flooding Scenario

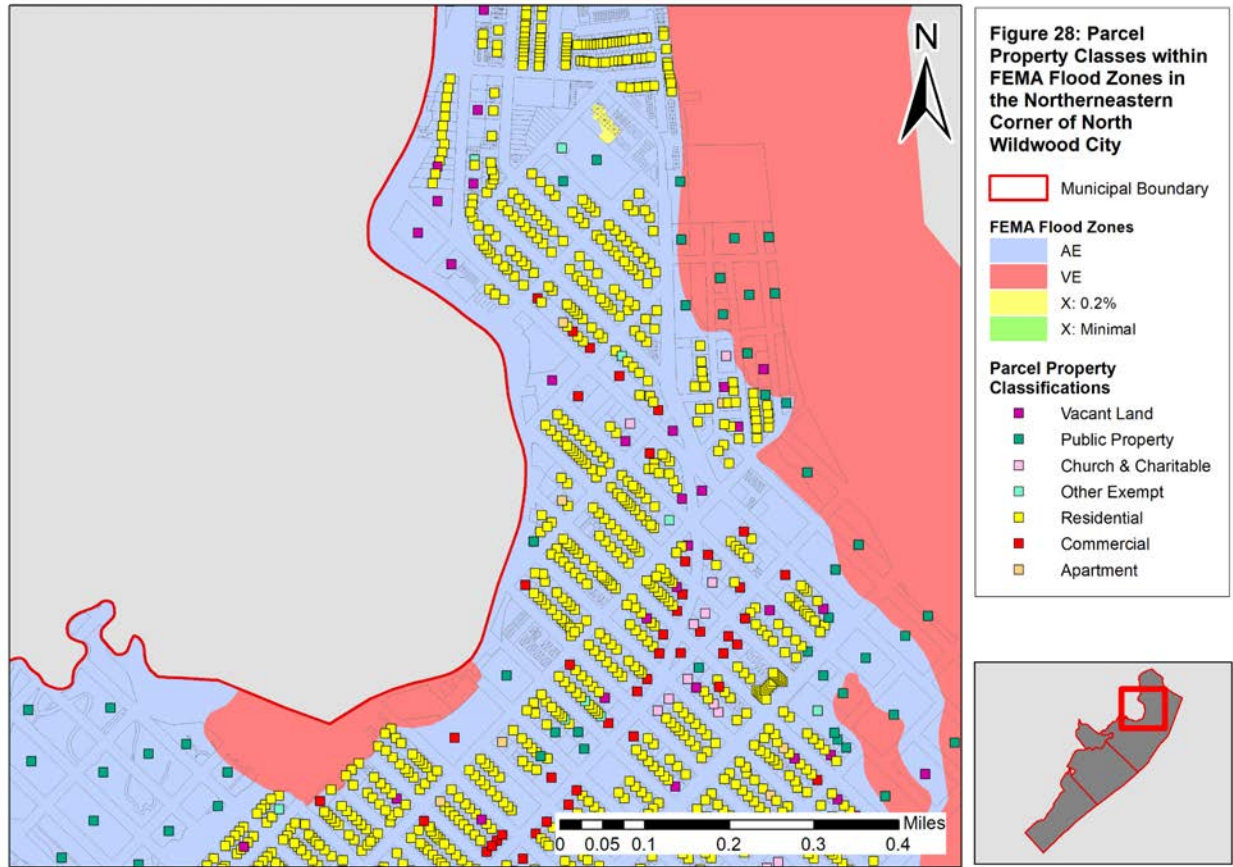


Figure 21. North Wildwood City parcel property classes within FEMA Flood Zones

Northeastern corner of North Wildwood City (Figure 22 through Figure 28)

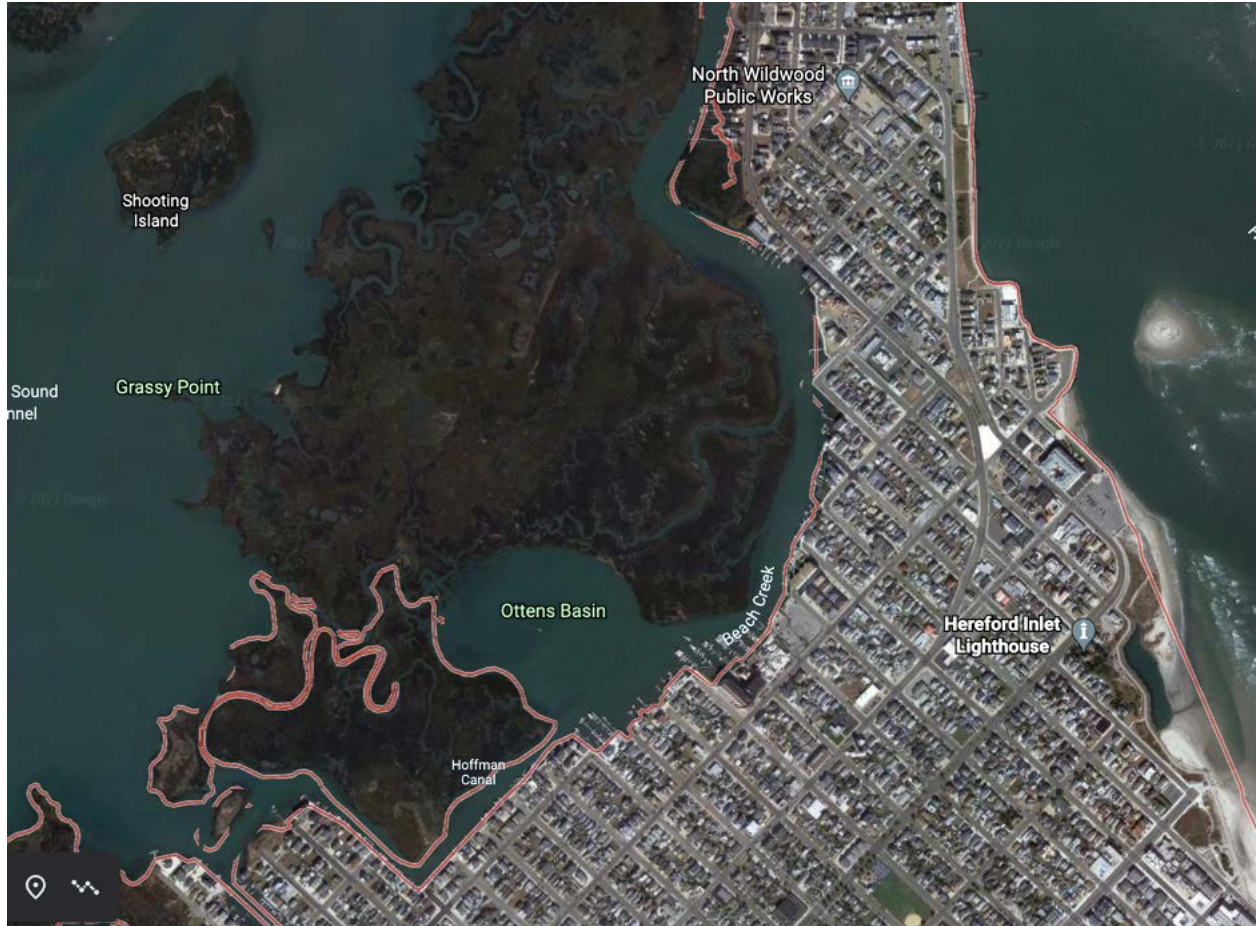


Figure 22. Reference map courtesy of Google Maps for Figures 23 through 28. The purpose of this map is to help readers orient themselves to Figures 23 through 28 which do not have labeled landmarks.

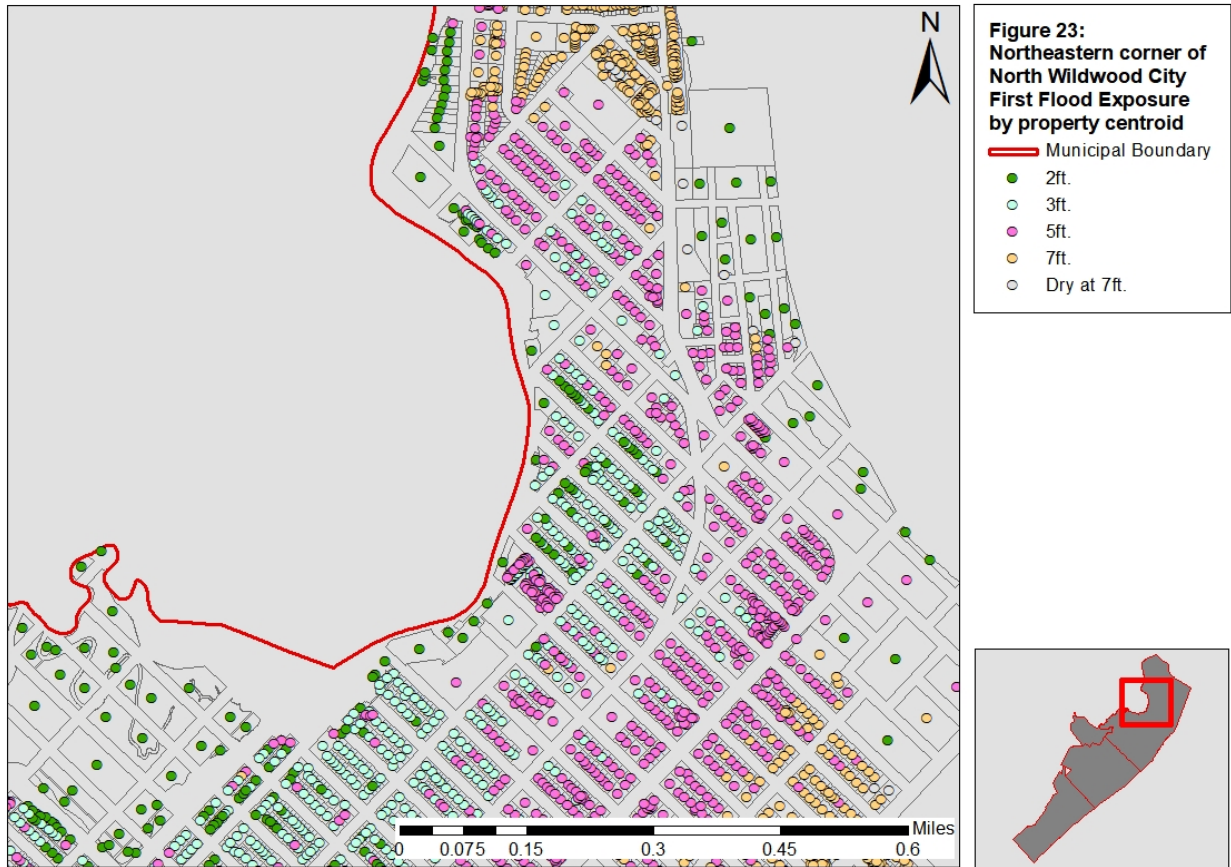


Figure 23. Planning benchmarks for inundation at the Northeast corner of North Wildwood City

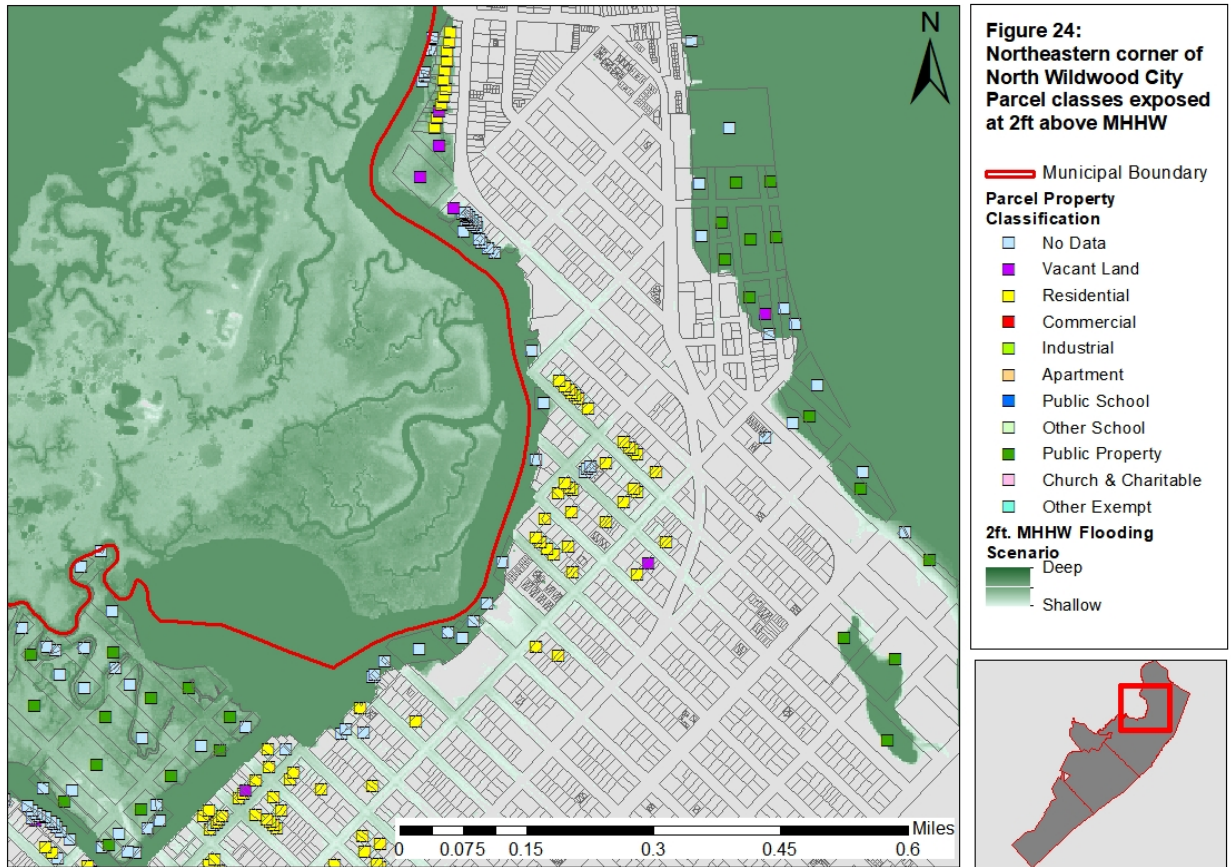


Figure 24. Northeast corner of North Wildwood City Vulnerability Under 2-Foot MHHW Flooding Scenario

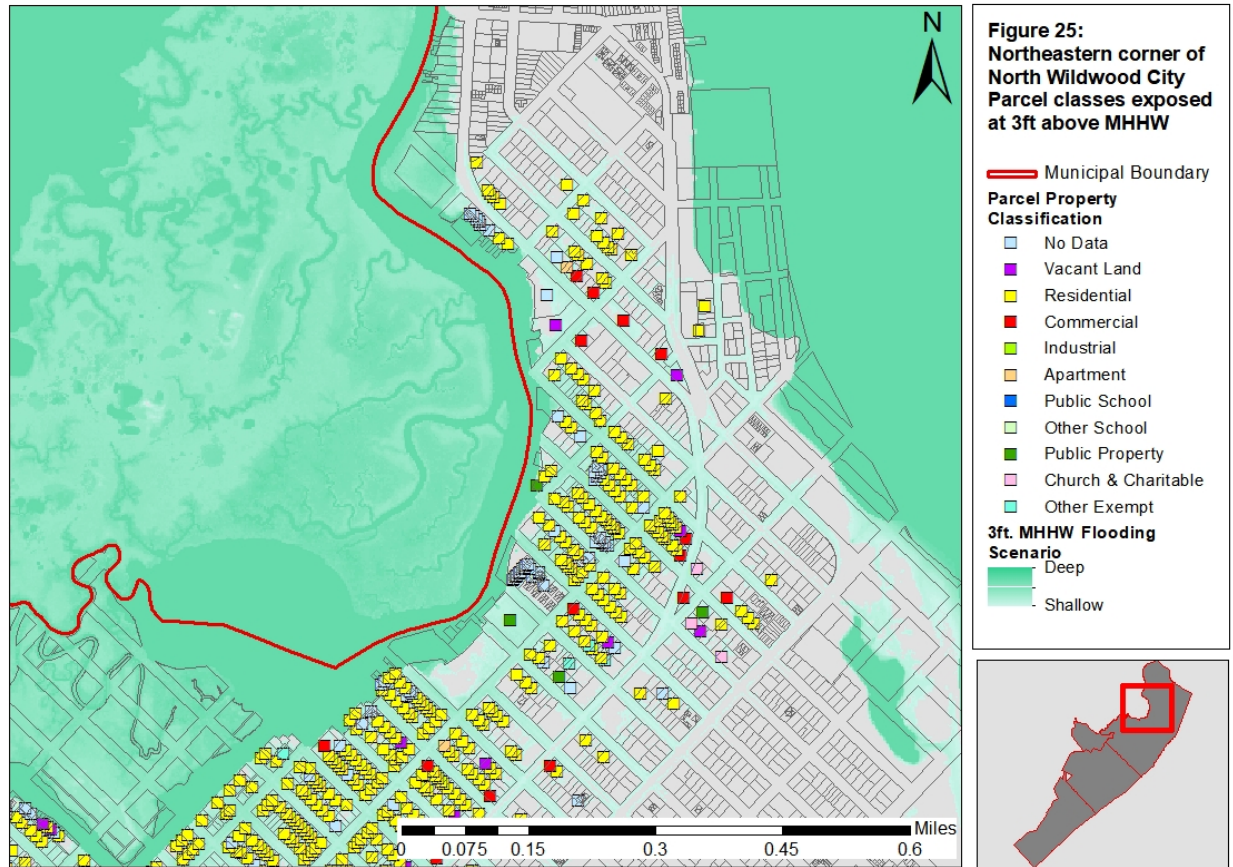


Figure 25. Northeast corner of North Wildwood City Vulnerability Under 3-Foot MHHW Flooding Scenario

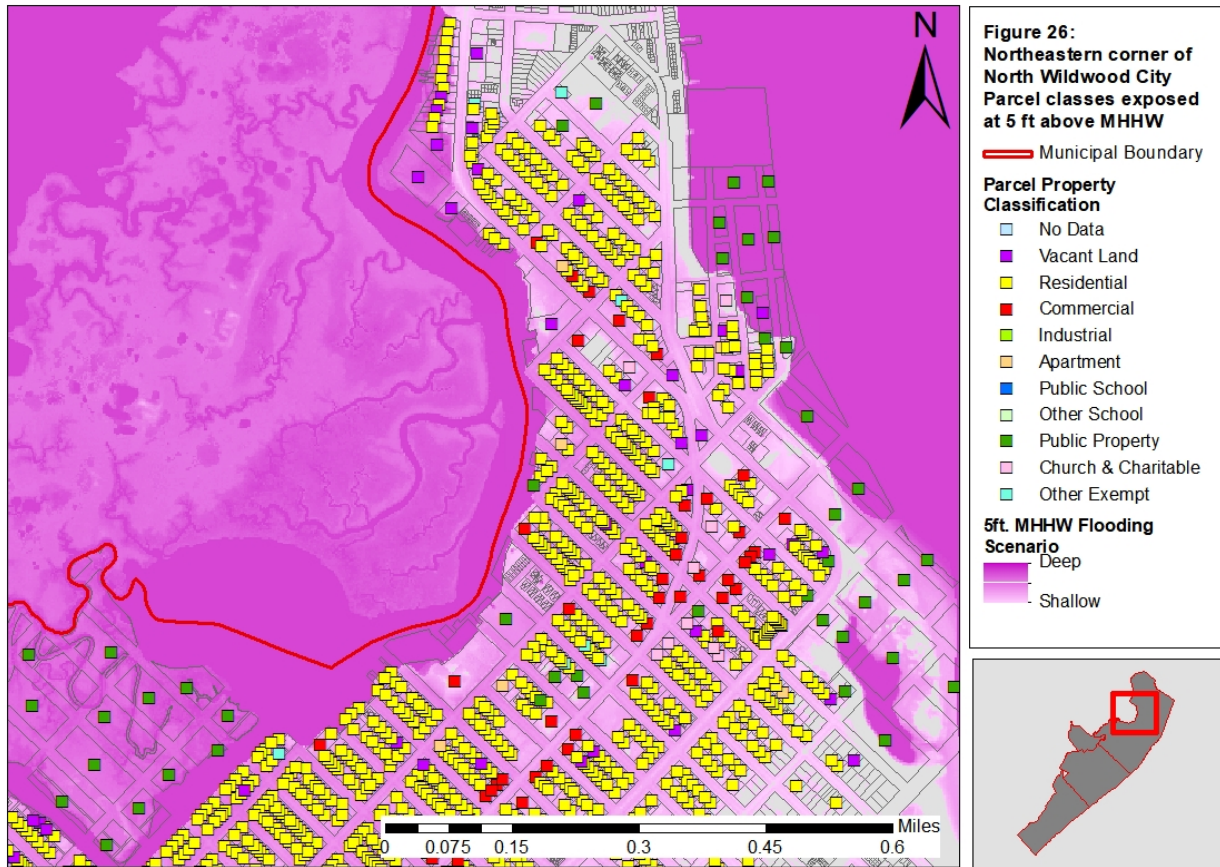


Figure 26. Northeast corner of North Wildwood City Vulnerability Under 5-Foot MHHW Flooding Scenario

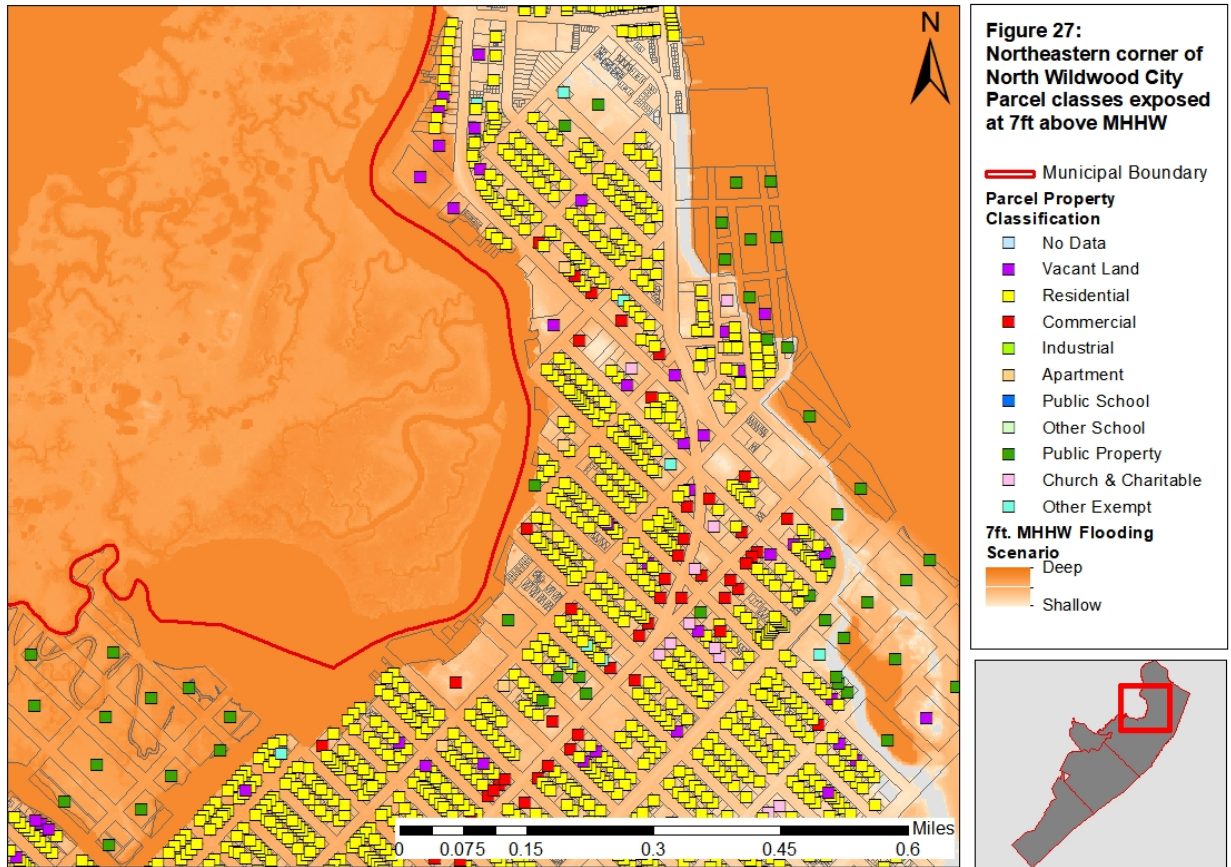


Figure 27. Northeast corner of North Wildwood City Vulnerability Under 7-Foot MHHW Flooding Scenario

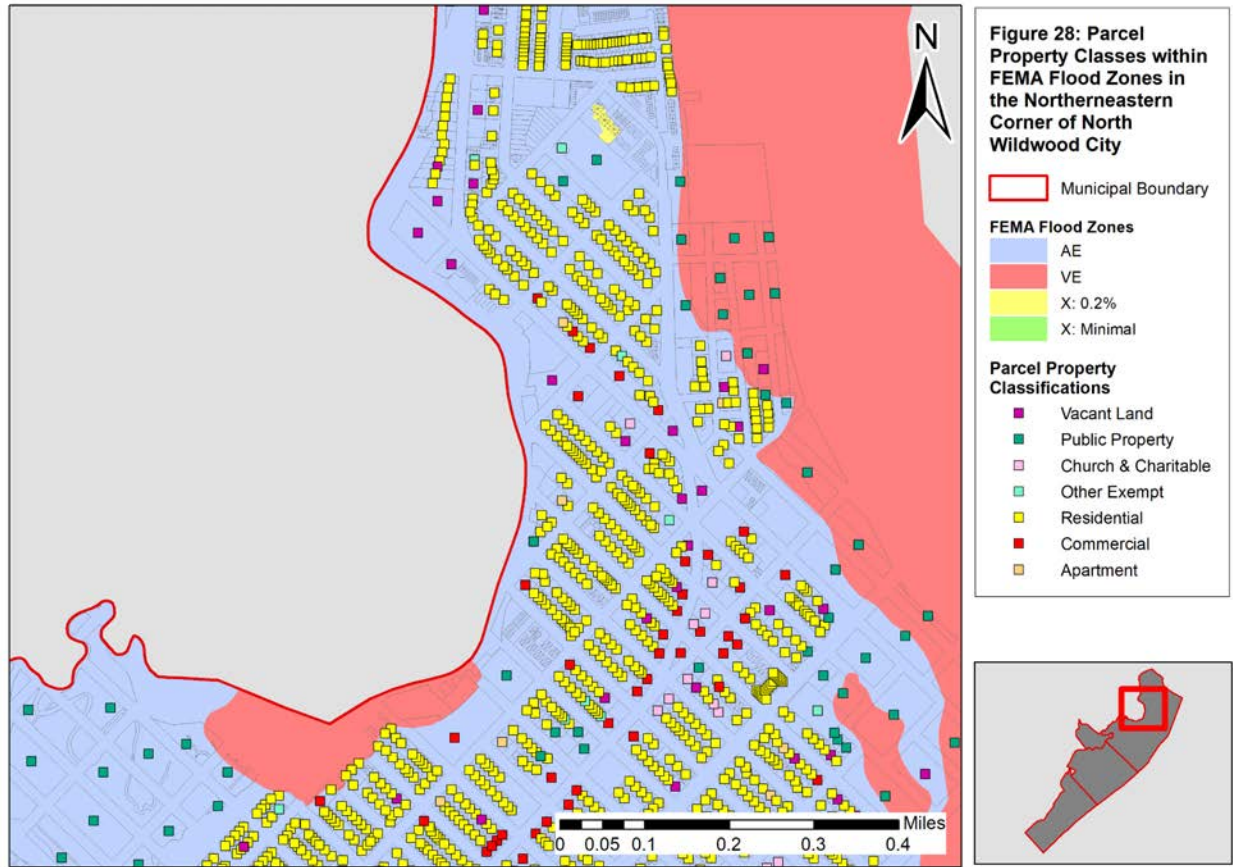


Figure 28. Northeast corner of North Wildwood City parcel property classes within FEMA Flood Zones

Northern section of Wildwood City (Figure 29 through Figure 35)

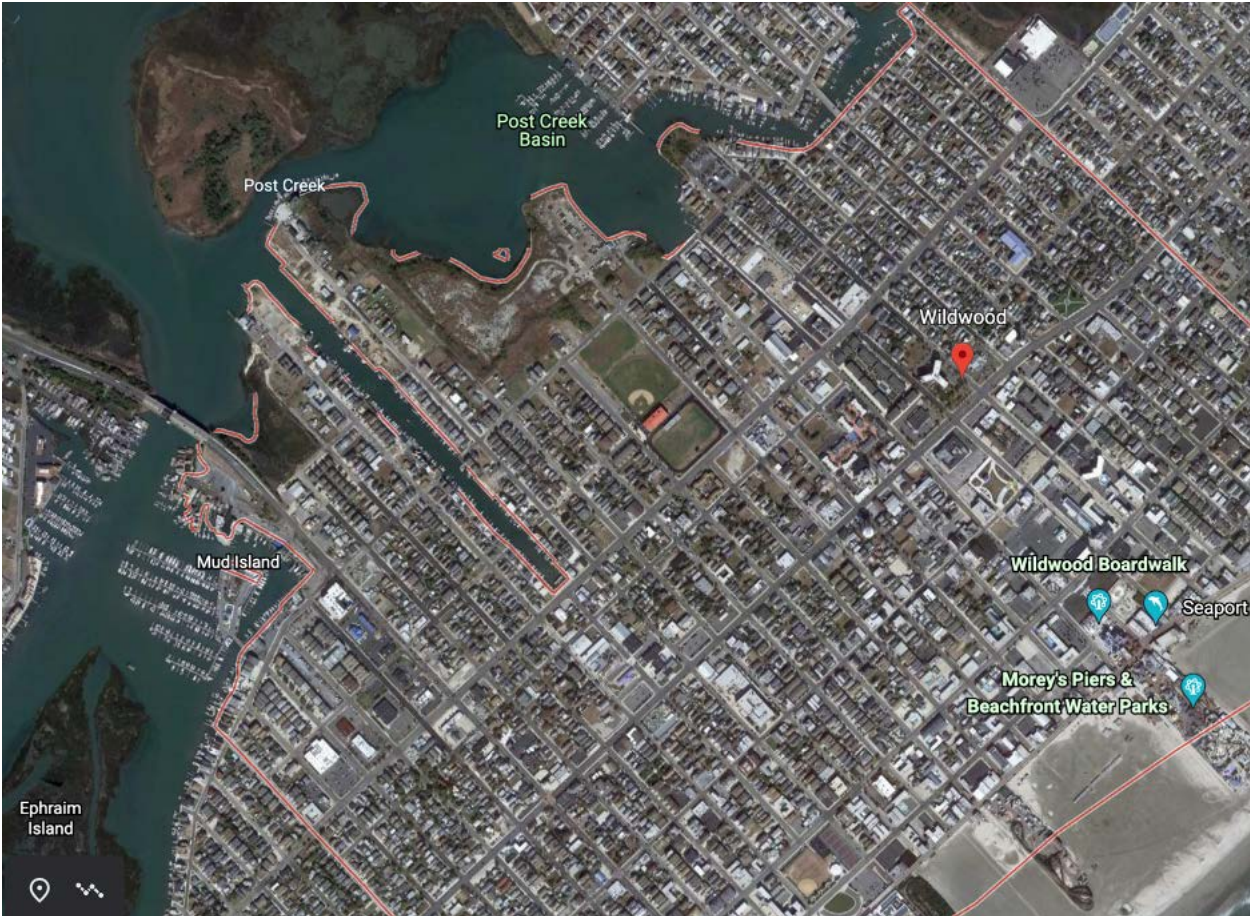


Figure 29. Reference map courtesy of Google Maps for Figures 30 through 35. The purpose of this map is to help readers orient themselves to Figures 29 through 35 which do not have labeled landmarks.

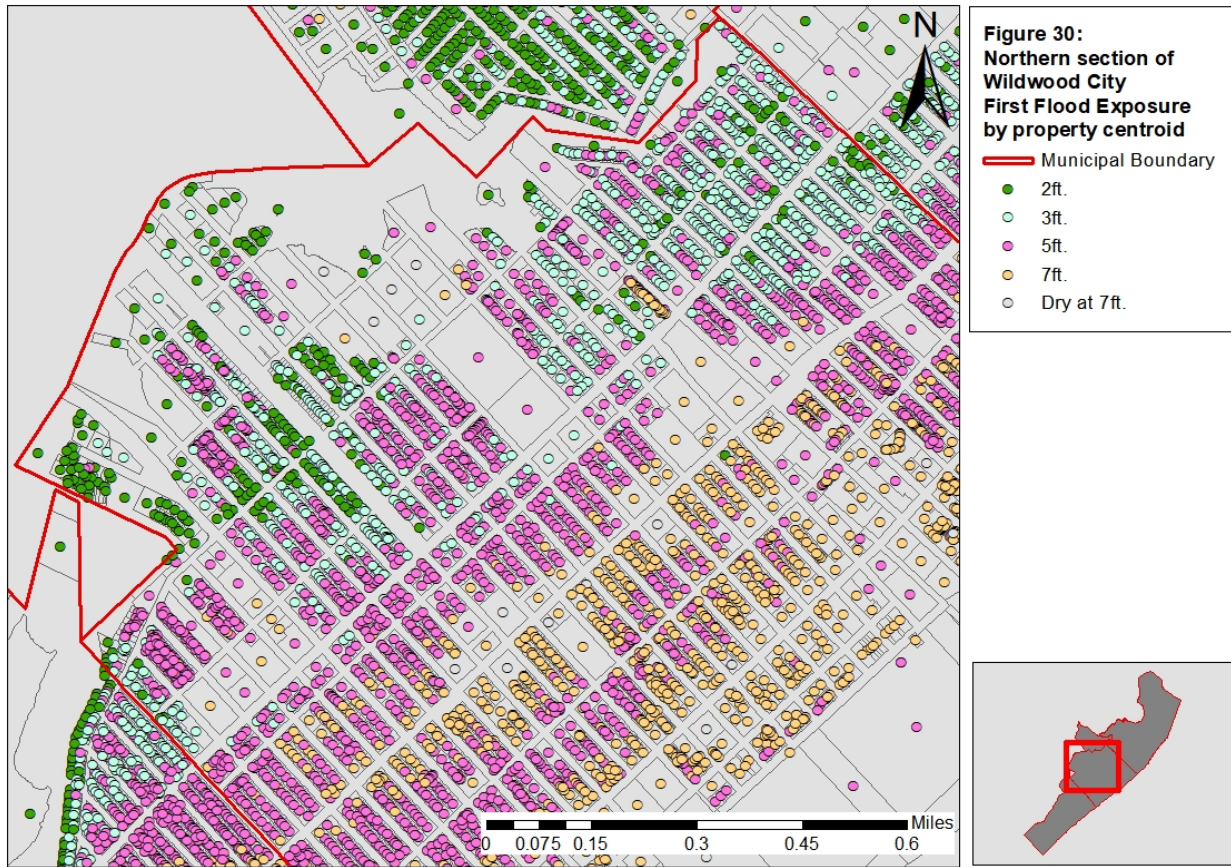


Figure 30. Planning benchmarks for inundation, at the Northern Section of Wildwood City

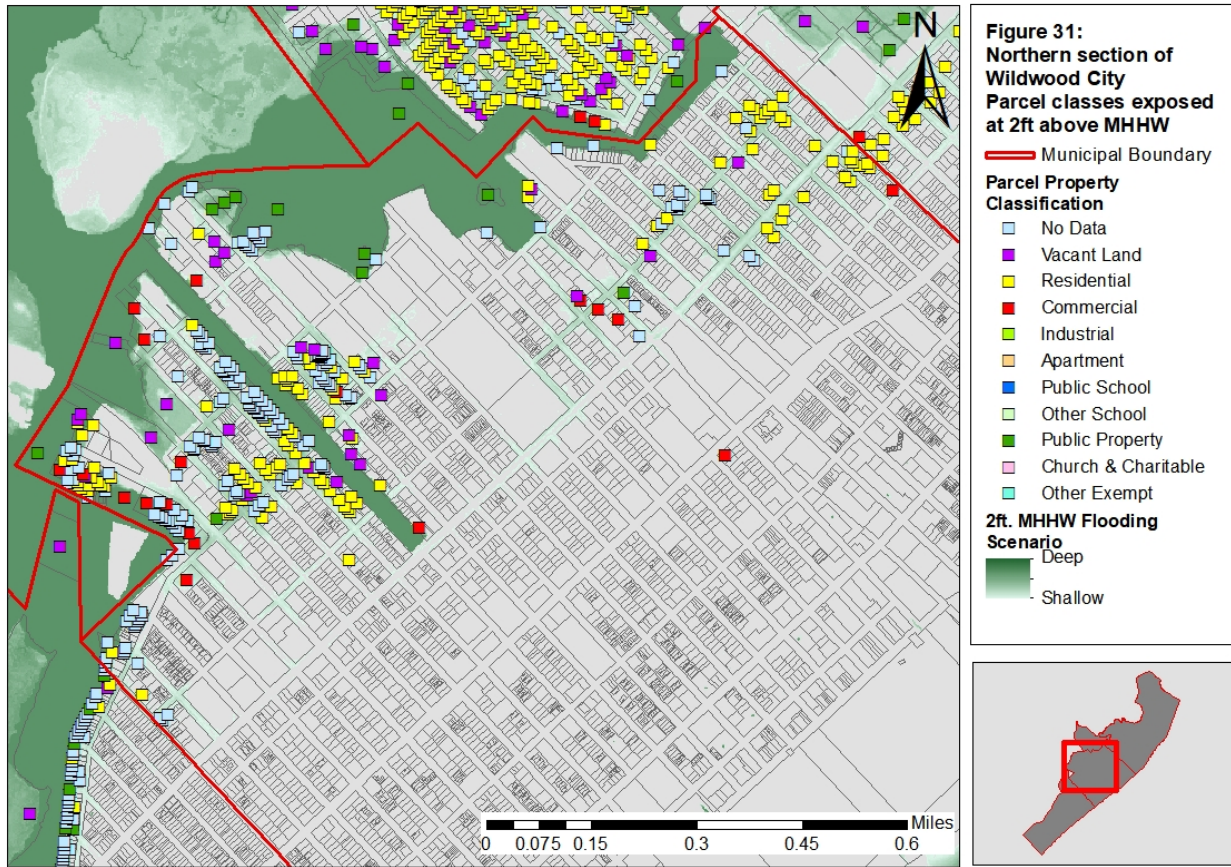


Figure 31. Northern Section of Wildwood City Vulnerability Under 2-Foot MHHW Flooding Scenario

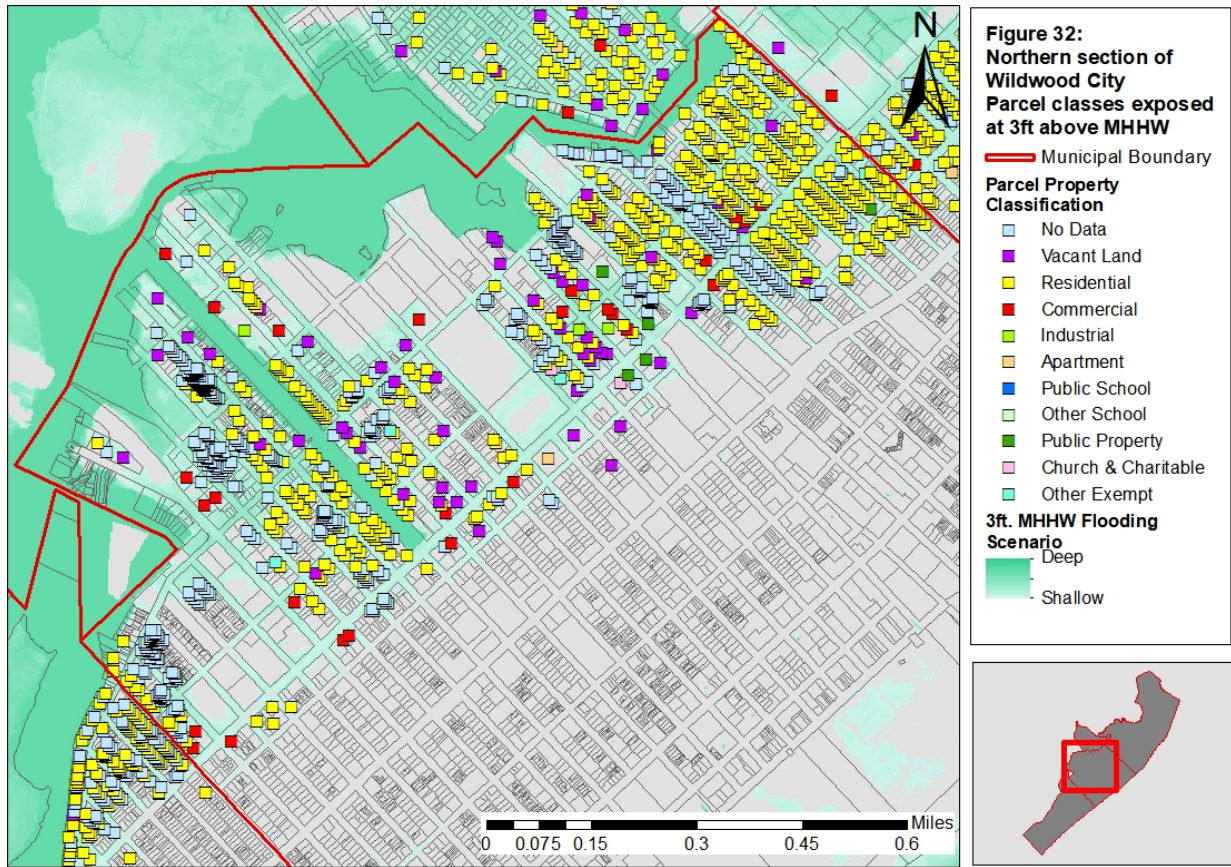


Figure 32. Northern Section of Wildwood City Vulnerability Under 3-Foot MHHW Flooding Scenario

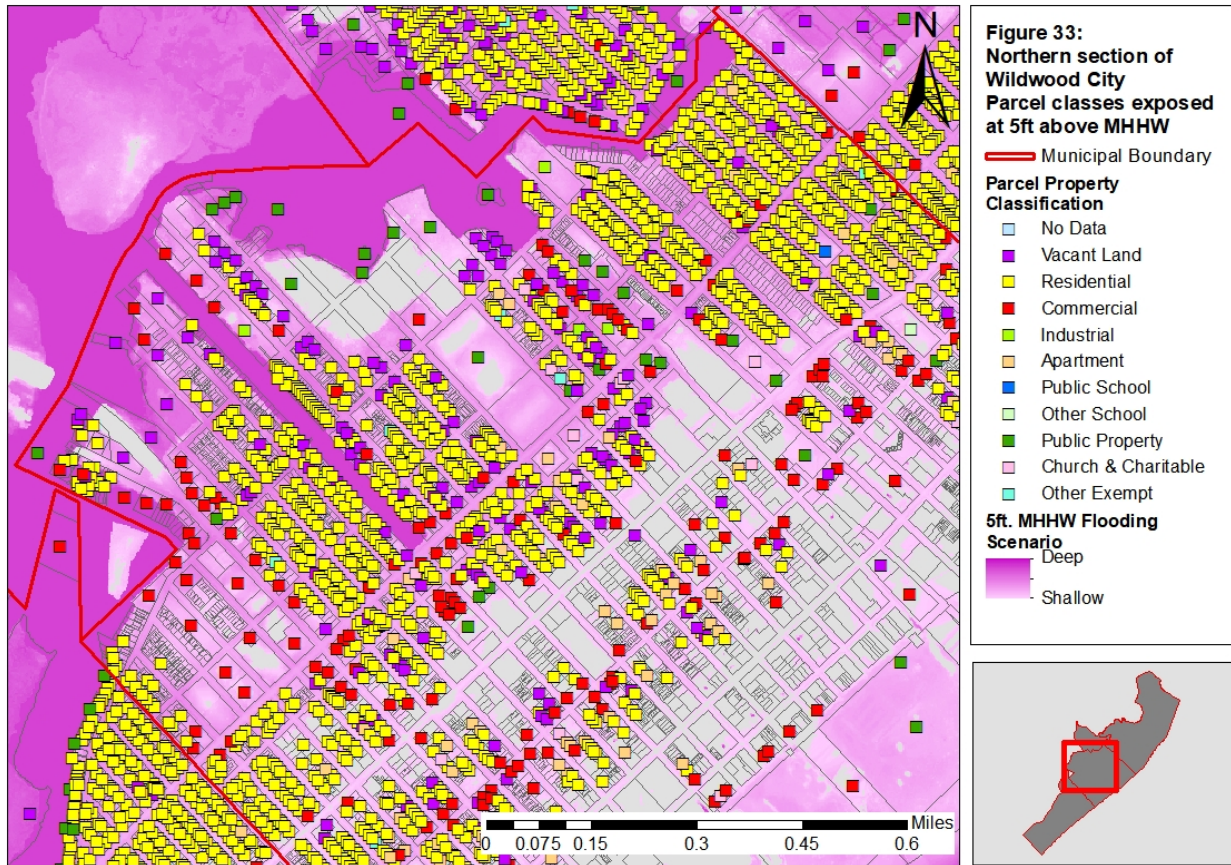


Figure 33. Northern Section of Wildwood City Vulnerability Under 5-Foot MHHW Flooding Scenario

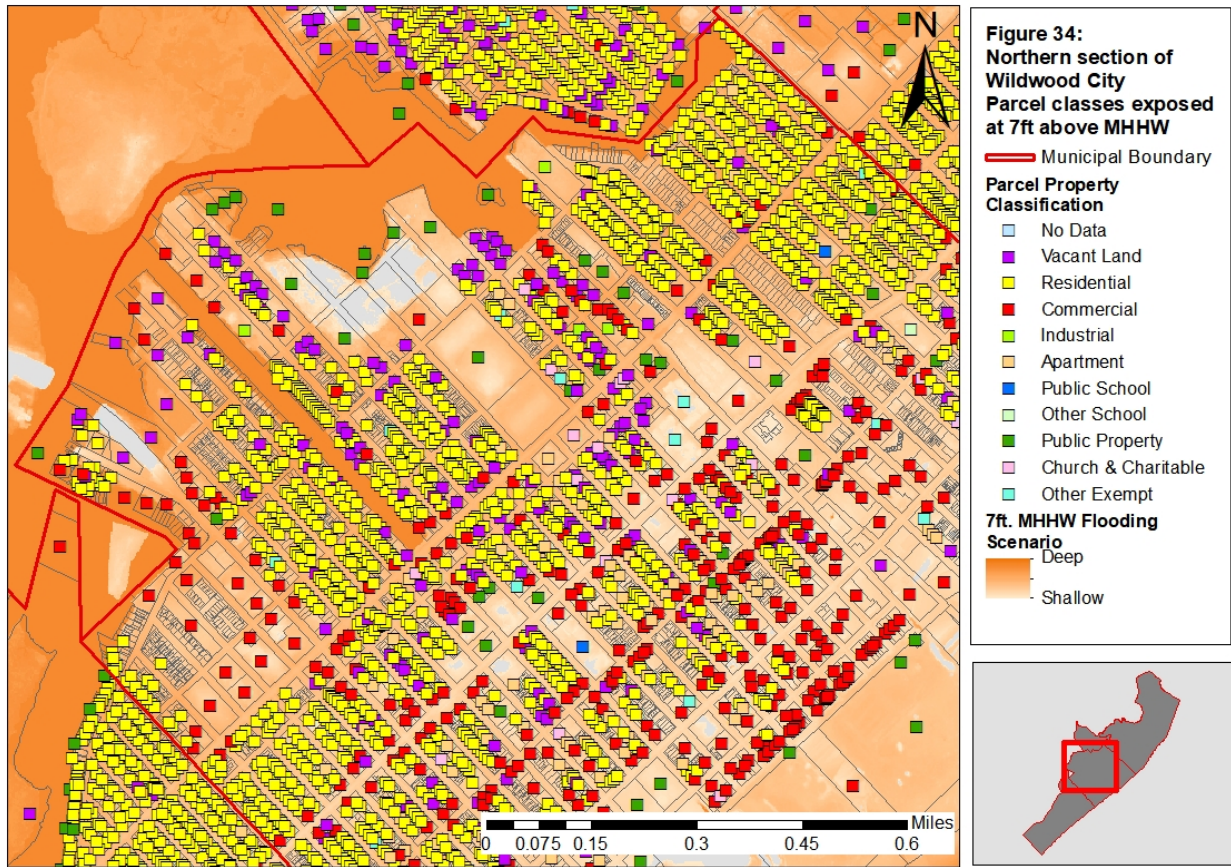


Figure 34. Northern Section of Wildwood City Vulnerability Under 5-Foot MHHW Flooding Scenario

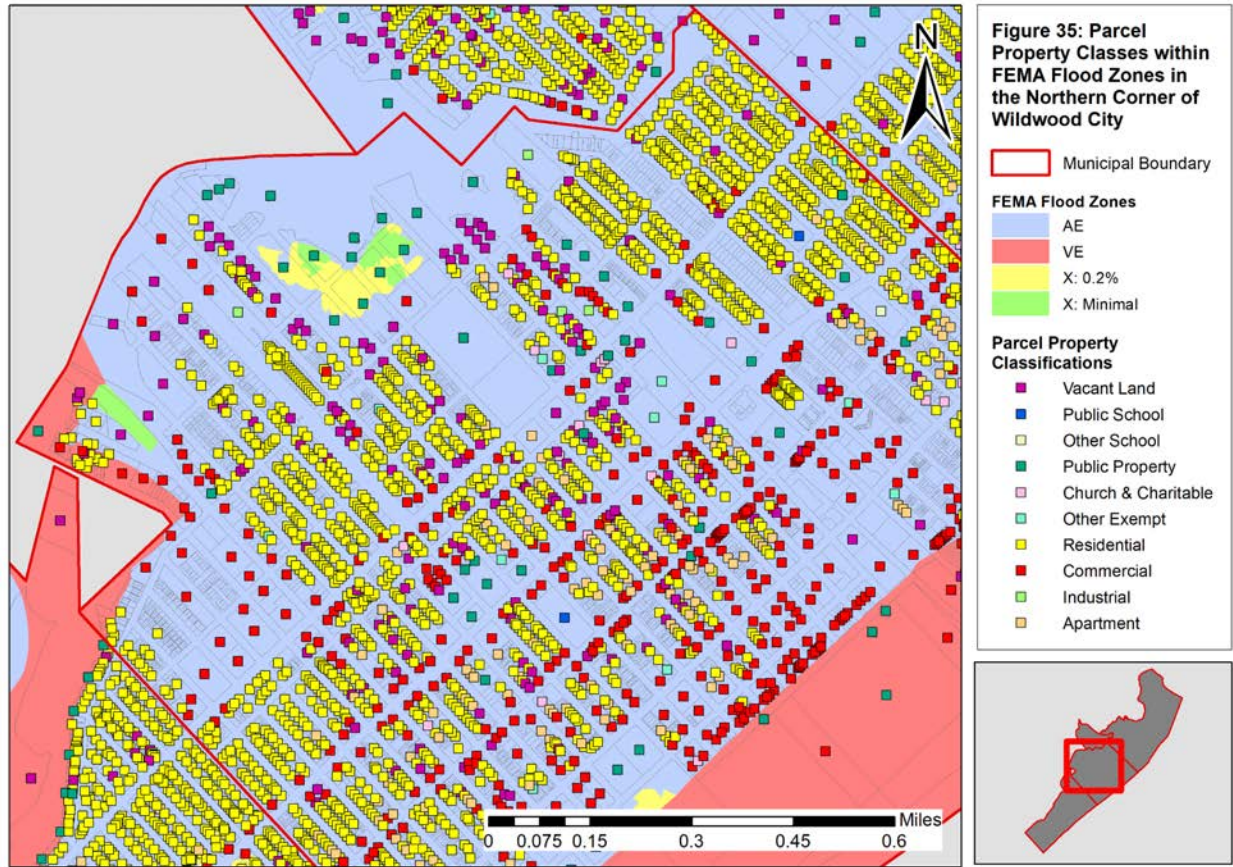


Figure 35. North Wildwood City parcel property classes within FEMA Flood Zones

Northeastern corner of Wildwood Crest Borough (Figure 36 through Figure 42)

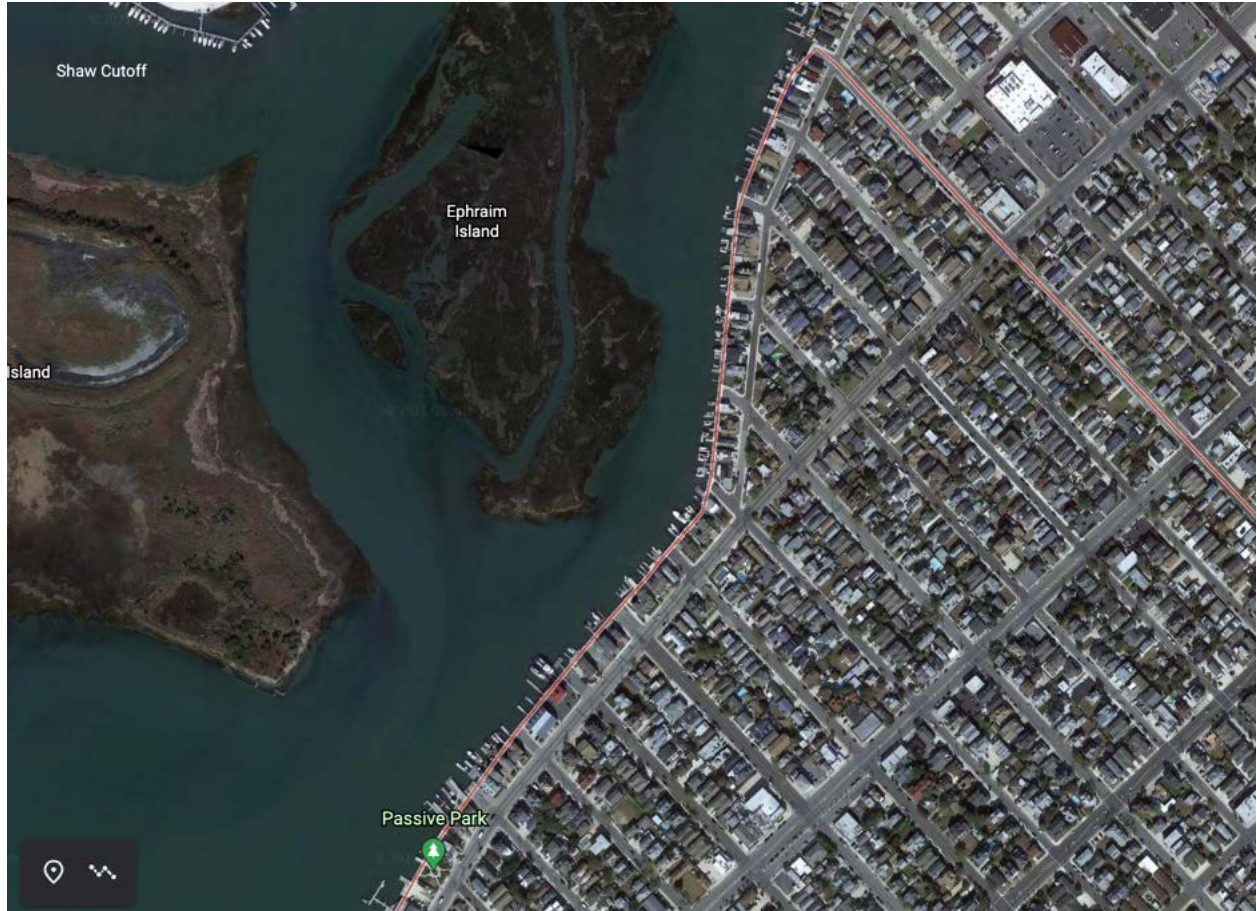


Figure 36. Reference map courtesy of Google Maps for Figures 37 through 42. The purpose of this map is to help readers orient themselves to Figures 23 through 28 which do not have labeled landmarks.

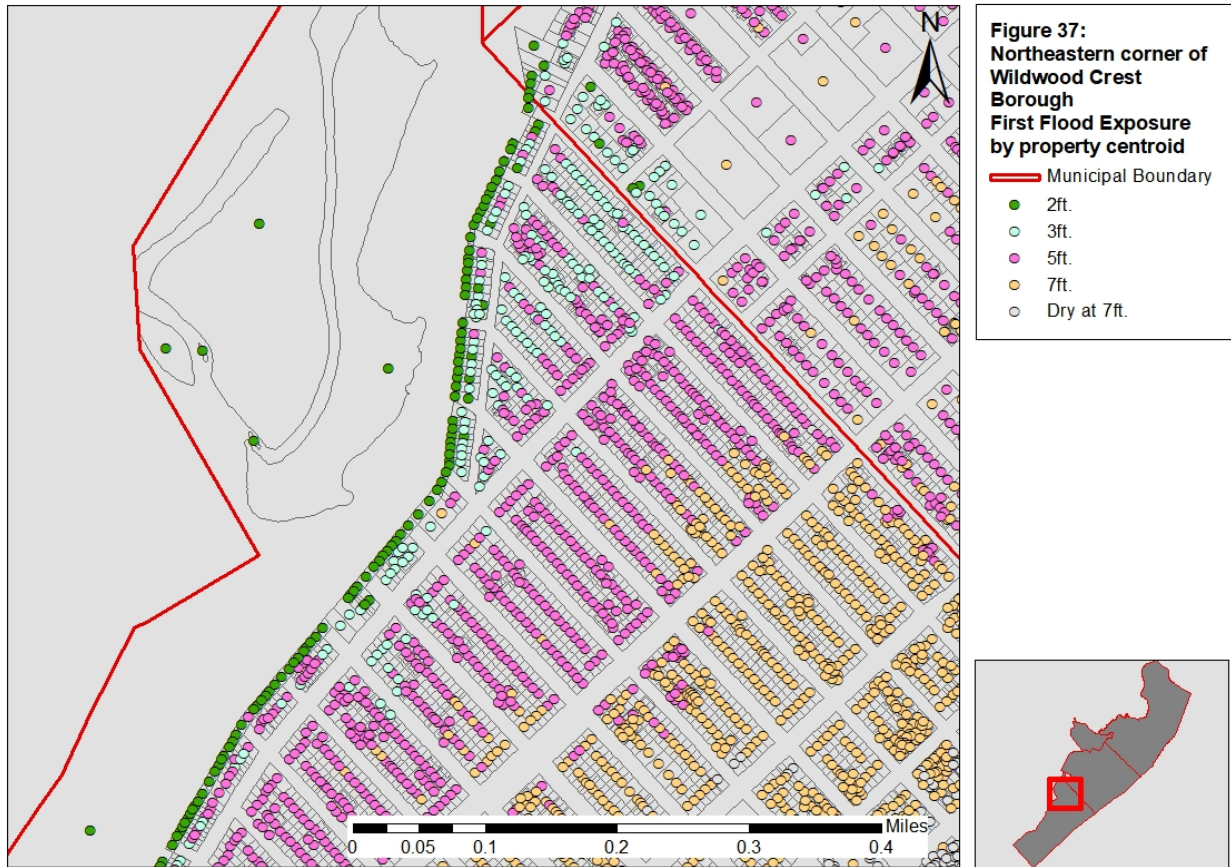


Figure 37. Planning benchmarks for inundation at the Northeast corner of Wildwood Crest Borough

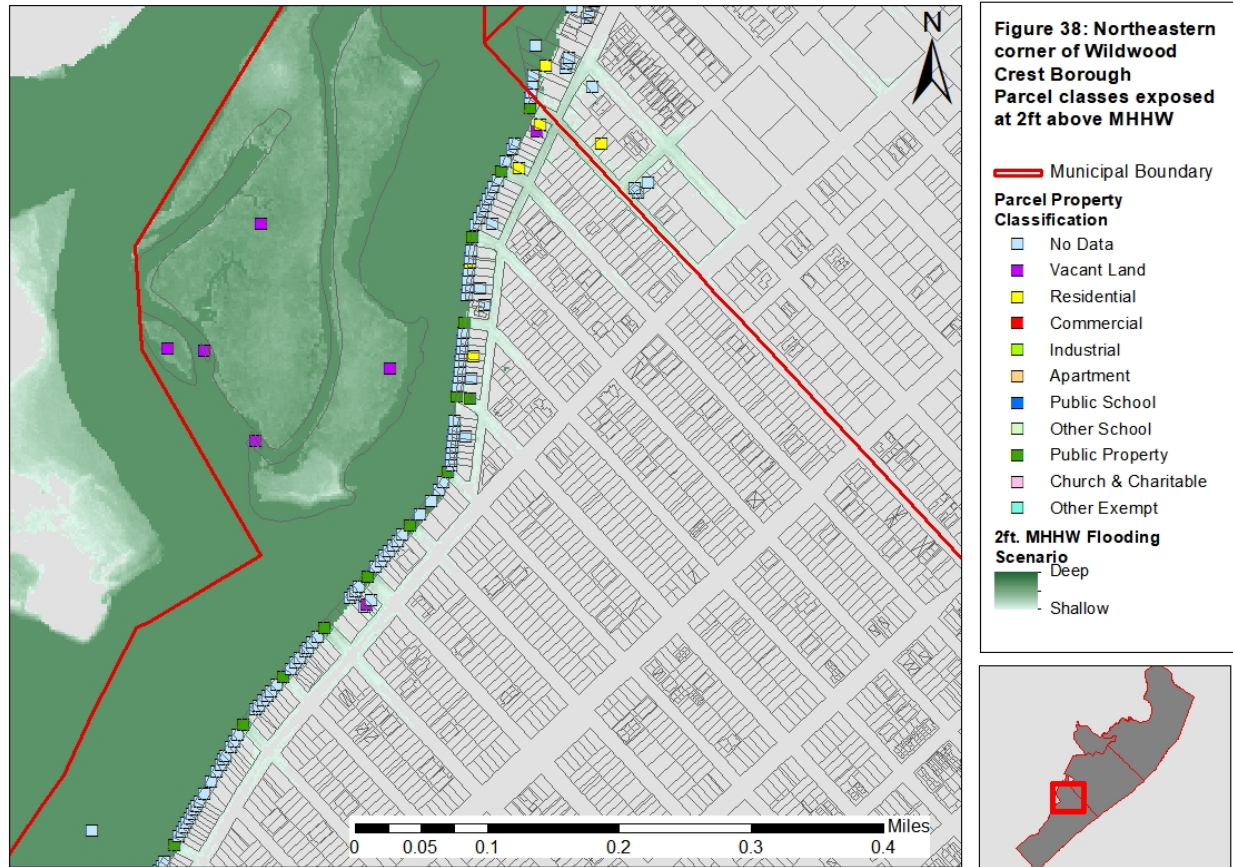


Figure 38. Northeast corner of Wildwood Crest Borough Vulnerability Under 2-Foot MHHW Flooding Scenario

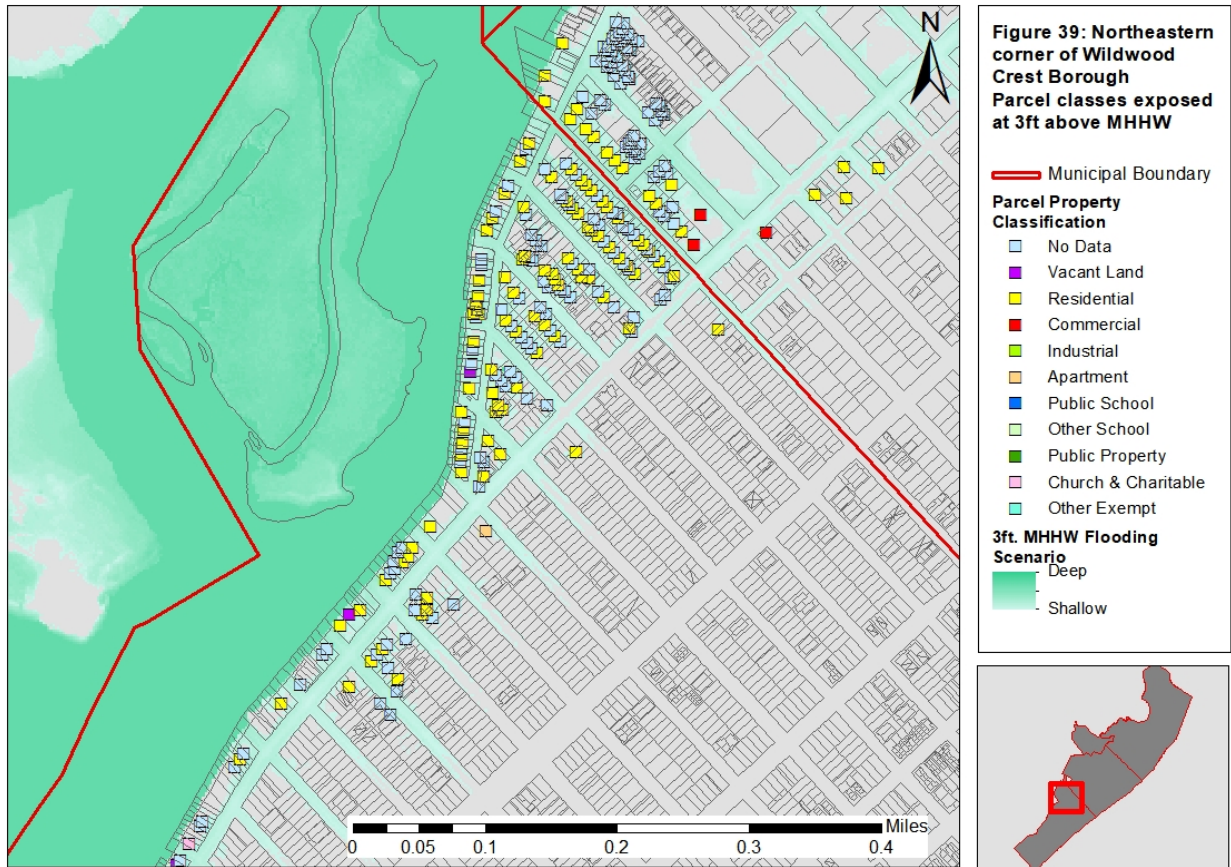


Figure 39. Northeast corner of Wildwood Crest Borough Vulnerability Under 3-Foot MHHW Flooding Scenario

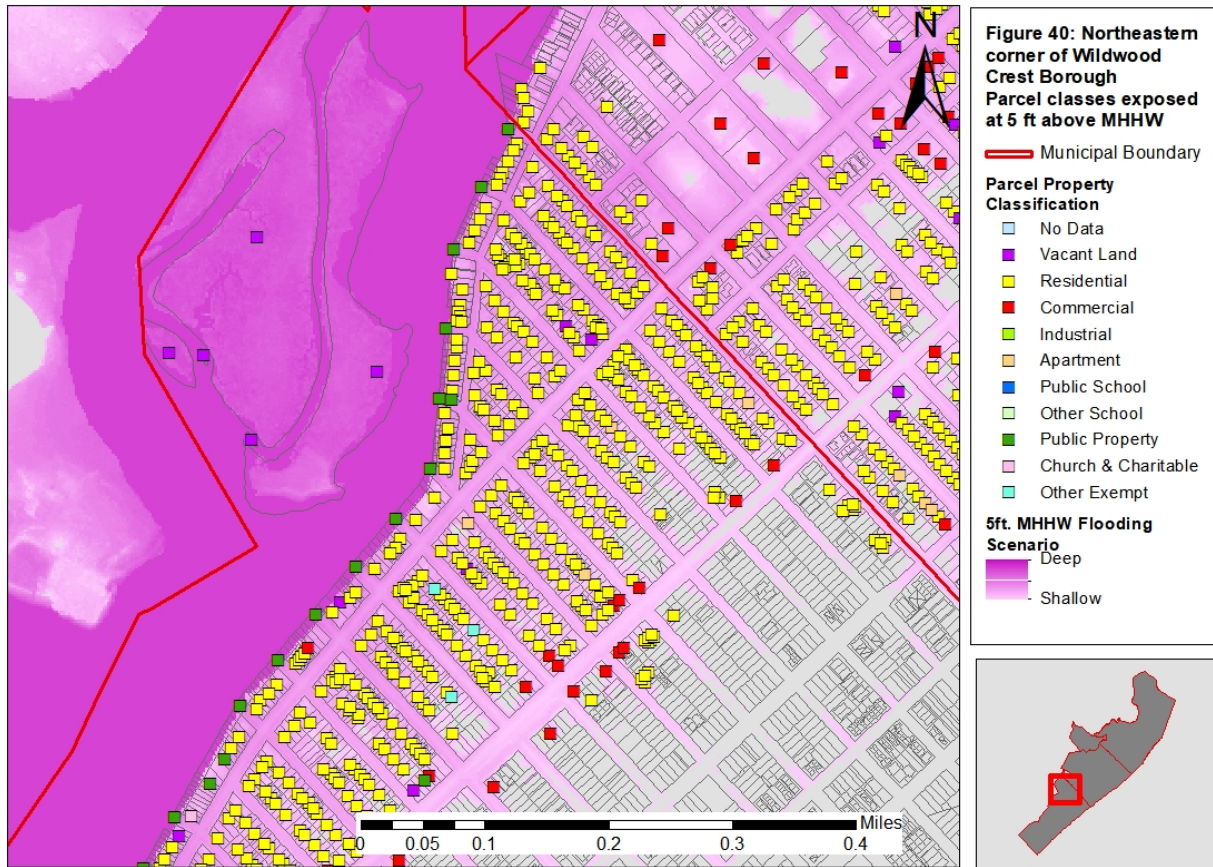


Figure 40. Northeast corner of Wildwood Crest Borough Vulnerability Under 5-Foot MHHW Flooding Scenario

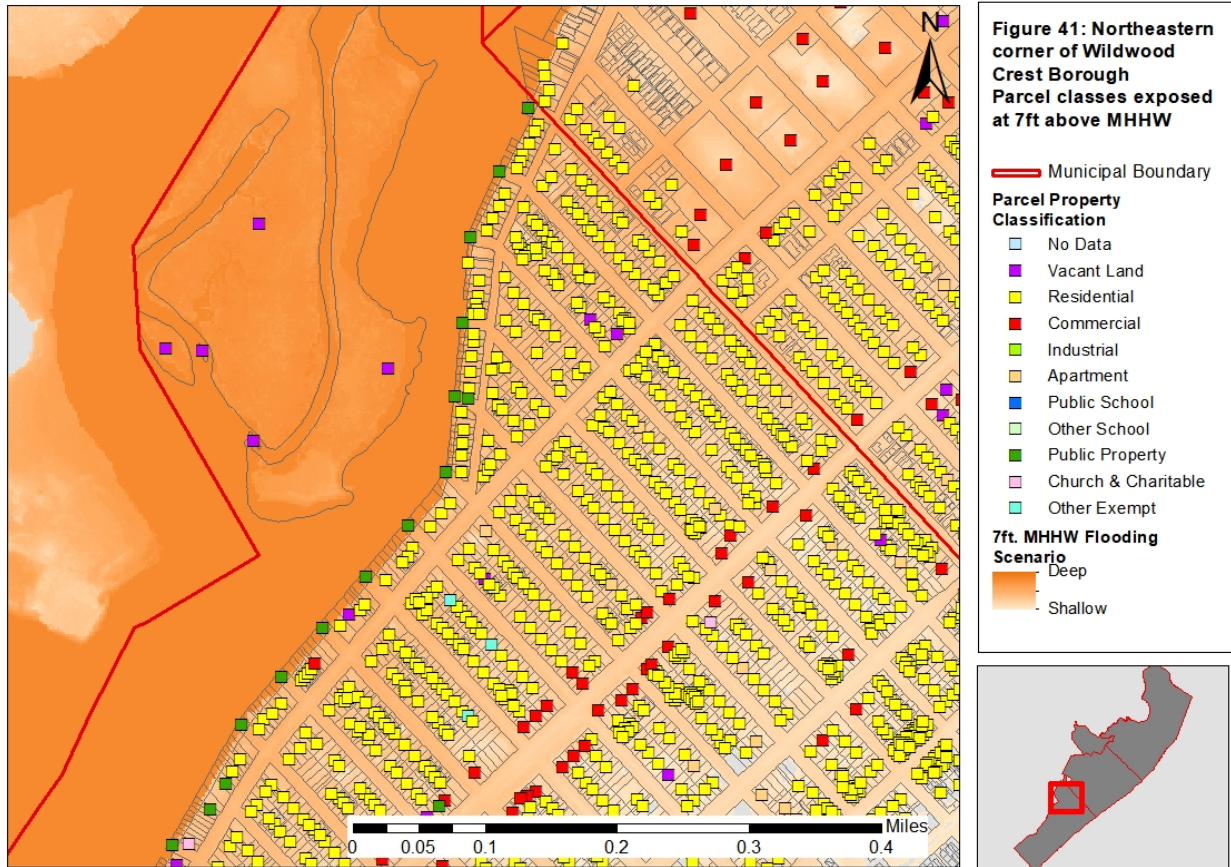


Figure 41. Northeast corner of Wildwood Crest Borough Vulnerability Under 7-Foot MHHW Flooding Scenario

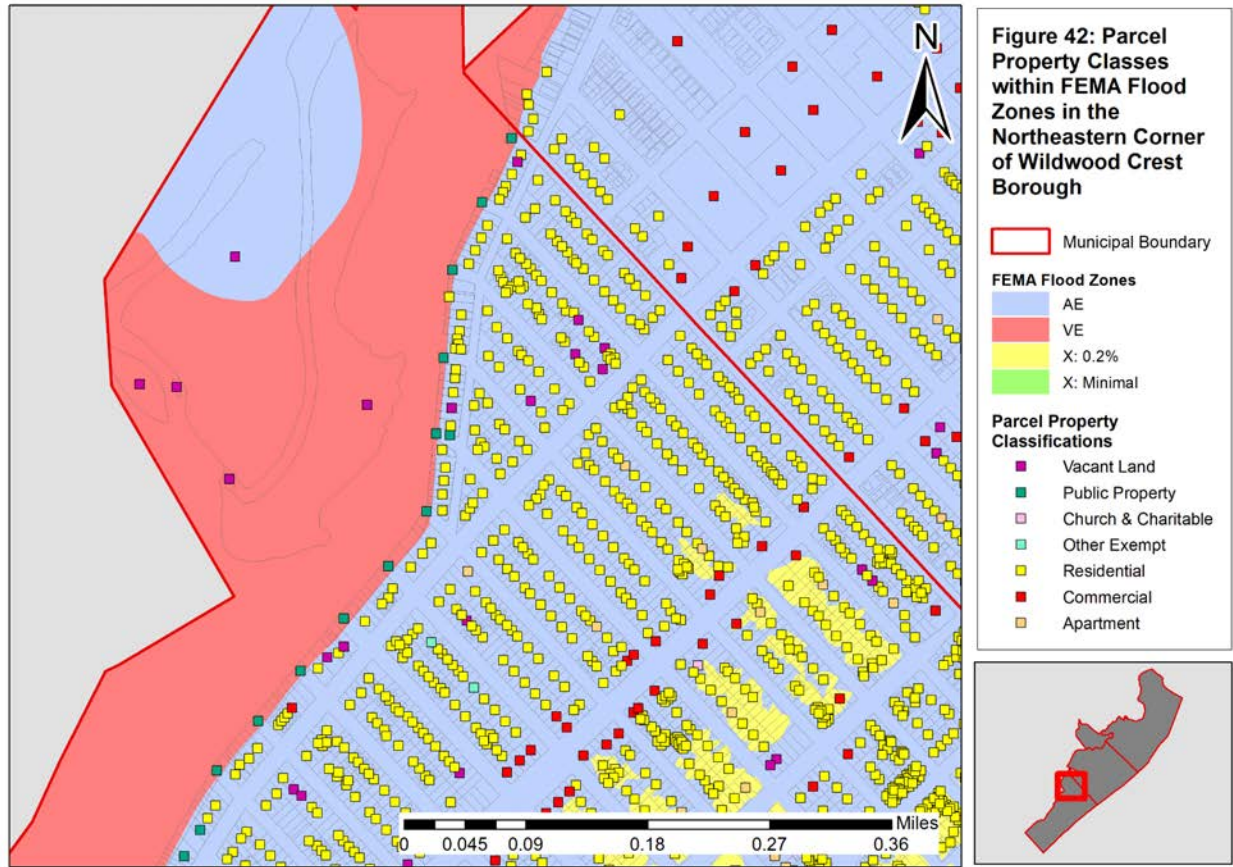


Figure 42. Northeast Wildwood Crest Borough parcel property classes within FEMA Flood Zones

TABLES

Note for Tables 1a, 1b, 2a, 2b:

Parcel Counts and Parcel dollar values exposed at various water levels, or included in various FEMA flood zones, are derived from GIS analysis completed using data layers described in the *Introduction and Methodology of Analysis* section.

Please refer to the section *How to Interpret Maps* on page 7 for definitions of the FEMA flood zones.

Table 1a. Cumulative Counts of Properties Affected by 2-, 3-, 5-, and 7-Foot Flood Hazard Levels.

This table presents the number of property parcels impacted by varying flood levels in Wildwoods, NJ.

<i>Cumulative Counts of Properties Affected by 2', 3', 5', and 7' Flood Hazard Levels.</i>													
		<i>1, Vacant Land</i>	<i>2, Residential</i>	<i>4A, Commercial</i>	<i>4B, Industrial</i>	<i>4C, Apartment</i>	<i>15A, Public School</i>	<i>15B, Other School</i>	<i>15C, Public Property</i>	<i>15D Church & Charitable</i>	<i>15F, Other Exempt</i>	<i>NO DATA</i>	<i>Total</i>
2 feet above MHHW	North Wildwood	31	183	2	0	1	0	0	59	0	0	124	400
	West Wildwood	93	487	4	0	1	0	0	19	1	3	63	671
	Wildwood	25	110	19	0	0	0	0	10	0	0	112	276
	Wildwood Crest	5	8	2	0	0	1	0	21	0	0	149	186
	ALL CITIES	154	788	27	0	2	1	0	109	1	3	448	1,533
3 feet above MHHW	North Wildwood	53	1,017	36	0	6	0	0	64	3	5	276	1,460
	West Wildwood	115	588	7	0	2	0	0	23	1	4	81	821
	Wildwood	89	628	46	3	3	0	0	16	3	4	347	1,139
	Wildwood Crest	8	110	3	0	1	2	0	26	1	0	298	449
	ALL CITIES	265	2,343	92	3	12	2	0	129	8	13	1002	3,869
5 feet above MHHW	North Wildwood	93	2,137	100	0	29	0	0	85	13	12	1,087	3,556
	West Wildwood	130	617	9	0	2	0	0	26	1	4	87	876
	Wildwood	207	1,474	206	4	86	1	1	37	15	7	1,407	3,445
	Wildwood Crest	30	1,227	35	0	8	3	0	45	1	3	1,130	2,482
	ALL CITIES	460	5,455	350	4	125	4	1	193	30	26	3,711	10,359
7 feet above MHHW	North Wildwood	106	2,836	156	0	46	1	1	89	19	16	3,230	6,500
	West Wildwood	133	618	9	0	2	0	0	29	1	4	89	885
	Wildwood	224	1,751	467	5	153	2	1	54	22	14	2,245	4,938
	Wildwood Crest	54	3,345	73	0	29	5	0	59	3	4	2,572	6,144
	ALL CITIES	517	8,550	705	5	230	8	2	231	45	38	8,136	18,467

Table 1b. Cumulative Net Values of Properties Affected by 2-, 3-, 5-, and 7-Foot Flood Hazard Levels.

<i>Cumulative Net Value (to the nearest \$1,000) of Properties affected by 2', 3', 5', and 7' Flood Hazard Levels.</i>												
<i>NOTE: parcels missing MOD-IV value data are not included.</i>												
		1, Vacant Land	2, Residential	4A, Commercial	4B, Industrial	4C, Apartment	15A, Public School	15B, Other School	15C, Public Property	15D Church & Charitable	15F, Other Exempt	Total
2 feet above MHHW	North Wildwood	\$2,258	\$58,101	\$1,032	\$0	\$736	\$0	\$0	\$19,153	\$0	\$0	\$81,280
	West Wildwood	\$4,816	\$118,367	\$1,576	\$0	\$238	\$0	\$0	\$2,828	\$321	\$523	\$128,669
	Wildwood	\$2,730	\$25,606	\$12,165	\$0	\$0	\$0	\$0	\$864	\$0	\$0	\$41,365
	Wildwood Crest	\$10	\$5,852	\$1,352	\$0	\$0	\$278	\$0	\$383	\$0	\$0	\$7,875
	ALL CITIES	\$9,814	\$207,926	\$16,124	\$0	\$974	\$278	\$0	\$23,228	\$321	\$523	\$259,189
3 feet above MHHW	North Wildwood	\$6,879	\$343,233	\$27,806	\$0	\$3,544	\$0	\$0	\$25,867	\$3,311	\$1,631	\$412,272
	West Wildwood	\$6,375	\$154,452	\$3,433	\$0	\$532	\$0	\$0	\$3,229	\$321	\$795	\$169,137
	Wildwood	\$11,524	\$136,745	\$26,421	\$2,750	\$2,087	\$0	\$0	\$5,578	\$798	\$745	\$186,646
	Wildwood Crest	\$1,465	\$66,122	\$3,039	\$0	\$386	\$1,100	\$0	\$2,730	\$2,156	\$0	\$76,997
	ALL CITIES	\$26,243	\$700,552	\$60,700	\$2,750	\$6,549	\$1,100	\$0	\$37,404	\$6,586	\$3,170	\$845,053
5 feet above MHHW	North Wildwood	\$18,910	\$809,580	\$111,159	\$0	\$16,446	\$0	\$0	\$51,038	\$11,912	\$4,890	\$1,023,935
	West Wildwood	\$7,921	\$168,574	\$6,701	\$0	\$532	\$0	\$0	\$4,058	\$321	\$795	\$188,901
	Wildwood	\$23,491	\$317,358	\$129,096	\$3,930	\$28,432	\$4,589	\$4,469	\$39,634	\$11,610	\$1,496	\$564,105
	Wildwood Crest	\$8,614	\$499,529	\$19,137	\$0	\$3,710	\$1,922	\$0	\$18,293	\$2,156	\$1,065	\$554,426
	ALL CITIES	\$58,936	\$1,795,040	\$266,093	\$3,930	\$49,120	\$6,511	\$4,469	\$113,023	\$25,999	\$8,246	\$2,331,368

Cumulative Net Value (to the nearest \$1,000) of Properties affected by 2', 3', 5', and 7' Flood Hazard Levels.												
NOTE: parcels missing MOD-IV value data are not included.												
		<i>1, Vacant Land</i>	<i>2, Residential</i>	<i>4A, Commercial</i>	<i>4B, Industrial</i>	<i>4C, Apartment</i>	<i>15A, Public School</i>	<i>15B, Other School</i>	<i>15C, Public Property</i>	<i>15D Church & Charitable</i>	<i>15F, Other Exempt</i>	Total
7 feet above MHHW	North Wildwood	\$23,691	\$1,153,396	\$214,126	\$0	\$27,093	\$16,154	\$13,739	\$58,892	\$17,265	\$9,084	\$1,533,441
	West Wildwood	\$8,015	\$169,208	\$6,701	\$0	\$532	\$0	\$0	\$5,171	\$321	\$795	\$190,743
	Wildwood	\$27,817	\$383,126	\$384,581	\$4,253	\$51,887	\$17,238	\$4,469	\$91,340	\$18,692	\$19,258	\$1,002,661
	Wildwood Crest	\$16,763	\$1,299,167	\$53,583	\$0	\$14,206	\$14,419	\$0	\$21,007	\$3,361	\$1,533	\$1,424,039
	ALL CITIES	\$76,286	\$3,004,898	\$658,991	\$4,253	\$93,718	\$47,811	\$18,208	\$176,410	\$39,639	\$30,669	\$4,150,884

Table 2a. Counts of Properties within FEMA Flood Zones.

<i>Number of Properties within FEMA Flood Zones</i>													
		<i>1, Vacant Land</i>	<i>2, Residential</i>	<i>4A, Commercial</i>	<i>4B, Industrial</i>	<i>4C, Apartment</i>	<i>15A, Public School</i>	<i>15B, Other School</i>	<i>15C, Public Property</i>	<i>15D Church & Charitable</i>	<i>15F, Other Exempt</i>	<i>NO DATA</i>	<i>Total</i>
AE (SFHA, 1% Annual Chance)	North Wildwood	103	2,838	155	-	46	1	1	67	19	16	3,246	6,492
	West Wildwood		618	9	-	2	-	-	26	1	4	86	875
	Wildwood		1,739	465	5	154		1	44	22	14	2,210	4,846
	Wildwood Crest	47	3,566	86	-	25		-	24	3	6	2,243	6,004
	ALL CITIES	469	8,761	715	5	227	7	2	161	45	40	7,785	18,217
VE (SFHA, 1% Annual Chance)	North Wildwood	3	-	2	-	-	-	-	29	-	-	23	57
	West Wildwood	4	-	-	-	-	-	-	2	-	-	3	9
	Wildwood	34	12	11	-	-	-	-	11	-	1	39	108
	Wildwood Crest	4	1	2	-	-	-	-	32	-	-	151	190
	ALL CITIES	45	13	15	-	-	-	-	74	-	1	216	364
X-500yr (0.2% Annual Chance)	North Wildwood	-	-	-	-	-	-	-	-	-	-	24	24
	West Wildwood	-	-	-	-	-	-	-	1	-	-	-	1
	Wildwood	-	-	-	-	-	-	-	2	-	-	-	2
	Wildwood Crest	11	1,239	48	-	5	1	-	19	2	1	865	2,191
	ALL CITIES	11	1,239	48	-	5	1	-	22	2	1	889	2,218
X- Minima l Hazard	North Wildwood	-	-	-	-	-	-	-	-	-	-	1	1
	West Wildwood	-	-	-	-	-	-	-	-	-	-	-	-
	Wildwood	-	-	-	-	-	-	-	2	-	-	-	2
	Wildwood Crest	-	-	-	-	-	-	-	-	-	-	-	-
	ALL CITIES	-	-	-	-	-	-	-	2	-	-	1	3

Table 2b. Net Values of Properties within FEMA Flood Zones.

Net Value (to the nearest \$1,000) of Properties in FEMA Flood Zones NOTE: parcels missing MOD-IV value data are not included.												
		1, Vacant Land	2, Residential	4A, Commercial	4B, Industrial	4C, Apartment	15A, Public School	15B, Other School	15C, Public Property	15D Church & Charitable	15F, Other Exempt	Total
AE (SFHA, 1% Annual Chance)	North Wildwood	\$23,690	\$1,154,518	\$199,625	\$0	\$27,093	\$16,154	\$13,739	\$57,290	\$17,265	\$9,084	\$1,518,458
	West Wildwood	\$7,986	\$169,208	\$6,701	\$0	\$532	\$0	\$0	\$3,144	\$321	\$795	\$188,687
	Wildwood	\$26,569	\$380,202	\$375,651	\$4,253	\$52,221	\$17,238	\$4,469	\$83,981	\$18,692	\$19,258	\$982,533
	Wildwood Crest	\$18,616	\$1,381,534	\$119,423	\$0	\$12,410	\$4,669	\$0	\$18,655	\$3,361	\$2,634	\$1,561,302
	ALL CITIES	\$76,861	\$3,085,461	\$701,399	\$4,253	\$92,256	\$38,061	\$18,208	\$163,071	\$39,639	\$31,771	\$4,250,980
VE (SFHA, 1% Annual Chance)	North Wildwood	\$1	\$0	\$15,435	\$0	\$0	\$0	\$0	\$29,158	\$0	\$0	\$44,594
	West Wildwood	\$30	\$0	\$0	\$0	\$0	\$0	\$0	\$1,094	\$0	\$0	\$1,124
	Wildwood	\$1,248	\$2,925	\$20,572	\$0	\$0	\$0	\$0	\$10,870	\$0	\$56,224	\$91,839
	Wildwood Crest	\$5	\$895	\$1,352	\$0	\$0	\$0	\$0	\$1,733	\$0	\$0	\$3,984
	ALL CITIES	\$1,283	\$3,819	\$37,359	\$0	\$0	\$0	\$0	\$42,855	\$0	\$56,224	\$141,540
X-500yr (0.2% Annual Chance)	North Wildwood	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	West Wildwood	\$0	\$0	\$0	\$0	\$0	\$0	\$932	\$0	\$0	\$0	\$932
	Wildwood	\$0	\$0	\$0	\$0	\$0	\$0	\$538	\$0	\$0	\$0	\$538
	Wildwood Crest	\$3,482	\$443,166	\$176,955	\$0	\$2,312	\$9,750	\$49,092	\$6,824	\$0	\$431	\$692,012
	ALL CITIES	\$3,482	\$443,166	\$176,955	\$0	\$2,312	\$9,750	\$50,562	\$6,824	\$0	\$431	\$693,482

Net Value (to the nearest \$1,000) of Properties in FEMA Flood Zones NOTE: parcels missing MOD-IV value data are not included.												
		1, Vacant Land	2, Residential	4A, Commercial	4B, Industrial	4C, Apartment	15A, Public School	15B, Other School	15C, Public Property	15D Church & Charitable	15F, Other Exempt	Total
X- Minima I Hazard	North Wildwood	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	West Wildwood	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	Wildwood	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$526,399	\$0	\$0	\$526,399
	Wildwood Crest	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	ALL CITIES	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$526,399	\$0	\$0	\$526,399

Table 3. Counts of properties affected in overburdened communities, by municipality and water level.

Municipality	Overburdened Community	Total Properties in Area	% Total Properties Exposed During Flood Event				
			2ft	3ft	5ft	7ft	dry
North Wildwood City	Total	3904	188 (4.8%)	680 (17.4%)	1309 (33.5%)	1719 (44.0%)	8 (0.2%)
	Minority	0	0	0	0	0	
	Low Income	3904	188	680	1309	1719	8
	Minority & Low Income	1857	0	0	0	0	0
West Wildwood Borough	Total	0	0	0	0	0	
	Minority	0	0	0	0	0	
	Low Income	0	0	0	0	0	
	Minority & Low Income	0	0	0	0	0	
Wildwood City	Total	5703	164 (2.9%)	792 (13.9%)	2038 (35.8%)	2693 (47.2%)	16 (0.28%)
	Minority	1815	42 (2.3%)	191 (10.5%)	714 (39.3%)	903 (49.8%)	7 (0.39%)
	Low Income	3109	121 (3.9%)	587 (18.9%)	1162 (37.4%)	1237 (39.8%)	2 (0.06%)
	Minority & Low Income	737	1 (0.14%)	14 (1.9%)	162 (22%)	553 (75%)	7 (0.95%)
Wildwood Crest Borough	Total	1535	0 (0%)	60 (3.9%)	376 (24.5%)	874 (56.9%)	225 (14.7%)
	Minority	0	0	0	0	0	
	Low Income	1535	0	60	376	874	225
	Minority & Low Income	0	0	0	0	0	

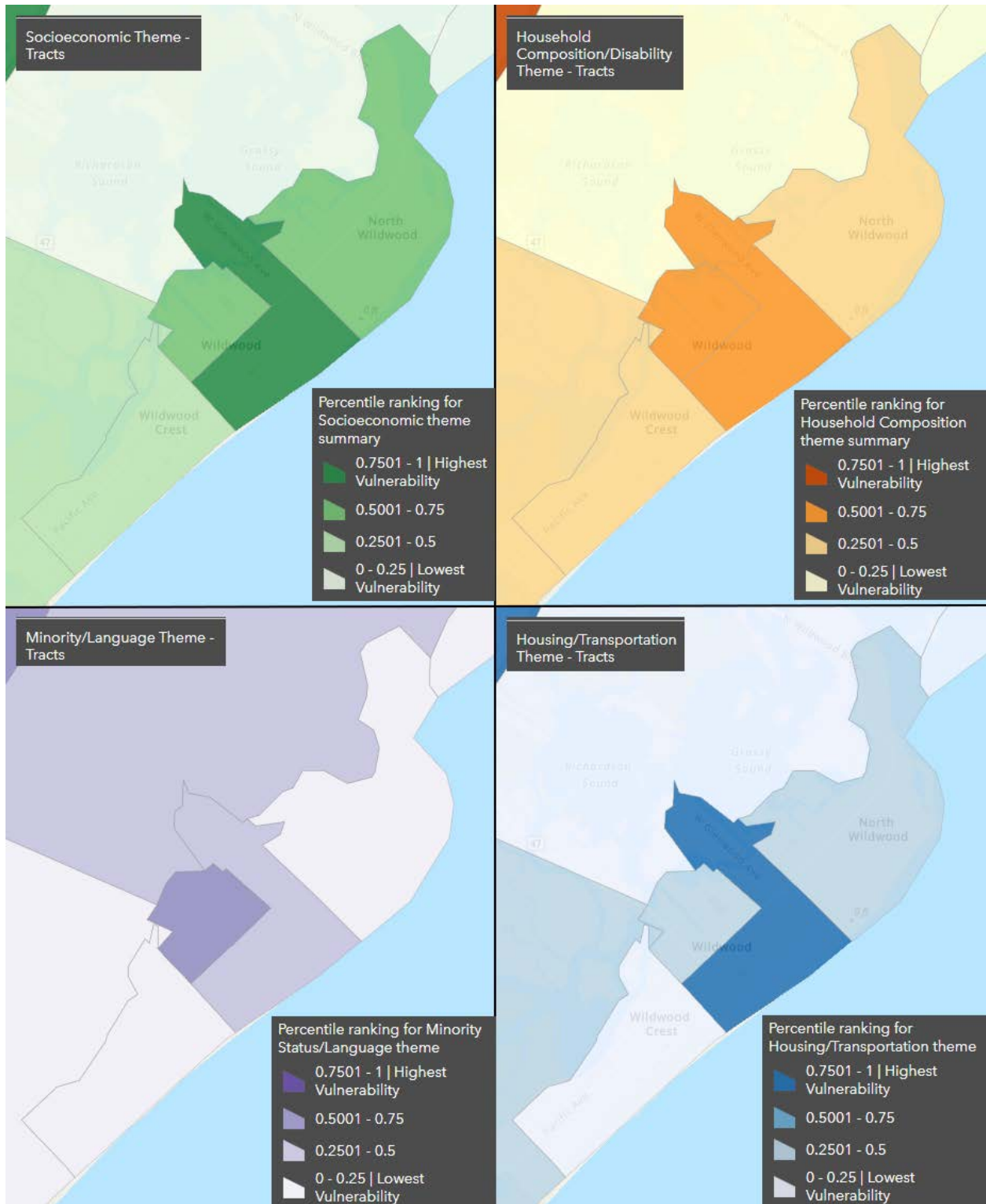


Figure G. This map, derived from [census bureau 2018 ACS data](#), is for illustrative purposes only and shows the percentile ranking of social vulnerability index scores by census tract.

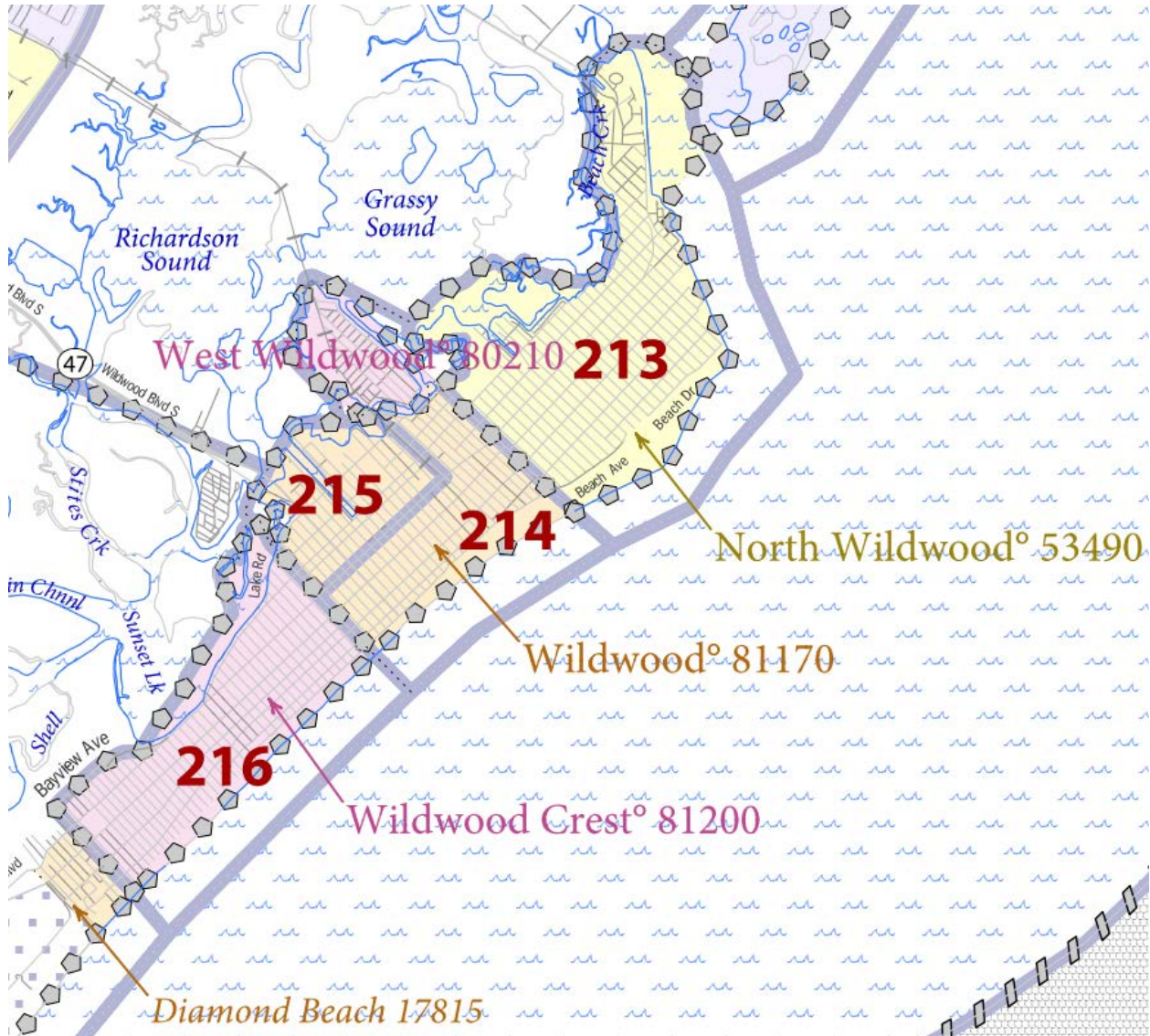


Figure H. 2010 Census Tract Reference Map - Cape May County, NJ. (Sourced from: https://www2.census.gov/geo/maps/dc10map/tract/st34_nj/c34009_cape_may/DC10CT_C34009_001.pdf)

Table 4. Socially Vulnerable Communities by Themes and Census Tract

Displays the status of socially vulnerable individuals in urban areas that are also vulnerable to varying flood levels in Wildwoods based on 2018 American Community Survey (ACS) data. Values derived from ArcMaps analysis completed using data layers described in Introduction and Methodology of Analysis section. Black bordered rows identify the SVI demographic most at risk in the particular census tract in all flooding scenarios. Black outlined rows highlight the most impacted socially vulnerable community that can be estimated by individual.

Census Tract	Social Vulnerability	Number of Individuals/Households Exposed During Flood Events				
		Total	2ft	3ft	5ft	7ft
CT 213 City of North Wildwood	All SVI	3849	308	924	2171	2906
	Below Poverty (individ.)	340	27	82	192	257
	Unemployed (individ.)	183	15	44	103	138
	Income (per capita)	35854	2873	8611	20226	27071
	No High School Diploma (individ.)	292	23	70	165	220
	Aged 65 or Older (individ.)	1518	122	365	856	1146
	Aged 17 or Younger (individ.)	405	32	97	228	306
	Older than Age 5 with a Disability (individ.)	664	53	159	375	501
	Single-Parent Households (households)	19	2	5	11	14
	Minority (individ.)	204	16	49	115	154
	Speaks English "Less than Well" (individ.)	17	1	4	10	13
	Multi-Unit Structures (count)	794	64	191	448	599
	Mobile Homes (count)	15	1	4	8	11
	Crowding (households)	20	2	5	11	15
	No Vehicle (households)	87	7	21	49	66
	Group Quarters (individ.)	0	0	0	0	0
CT 214 Borough of West Wildwood and portion of City of Wildwood	All SVI	3707	527	790	1753	2447
	Below Poverty (individ.)	989	141	211	468	653
	Unemployed (individ.)	285	41	61	135	188
	Income (per capita)	30820	4385	6567	14573	20342
	No High School Diploma (individ.)	382	54	81	181	252
	Aged 65 or Older (individ.)	748	106	159	354	494

Census Tract	Social Vulnerability	Number of Individuals/Households Exposed During Flood Events				
		Total	2ft	3ft	5ft	7ft
	Aged 17 or Younger (indiv.)	650	92	139	307	429
	Older than Age 5 with a Disability (indiv.)	555	79	118	262	366
	Single-Parent Households (households)	147	21	31	70	97
	Minority (indiv.)	808	115	172	382	533
	Speaks English "Less than Well" (indiv.)	59	8	13	28	39
	Multi-Unit Structures (count)	344	49	73	163	227
	Mobile Homes (count)	6	1	1	3	4
	Crowding (households)	63	9	13	30	42
	No Vehicle (households)	332	47	71	157	219
	Group Quarters (indiv.)	23	3	5	11	15
CT 215 <i>portion of City of Wildwood</i>	All SVI	1742	275	759	1445	1587
	Below Poverty (indiv.)	294	46	128	244	268
	Unemployed (indiv.)	58	9	25	48	53
	Income (per capita)	46213	7283	20128	38340	42111
	No High School Diploma (indiv.)	180	28	78	149	164
	Aged 65 or Older (indiv.)	392	62	171	325	357
	Aged 17 or Younger (indiv.)	210	33	91	174	191
	Older than Age 5 with a Disability (indiv.)	315	50	137	261	287
	Single-Parent Households (Households)	57	9	25	47	52
	Minority (indiv.)	501	79	218	416	457
	Speaks English "Less than Well" (indiv.)	65	10	28	54	59
	Multi-Unit Structures (count)	221	35	96	183	201
	Mobile Homes (count)	0	0	0	0	0
	Crowding (households)	0	0	0	0	0
	No Vehicle (households)	204	32	89	169	186
Group Quarters (indiv.)	28	4	12	23	26	
CT 216 <i>Borough of Wildwood Crest</i>	All SVI	3131	39	181	969	1937
	Below Poverty (indiv.)	166	2	10	51	103

Census Tract	Social Vulnerability	Number of Individuals/Households Exposed During Flood Events				
		Total	2ft	3ft	5ft	7ft
	Unemployed (individ.)	170	2	10	53	105
	Income (per capita)	39143	483	2267	12115	24222
	No High School Diploma (individ.)	133	2	8	41	82
	Aged 65 or Older (individ.)	1133	14	66	351	701
	Aged 17 or Younger (individ.)	403	5	23	125	249
	Older than Age 5 with a Disability (individ.)	432	5	25	134	267
	Single-Parent Households (households)	36	0	2	11	22
	Minority (individ.)	235	3	14	73	145
	Speaks English "Less than Well" (individ.)	9	0	1	3	6
	Multi-Unit Structures (count)	304	4	18	94	188
	Mobile Homes (count)	0	0	0	0	0
	Crowding (households)	0	0	0	0	0
	No Vehicle (households)	55	1	3	17	34
	Group Quarters (individ.)	0	0	0	0	0

ACKNOWLEDGEMENT

This product was developed by the Rutgers NJ Climate Change Resource Center's *NJ Climate Resilience Corps*. For more information about the Climate Change Resource Center, visit <https://njclimateresourcecenter.rutgers.edu/>