



THE BOROUGH OF LITTLE FERRY

Strategic Recovery Planning Report

APRIL 8, 2014

Clarke Caton Hintz



Architecture

Planning

Landscape Architecture

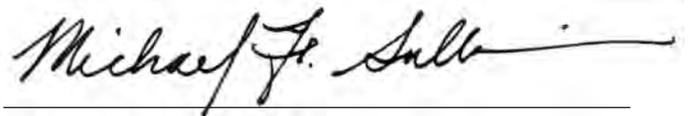
Strategic Recovery Planning Report

**Borough of Little Ferry,
Bergen County, New Jersey**

*Prepared for:
The Borough of Little Ferry*

April 8, 2014

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Bergen County, New Jersey**

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Introduction

Hurricane Sandy was the deadliest hurricane of the 2012 Atlantic Hurricane season, as well as one of the costliest storms to impact the United States coast. It made landfall on October 29, 2012 along the southern coast of New Jersey near Atlantic City. Fortunately, it was downgraded to a post-tropical cyclone with hurricane force winds prior to landfall. Even with the downgraded status, the damage in New Jersey was unprecedented with approximately 346,000 New Jersey homes damaged, of which 22,000 were uninhabitable and nearly 19,000 businesses sustained damage of \$250,000 or more¹.

With flood waters south of Route 46 approximately three to four feet deep (high water elevation measured at approximately 9 feet NGVD29; see Appendix A), Little Ferry experienced significant flooding due to a tidal surge overtopping various berms (man-made land forms serving as flood protection) and the natural edges of the Hackensack River. Breaches occurred as a result of storm-generated water level rise at Newark Bay, which pushed a massive volume of water into the inland reaches of the Hackensack River. As a result of the River's capacity being exceeded, protective berms were breached and overtopped in many places, including but not limited to, Little Ferry. The rising water levels were exacerbated since the storm occurred during high tide.

In response to the storm's impacts, the federal government allocated more than \$50 billion to 19 federal agencies as part of the Disaster Relief Appropriations act of 2013. Of that allocation, \$15.2 billion was appropriated for the HUD Community Development Block Grant Disaster Recovery (CDBG-DR) program and of this, \$3.3 billion was set aside for New Jersey and will be awarded in two rounds. New Jersey received \$1.8 billion in the first round (2013) and will receive \$1.5 billion in the second round (2014). This Strategic Recovery Planning Report (SRPR) is prepared for the Borough of Little Ferry



1. A satellite image of the storm on October 29, with most of the U.S. coastline artificially highlighted.

¹ Blake, Eric S.; Kimberlain, Todd B.; Berg, Robert J.; Cangialosi, John P. and Beven, John L., II. Tropical Cyclone Report, Hurricane Sandy. National Hurricane Center. February 12, 2013.

with funding provided by the New Jersey Department of Community Affairs through its Post Sandy Planning Assistance Grant Program. This State grant program is funded by the Federal CDBG-DR program allocation. Completion of a Strategic Recovery Planning Report is prerequisite for additional funding from the Post Sandy Planning Assistance Grant Program; subsequent applications may request funding for master planning, ordinances, capital facilities planning and similar projects.

The Borough, as well as the State and County, are now conducting post-disaster planning, which is defined as creating a vision for the community's recovery that addresses reconstruction, economic recovery and land use regulations. The immediate safety issues during and after a disaster are not addressed in this topic and are better addressed in emergency response planning. There are three broad categories which municipalities should address in their post-disaster planning:



2. Flooding in Little Ferry from Superstorm Sandy

Hazard Mitigation – The lessening of the potential adverse impacts of physical hazards (including those that are human-induced) through actions that reduce hazard, exposure, and vulnerability.

Resilience – The ability of a system and its component parts to anticipate, absorb, accommodate or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration or improvement of its essential basic structures and functions

Adaptation – The process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities.²

This Strategic Recovery Planning Report address each of these categories and provides action steps for how Little Ferry can perform hazard mitigation, increase its resilience and adapt to a changing climate and weather events.

Also ongoing for post-disaster planning in Little Ferry is a study by the Flood Mitigation Center of the New Jersey Institute of Technology (NJIT) that is funded by the New Jersey Department of Environmental Protection. The study will address ways to alleviate flooding in Little Ferry, Moonachie and Hackensack. Public release of the study is not anticipated until late spring or early summer 2014.

² IPCC, 2012: Glossary of terms. In: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.)]. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC). Cambridge University Press, Cambridge, UK, and New York, NY, USA, pp. 555-564.

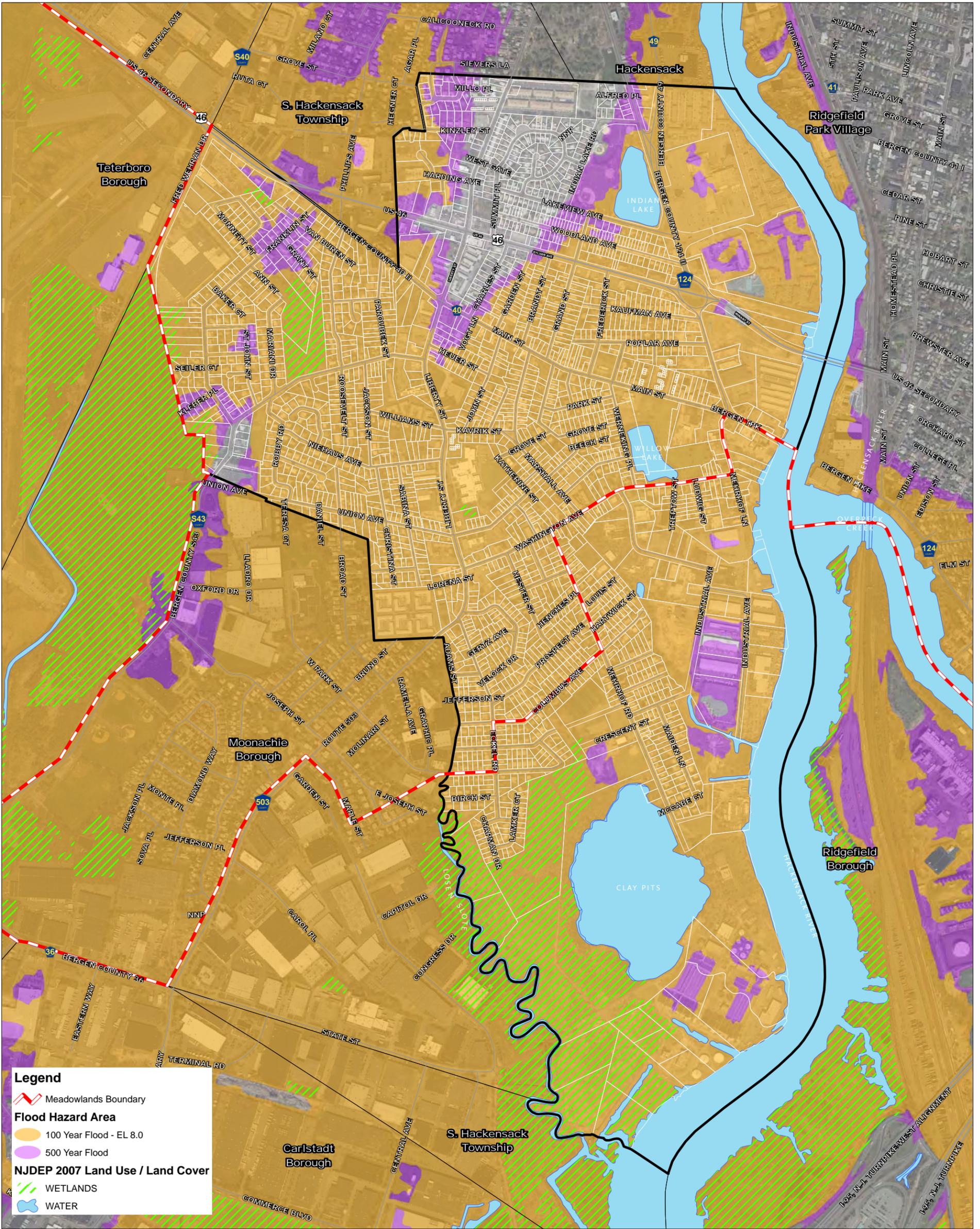
Existing Conditions and Current Flood Control Strategy

While the level of flooding that resulted from Superstorm Sandy was unprecedented in the Borough, Little Ferry regularly floods during rain events. Nearly the entire Borough - 1,004 acres or 94% - is located within the Special Flood Hazard Area (defined as having a 1% annual chance of flooding) that relates to the Hackensack River, Losen Slote Creek and/or the Riser Ditch. The primary stormwater storage for Little Ferry is Losen Slote Creek at the southwest portion of the Borough. Surrounding this waterway in the Borough are significant wetlands, particularly between the creek and the Clay Pits – a former quarry now serving as a pond. Losen Slote Creek also provides stormwater capacity for the surrounding municipalities of Moonachie, South Hackensack and Carlstadt.

The Borough's primary flood prevention and resilience strategies are focused on collecting water and pumping it out of Borough lands and waterways and into the Hackensack River. To accomplish this, the Borough has created a storm water management system comprised of two primary components:

1. Man-made items such as stormwater piping and pump stations at the following locations: the meeting of Losen Slote Creek and the Hackensack River, Willow Lake Park, Main Street; Maiden Lane, Eckel and Adams Streets, Williams Street, Union Avenue and Street (DePeysler); and
2. A system of natural creeks and ditches that move storm water through the Borough into the Hackensack River and marches of the Meadowlands. The system includes the following: Losen Slote Creek, a ditch along Route 46 east and the Riser Road ditch.

As described in this Report, much of the Borough's stormwater and flood infrastructure is in need of repair or upgrade. Such improvements include, but are not limited to, expanding capacity or stormwater pipes along Main Street, cleaning and expansion of ditches and dredging and expansion of Willow Lake.



Parcel Source: NJGIN Tax Parcels for Atlantic County 2012
 Aerial Source: 2012 High Resolution Orthophotography, NAD83 NJ State Plane Feet, MrSID Tiles
 Published by NJ Office of Information Technology (NJGIT), Office of Geographic Information Systems (OGIS) 3/2013

0 175 350 700 1,050 1,400 Feet



STRATEGIC RECOVERY PLANNING REPORT

Flood Hazard Area

Little Ferry Borough, Bergen County, NJ April 2014

Clarke Caton Hintz

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Damage from Superstorm Sandy

It was a tidal surge at Newark Bay during Superstorm Sandy that caused the Hackensack River to inundate Little Ferry, as well as surrounding municipalities. The surge measured three to four feet (high water elevation measured at approximately 9 feet NGVD29; see Appendix A), exceeding the height of the berms along the Hackensack River, which have an approximate height of five (5) feet above sea level. The height of the berms allowed water to flow into Little Ferry (and surrounding municipalities); their presence also prevented the water from receding to the Hackensack River, or other waterways, creating a “bathtub” effect until the water could be pumped out. This may in part be because the berms were not constructed with the intended purpose of flood control; instead they were created by the Mosquito Commission to prevent standing water in low lying areas. Notwithstanding, one of the primary purposes of the berms today is flood control. Up to nine (9) feet of water was seen along inland areas south of Route 46. See Appendix A, Job and Job High Water Elevation Tabulation, dated October 7, 2103. This flooding not only caused damage to homes and businesses, but also to Borough facilities and infrastructure.



3. Flooding in Little Ferry after Superstorm Sandy



4. Emergency rescue after Superstorm Sandy

Exacerbating the flood damage was an inability to pump water at the Main Street Pump Station due to power outages, creating a prolonged “bathtub effect”. As recommended in the Job and Job High Water Elevation Tabulation dated October 7, 2103, the Borough should install a permanent emergency

standby generator for the Main Street Pump Station; such an improvement should also be considered for the Borough's other pump stations.

FEMA reports that the Borough, as of January 2013, has 159 repetitive loss properties. Repetitive loss figures are an indicator of the extent of significant flooding in the Borough, and its impact on residents' homes and quality of life. With a few exceptions, these properties are located south of Route 46 and east of Franklin Street. These properties, which qualify under the Severe Repetitive Loss Program, are defined as a residential property which has at least four National Flood Insurance Program (NFIP) claim payments over \$5,000 each with a cumulative loss that exceeds \$20,000, at least two separate claims payments have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building and at least two of the claims must have occurred within in a 10 year period at least 10 days apart. Repetitive loss data for the years 2009 through the end of 2012 indicates that repetitive loss claims in Little Ferry for this period total approximately \$6.84 million for building payments and \$380,000 for contents.

In addition to private property damage, there was significant damage to Borough property and infrastructure. Flood damage occurred at Willow Lake, Lake View and Pickens Parks. The playing fields and recreation facilities, such as batting cages, were damaged by flooding from Superstorm Sandy. Other damage included water inundation and loss of soil stability at the public safety building and loss of Borough vehicles.

Vulnerabilities & Opportunities Highlighted by Superstorm Sandy

Although the Borough regularly floods during rain events, Superstorm Sandy resulted in flood waters from the Hackensack River that originated from a tidal surge over 20 miles away at Newark Bay. The extreme flooding and events leading to it, and those that occurred after, highlighted many of the Borough's vulnerabilities to weather events.

There were few opportunities highlighted by Superstorm Sandy, but it did create the opportunity to evaluate the flood control infrastructure and to renew advancement of proposals for a Newark Bay flood gate and an early warning system – two measures that have been recommended for many years prior.

Sea Level Rise

Rising sea levels will exacerbate the risks to the Borough's population and economic activity from flooding. Global sea levels rose an average rate of 0.6 inches per decade during the 20th century with the average rate increasing to 1.2 inches per decade since the 1990's³. Since 1870, global sea levels have risen about 8 inches⁴. While rates of sea level rise have been and will continue to vary globally; those along the New Jersey coast have risen faster than the global average due to land subsidence. Atlantic City, for example, has seen a sea level rise of 1.5 inches per decade since the earliest record keeping in 1912⁵. Global sea levels are projected to increase between .85 feet and 2.95 feet above the 2005 sea level by 2100⁶. While Atlantic City is in a different geophysical

3 New Jersey Climate Adaptation Alliance (NJCAA). 2013. Resilience. Preparing New Jersey for Climate Change: A Gap Analysis from the New Jersey Climate Adaptation Alliance. Edited by Matt Campo, Marjorie Kaplan, Jeanne Herb. New Brunswick, New Jersey: Rutgers University.

4 Future Climate Change. United States Environmental Protection Agency. <http://www.epa.gov/climatechange/science/future.html#sealevel>. Accessed March 12, 2014

5 New Jersey Climate Adaptation Alliance (NJCAA). 2013. Resilience. Preparing New Jersey for Climate Change: A Gap Analysis from the New Jersey Climate Adaptation Alliance. Edited by Matt Campo, Marjorie Kaplan, Jeanne Herb. New Brunswick, New Jersey: Rutgers University.

6 IPCC, 2013: Summary for Policymakers. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)].

area than Little Ferry, the example illustrates the varying nature of global sea level rise and the particular impact to the New Jersey coast. It further indicates that storm surges from the Atlantic Ocean may be exacerbated in the future.

Sea level rise will cause flooding to occur more frequently and to last for longer periods of time. In Little Ferry this means that tidal flood waters along the Hackensack will occur more frequently and will last longer. The effects of sea level rise on Little Ferry will not be uniform across the Borough but will adjust according to topography with these properties at the lowest elevation or otherwise serving as a water collection point experiencing the largest impacts. Additional impacts from sea level rise include conversion of the some of the Borough's marshes to open water.

Planning for the future should consider sea level rise. Doing so leads to policies and improvements that will guide development out of harm's way not only now but in the future and will ensure that policies remain relevant for decades to come. As shown in Appendix B., which contains maps depicting flooding and flood hazard areas associated with sea level rise, just one foot of sea level rise will impact the Borough's neighborhoods with water inundation. At three feet, the majority of neighborhoods south of Route 46 will be inundated. Also included in this Appendix are maps depicting the degree of confidence of inundation during the various sea level rise scenarios. The Appendix additionally includes maps depicting changes to the Borough's flood hazard area and marshlands as a result of the various sea level rise scenarios.⁷

Population and Economic Activity at Risk

The Bergen County 2008 Natural Hazard Mitigation Plan recognized one of the Borough's greatest vulnerabilities, stating "Because much of Bergen County is developed, the vulnerability is extremely high if an event were to occur. Tropical storms and hurricanes do not need to have a direct path over Bergen County to affect the residents." The Bergen County Plan, which is based on information which is at least five years old, states in Little Ferry 3,343 permanent housing units would be vulnerable to damage by a Category 1 hurricane, 196 units would be vulnerable to damage by a Category 2 hurricane, 66 units would be vulnerable to damage by a Category 3 hurricane and 301 units would be vulnerable to damage by a Category 4 hurricane. Furthermore, the Plan shows nearly the entire Borough being subject to flooding during a Category 2 hurricane. Fortunately, Superstorm Sandy was downgraded to a post-tropical cyclone with hurricane force winds prior to landfall; the damage to Little Ferry and beyond may have been significantly worse or even disastrous should the storm made



5. Residential neighborhood

Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

7 The data and the maps in this Appendix were generated by NJ Flood Mapper – a tool created by collaboration between the NOAA Coastal Services Center, Jacques Cousteau National Estuarine Research Reserve and Rutgers University.

landfall as a hurricane.

Many buildings in Little Ferry suffer with basement flooding. Typically building systems, such as heating, are located in the basement. These systems, which are critical for habitability, are subject to damage or destruction during flood events from water intrusion. Damage to such buildings would be significantly reduced if the basements were filled in and building systems were relocated to above the base flood elevation.

During Superstorm Sandy it also became clear that it is not only Borough residents that are vulnerable and require help from the Borough, but also Borough businesses. Those businesses in the area of Industrial Avenue and Gates Road experienced significant flooding and loss of inventory and/or productivity. Protecting these and other businesses in the community are necessary to protect jobs and the Borough's tax base.

The at-risk land area from storm surges is shown on maps prepared by the New Jersey Meadowlands Commission (NJMC) which depict flood levels from storm surges ranging from two (2) to eight (8) feet in depth. These maps also depict the benefit of reduced flooding received from the existing tide gates along the Hackensack River in Little Ferry. These maps can be found in Appendix C.

Demographics and Communication

The Borough did not experience any challenges during or after Superstorm Sandy related to the Borough's population demographics, including those related to age, income or non-English speaking residents. Good communication before, during and after Superstorm Sandy occurred despite the fact that approximately 56 percent of Borough residents speak a language other than English at home, with the most common languages being Spanish (20%) and Asian and Pacific Islander languages (22%)⁸.

One communications challenge facing the Borough is the lack of an effective notification system to alert residents of an impending flood (or other event). Presently, the Borough relies on the *Nixle* alert system. There are currently about 400 people participating in the system – this represents just 4% of the Borough's 2012 estimated population. The Borough advertises the *Nixle* alert system, including placement of flyers in the tax bills and the Citizen Emergency Response Team also distributes flyers advertising the program. The Borough maintains a list of disabled residents; however, it's unclear if that list is complete. Alerts are also available through the County reverse 911 program. Greater participation in the Borough's alert program, or a more effective alternative, would allow residents to better prepare for flooding and evacuate safely when necessary.

8 2008-2012 American Community Survey 5-year Estimates, DP02: Selected Social Characteristics

Change in Value

The Borough experienced a 2.3% decrease in value between 2012 and 2014, as measured by the total assessed value of land in Little Ferry. The change in value signifies not only the damage that occurred but also the investment necessary for full recovery. As further detailed in the following table, the loss in value was relatively insignificant considering that 94% of the Borough land is within the flood hazard area.

Annual Assessed Value		
Year	Assessed Value	Change in Value
2006	\$1,231,284,797	-
2007	\$1,233,156,597	\$1,871,800 / 0.2%
2008	\$1,228,310,073	-\$4,846,524 / -0.4%
2009	\$1,221,281,687	-\$7,028,386 / -0.6%
2010	\$1,220,807,253	-\$474,434 / 0%
2011	\$1,213,333,972	-\$7,473,281 / -0.6%
2012	\$1,206,092,026	-\$7,241,946 / -0.6%
2013	\$1,185,041,170	-\$21,050,856 / -1.8%
2014	\$1,179,647,130	-\$5,394,040 / -0.5%

Source: Little Ferry Tax Office

The following tables provide additional detail for the years 2010 through 2014.

Single Family				
Year	Number of Properties	Average Value	Total Value	Change in Value
2010	2238	\$357,896	\$800,971,000	-
2011	2,239	\$357,248	\$799,879,000	-0.18%
2012	2,238	\$355,027	\$794,550,000	-0.62%
2013	2,237	\$352,420	\$788,362,500	-0.73%
2014	2,236	\$348,624	\$779,523,100	-1.08%

Source: Little Ferry Tax Office

Multi-family				
Year	Number of Properties	Average Value	Total Value	Change in Value
2010	25	\$4,400,364	\$110,009,100	-
2011	25	\$4,400,364	\$110,009,100	0.00%
2012	25	\$4,400,364	\$110,009,100	0.00%
2013	25	\$4,175,372	\$104,384,300	-0.05%
2014	25	\$4,366,016	\$109,150,400	0.46%

Source: Little Ferry Tax Office

Commercial				
Year	Number of Properties	Average Value	Total Value	Change in Value
2010	164	\$925,978.00	\$151,860,400.00	-
2011	162	\$926,774.00	\$150,137,400.00	0.00%
2012	162	\$920,614.00	\$149,139,400.00	-0.01%
2013	160	\$920,736.00	\$147,317,800.00	0.00%
2014	160	\$915,917.00	\$146,546,700.00	-0.01%

Source: Little Ferry Tax Office

Industrial				
Year	Number of Properties	Average Value	Total Value	Change in Value
2010	77	\$1,821,662.00	\$140,268,000.00	
2011	77	\$1,769,366.00	\$136,241,200.00	-0.03%
2012	77	\$1,754,982.00	\$135,133,600.00	-0.01%
2013	77	\$1,749,868.00	\$134,739,800.00	0.00%
2014	77	\$1,744,231.00	\$134,305,800.00	0.00%

Source: Little Ferry Tax Office

The loss in value from 2012 through 2014 is part of a larger trend of small annual declines beginning in or at least 2007. Notwithstanding this larger trend, rehabilitation and redevelopment of Superstorm Sandy damaged properties, as well as enhanced Borough resilience, will contribute toward increased value.

Lack of Jurisdiction

The Borough does not have the ability to control floodwaters emanating from the Hackensack River. Storm surges originate in the Atlantic Ocean and concentrate nearly 20 miles away at Newark Bay, well beyond the Borough's jurisdiction, and is contained (or not) by a series of berms along the Hackensack River which are under the jurisdiction of the New Jersey Meadowlands Commission, the Meadowlands Conservation Trust or private property owners. Additionally, stormwater management is not entirely a locally-controlled issue. Not only does the County have jurisdiction over drainage along County Roads, much of the surface water flowing through the Borough originates outside from surrounding municipalities. These jurisdictional issues significantly reduce and complicate Little Ferry's ability to address flooding within its borders.

Lack of Flood Capacity

The Borough is nearly fully developed with no large areas of undeveloped land to use for flood storage capacity. The majority of flood storage occurs between the Clay Pits and Losen Slote Creek along the Borough's southwest boundary. This area hosts not only the Clay Pits and creek but about 74 acres of wetlands. Lands along the Hackensack River are nearly entirely developed with industrial or multi-family uses. As such, the Borough does not have the opportunity to develop flood storage without acquisition of privately-owned and developed land and subsequent conversion to open space. Doing so would not only be a very costly process, but would erode the Borough's tax base since the majority of non-residentially used land is along the River.

Flood & Stormwater Infrastructure

The Borough's flood and stormwater infrastructure are not capable of moving water out of the Borough fast enough during heavy rain events. For example, the Riser Road ditch, which collects water from a ditch along Route 46 discharged from a pump station in

South Hackensack, is not able to move water fast enough and, as a result, there is localized flooding two or three times a year along the Borough's western boundary. The following list identifies the vulnerabilities and necessary improvements to much of the Borough's flood and stormwater infrastructure.

- Self-cleaning grates should be installed at pump stations, particularly the Losen Slote pump station which is frequently clogged with debris. This will enhance water flow since a grate is filled with debris and can contribute toward in flooding upstream. The Borough's



6. Flooding on Route 46 from Superstorm Sandy

Losen Slote Pump Station services the largest amount of residential properties within the Borough and is vital to the Borough's storm water management. It can push through its three 150 horsepower pumps 129,000 gallons per minute. Currently, the station is underperforming as debris clogs the pumps during storms. Before storms, the Borough proactively cleans the station but tidal and fluvial water flows bring debris that settles at the station's pumps. By installing an automatic self cleaning grate system, the Losen Slote pump station the Borough will be able to move more storm water out of the Borough's boundaries faster and more efficiently.

- Portable pumps for sanitary sewer should be provided when necessary to ensure sewer back-ups do not occur in homes and businesses.

- A mix of local, County and State roads, the storm water infrastructure in the downtown area is greatly undersized to effectively remove storm water from the immediate area. The Main Street Corridor consists of the main commercial artery of Main Street and the vast network of secondary and tertiary roads that comprise the main "downtown" of the Borough. This Corridor is home to various emergency services (a volunteer first aid and fire department operate from here). The improvements necessary include increasing the capacity of storm water piping and re-lining existing pipes that can handle a large flow volume, but are decaying. Such improvements will decrease the risk of road collapsing due to failing infrastructure.



7. Main Street, Little Ferry

- The Federal Aviation Administration and the Port Authority of New York and New Jersey are proposing to pipe the ditch along Route 46 eastbound and connect it to the Riser Road ditch. Such a change would increase the low velocity of the water flowing into the Riser Road ditch. Since the Riser Road ditch is already incapable of moving water fast enough to prevent flooding, piping the ditch along Route 46, and therefore increasing the water velocity and volume, will exacerbate localized flooding which already occurs.
- The Borough's outfalls and the ones maintained by private property owners located where Industrial Avenue is closest to the Hackensack River do not function properly during flood events. Due to their location and the velocity of water exiting the outfalls, flood waters are able to flow back into the outfalls rather than out to the Hackensack River. A pump station at this location would eliminate the problem.
- The capacity of the Borough's ditches and creeks is insufficient for moving water. It is unclear at this time if the ditches and creeks cannot move water fast enough due to an inherent lack of capacity, reduced capacity due to a lack of maintenance,

ineffective pump stations or other concerns. Certainly, portions of the Borough's infrastructure is in need of improvement.

- The Borough should consider use of riprap and/or a vertical hydraulic barrier to prevent stream bank erosion. The erosion can lead to choke points that can lead to increased flooding downstream.
- The Borough's sanitary sewer system suffers from infiltration. During rain events water leaks into the sanitary sewer pipes thorough cracks or leaks in the pipes and contributes to excess flow to the sanitary treatment facility. The excess flow can overwhelm the system leading to reduced treatment or at a minimum, waste energy on treatment. Slevaing the problem pipes and sealing manhole covers, as well as any other openings, would eliminate infiltration.
- Borough Hall's existing underpowered electric generator only provides partial service to the Police Department, but no other parts of the building – not even the main lobby. The Borough Hall, once it obtains electricity, utilizes the Council Chambers as a warming/cooling station and temporary shelter; but this can only be done once power is restored to the building. Borough Hall's generator should be upgraded to address this issue.
- The Borough's ditches and slotes are in need of cleaning and expansion to improve the efficiency of this aspect of the storm water system. Cleaning entails removing sediment that has been deposited from the various storm events over the years to return to the natural base of the waterway. Expansion includes both increasing the depth and width.
- The immediate surrounding area of the Little Ferry First Aid Building has become compromised due to continued tidal flooding. After Hurricane Irene, the Borough expended significant funds in efforts to stabilize the area surrounding the building, including three aprons for vehicles to enter/exit and the cell tower. After Superstorm Sandy, the Borough once again had to stabilize the existing aprons, cell tower and an expanded stabilization area that includes rooftop solar panel equipment.
- The Borough is in need of a stormwater pump station and check valve in the Industrial Road/Gates Avenue area. This portion of the Borough contains the majority of its industrial base, but experiences tidal flooding from the Hackensack River. Like many older river communities, the industrial base was located along a river; in this case the Hackensack River. This industrial area is home to various entities ranging from chemical plants to regional office headquarters to distribution centers. During tidal events, the local roadways become flooded and impassable causing regional commerce to stop and impacting access by emergency services.
- The Borough of Little Ferry's primary emergency shelter is Memorial School located on Liberty Street. This two-story building currently does not possess a permanently installed electric backup generator; nor does it have the ability to accommodate a temporary generator at this point in time.

- Bailey Park (Block 46, Lot 8) is protected open space that provides a buffer between residential and commercial users. This 1.9 acre park is home to a playground and basketball court with the remaining sixty percent of the Park is open Space, clear land devoid of trees. In the rear of the Park is a storm water drainage ditch that the nearby commercial area drains to. During most rain events, the ditch fills with water and the overflow not only makes its way into the Park, but the yards of residents. This water then ponds as the only drainage method is seepage. The Borough's in need of a gravity based storm water management system that will bring storm water from the rear of the Park towards the existing storm water system located at Redneck Avenue as well as one to three catch basins along the rear of the park and a detention basin to ensure the storm water system does not overflow.



8. Bailey Park

- Willow Lake, located with a Park within the same name is at the geographical center of the Borough. Water from the surrounding neighborhoods drains into the Lake and is pumped out of the Borough by the local pumping station. However, the Lake and pump station are too small to handle the incoming water from recent tidal and fluvial storms. As a result, flooding in this area impacts the Little Ferry Volunteer First Aid Corps and the Little Ferry Volunteer Hook and Ladder Fire Company, two Bergen County roadways (Main Street and Bergen Turnpike). The increased water volume has resulted in this vital area being under water for days when the rest of the Borough is dry. This lake is in need of dredging and expansion to handle the increased water volume seen during recent storms so as to ensure the Borough's emergency services are not limited.
- The Willow Lake Pump Station is in need of a back-up generator. During Hurricane Irene and Superstorm Sandy when the Borough lost power, the station failed and the Lake had to be pumped by fire hoses and external pumps. These secondary and last ditch efforts to remove water from the Lake to alleviate localized flooding are insufficient for ensuring the health and safety of Borough residents and businesses.
- The Main Street Pump Station is in need of a back-up generator. This Station assists in removing water from State Highway Route 46, County Route 49 (Bergen Turnpike) and various streets along the Main Street Corridor. Situated along the Hackensack River, this pump station also services a commercial portion of the Borough located along the Hackensack's banks. Given the pump station's relationship to regional roadways, it is critical it be functional during flood events when power is lost.

Critical Facilities

All of the Borough's critical facilities are located within the flood hazard area; this is due to a lack of land outside of the flood hazard area. Critical facilities include the municipal building and public safety building. Information on each facility, a map identifying their locations and the vulnerabilities can be found in Appendix D.

Lack of an Early Warning System

Another vulnerability highlighted by the storm is the lack of an accurate early warning system. Water that flooded the Borough during Superstorm Sandy was driven in from the Atlantic Ocean through Newark Bay and up the Hackensack River corridor. It was not generated by rain falling within the Borough's borders. The Borough cannot anticipate such flooding and cannot prepare itself for it without an early warning system.



9. Rescue operations during Superstorm Sandy

The Borough views a tidal flooding early warning system as a critical component to storm preparedness. During Superstorm Sandy, the Borough was alerted by the State Office of Emergency Management that the Hackensack River berms had been breached three (3) hours after the Borough began flooding. Not only was the notification too late, it provided incorrect information such as a berm failed, whereas in actuality, multiple portions of berms were over-topped. As a result of flooding from Superstorm Sandy, the Borough lost five (5) police cars; this could have been avoided with an early warning system. Such a system would enable the Borough to not only alert residents of impending flooding but would also allow the Borough to relocate vehicles and other sensitive equipment out of the floodway.

Permit and Application Process

The aftermath of Superstorm Sandy highlighted the efficiency of the Borough's existing permit and application process. During the immediate days after the storm, the Borough Construction office not only addressed the needs of its citizens, but also took over the Moonachie Construction office's duties. During this time, the Borough was able to fill requests and provide permits in a timely manner, despite the increased demand and despite that no additional staff assistance was available.

The only vulnerability highlighted with respect to permitting was the difficulty faced in the enforcement of requirements that construction permits be obtained prior to work. The Borough has found that many residents and businesses renovated sites and buildings without obtaining the proper permits and approvals.

Dependence on Electricity

Little Ferry's inability to rid itself of water during times when there is a loss of electricity was the primary vulnerability brought to light by Superstorm Sandy. The Borough is equipped with electric motor pumps to address flooding; however, those pumps are of no use during times when the electricity is out, unless a generator is available. The Borough must be able to pump water during a loss of electrical power in order to quickly recover from flooding and provide clear and accessible roads, safe neighborhoods and access to goods and services.

The entire Borough lost electricity as a result of Superstorm Sandy. Little Ferry's electricity provider is PSE&G. The Borough is at the front end of the power feed of an electrical substation and as a result, electricity in the Borough was restored first after initial repair of what caused the electricity outage. However, PSE&G turned off the electricity several times during repair of other parts of the electricity system. Restoration of electricity led to building fires and surcharging of electrical panels resulting in "fire-like" conditions (i.e. smoking electrical boxes and small fires) as electricity was restored to outlets in buildings which were wet from flooding. This was particularly problematic after Superstorm Sandy when electricity was restored multiple times during repairs taking place elsewhere and at night, when residents were sleeping in those homes. To combat this problem, PSE&G should keep the electricity on (or off) during the night to avoid intermittent electrical power restoration and to better communicate with Borough officials about when the power will be turned on/off.

Natural Gas Infrastructure

Natural gas infrastructure in the Borough contributed toward problems during the aftermath of Superstorm Sandy. The natural gas lines that underlay much of the Borough are low pressure. During flood events, the low pressure lines allow water to seep in, and as a result, do not function which result in a loss of heating and/or cooking for its customers. To combat this problem, PSE&G (the Borough's natural gas provider) is proposing to increase pressure to the pipes as part of their proposed Energy Strong program.

The following provides a review of the policies of Little Ferry, Bergen County and New Jersey Meadowlands Commission regarding hazard mitigation, resiliency and adaptation. This review is necessary to understand the capability of existing policies to address the challenges raised by Superstorm Sandy and those likely to be raised during future weather events. It also reveals how the policies may be revised to better address the vulnerabilities highlighted by Superstorm Sandy.

Policy & Data Review

Overview

Little Ferry addresses flood mitigation through its stormwater infrastructure maintenance policies, 2009 Stormwater Management Plan and stormwater management regulations in Article 1200 of Chapter XXXV Land Use Regulations of the municipal code. Resilience is addressed by the Borough in its stormwater infrastructure maintenance policies and the Flood Prevention and Protection standards in Chapter XXV of the municipal code. The New Jersey Meadowlands participates in the FEMA Community Rating System (CRS) on behalf of its municipalities, including Little Ferry. The benefit of this program could be expanded should Little Ferry participate directly in the program. The 2013 Reexamination Report also provides guidance as to how hazard mitigation, resiliency and adaptation should be further addressed in planning documents. However, the Borough does not have any substantial or comprehensive policies on hazard mitigation or resiliency in its Master Plan or Land Use Code. Additionally, climate adaptation has not been addressed by the Borough.

Bergen County adopted a Natural Hazard Mitigation Plan in 2008. Like most New Jersey municipalities, this County plan is the Borough's primary document addressing hazard mitigation. It recognizes flooding, both coastal and riverine, as one of the natural hazards facing the County and provides mitigation measures for addressing the hazards. This Plan also recognizes hurricanes and tropical storms as a potential hazard, stating "Because much of Bergen County is developed, the vulnerability is extremely high if an event were to occur. Tropical storms and hurricanes do not need to have a direct path over Bergen County to affect the residents." Superstorm Sandy validated this analysis.

The County Plan references the September 30, 2005 FEMA Flood Insurance Study (FIS) for Bergen County and states the principal flooding in southern Bergen County results from tidal surges of the Newark Bay, which affect the Hackensack River. Additionally, the FIS notes that the New Jersey Meadowlands Commission District is impacted yearly by nor'easter storm events, which can create larger stream elevations than rainfall events. The Plan identifies the maximum historical tide as one that resulted from a hurricane on September 3, 1821 and produced a surge of approximately 10 to 11 feet above normal tide.

The 2008 Plan identifies one proposed mitigation project in Little Ferry – pump stations along the Hackensack River. The pump stations were recommended to address

riverine and stormwater flooding. It was recommended that they be installed within two years; however, six years later, they have not yet been installed.

Bergen County is working with the New Jersey Meadowlands Commission to prepare an updated County Natural Hazard Mitigation Plan. The revised Plan is anticipated for completion in late summer 2014 or early fall 2014. To date, public input meetings were held and municipalities, including Little Ferry, are submitting information for use in the updated Plan. Little Ferry's updated and submitted information that identified 23 critical facilities. The table and map in Appendix D, Little Ferry Critical Facilities, identifies each facility and additional relevant information. It is anticipated that the County's Natural Hazard Mitigation Plan will reflect this information. The Borough also provided a list of sample activities/actions that should be completed in the future. The items on the list, while not exhaustive, address both infrastructure hardening and planning and are incorporated into the Action Steps at the end of this Report.



10. Neighborhood flooding from Superstorm Sandy

The New Jersey Meadowlands Commission's Master Plan for the region is dated 2004; notwithstanding that the report was prepared a decade ago, it provides the Commission's current policies related to flood hazard areas. Additionally, the Commission prepared Floodplain Management Plan in 2005. The Plan is in response to the organization's participation in National Flood Insurance Program's Community Rating System ("CRS") on behalf of the 14 municipalities within the New Jersey Meadowlands Commission District, including Little Ferry. The New Jersey Meadowlands Commission entered the program in 1992 and now

boasts that "some 2,300 commercial, industrial and residential property owners are eligible for 15 percent discounts on premiums – a total savings of \$323,000 to local businesses and homeowners"⁹. While 15 percent is a significant discount, the maximum discount is 45%. The Plan provides a flood hazard assessment and hazard mitigation recommendations. The Commission also prepared, in 2006, the New Jersey Meadowlands Commission Tide Gates Inspection Report.

The Borough, County and Meadowlands Commission address specific policy topics related to hazard mitigation, resiliency and adaptation in their various regulations and policy documents. Review of these documents leads to the finding that there is little to no coordination between the levels of Government. The county has taken jurisdiction of hazard mitigation and resiliency but its policies have not been implemented at the local level. None of these agencies have addressed climate adaptation in a manner which is relevant to this Report.

The relevant policy and data discussions are organized by the following topics:

⁹ New Jersey Meadowlands Commission. <http://www.njmeadowlands.gov/eg/flood/crs.html>. Accessed March 18, 2014.

protection/conservation of flood hazard areas and storm damage areas, flood resilient building, maintenance of flood protection infrastructure and emergency response.

Protection / Conservation of Flood Hazard Areas and Storm Damage Prone Areas

Borough of Little Ferry

2013 Master Plan Reexamination Report

The 2013 Master Plan Reexamination Report recommends that redevelopment along the Hackensack Waterfront address storm and flood water management. Additionally, it recognizes that neighborhoods south of Route 46 experience flooding which has a detrimental impact on quality of life, particularly so during Superstorm Sandy. The Report recommends the Borough consider open space set-asides as a method of providing flood water storage during weather events.



11. Hackensack River near Mehrhof Road

Bergen County

2008 Natural Hazard Mitigation Plan

The Plan contains one goal and objective that relates to protection/conservation of flood hazard areas and storm prone areas. As part of Goal 3, “Protect public and private property”, the County identifies the following objective: “Adopt and enforce public policies to minimize impacts of development and enhance safe construction in high hazard areas”.

New Jersey Meadowlands Commission

The 2005 Floodplain Management Plan (page 196) recommends open space purchases include wetland areas and properties “bordering established wetlands based upon the demonstrated ability of such features to reduce flooding, provide critical habitat, and improve overall water quality.” The Plan goes on to identify seven properties of interest in Little Ferry, all of which were privately owned. As shown in the below table, the properties to this day continue to be privately owned.

Meadowlands Commission Properties of Interest				
Block / Lot	Street Address	Lot Size	2008 Status	Current Status
Block 82 / Lot 20	Mehrhoff Road	1.12 ac	Privately owned	Privately owned
Block 82 / Lot 17	Mehrhoff Road	0.31 ac	Privately owned	Privately owned
Block 82 / Lot 19	Mehrhoff Road	0.16 ac	Privately owned	Privately owned
Block 108.06 / Lot 2	Industrial Avenue	0.97 ac	Privately owned	Privately owned
Block 109 / Lot 5.04	Off of Washington Avenue	0.17 ac	Privately owned	Privately owned
Block 107 / Lot 2.01	Lot east of Maiden Lane	8.03 ac	Privately owned	Privately owned
Block 106.01 / Lot 13.06	Lot south of Maiden Lane	1.07 ac	Privately owned	Privately owned

The Meadowlands Commission Master Plan includes a strategy for the Natural Environment, “Preserve wide expanses of land for open space, wildlife habitats, and recreational opportunities”. The strategy goes on to recommend targeted open space acquisition consistent with the Commission’s “Green Map”. This map depicts lands north and east of the Clay Pits as being targeted for open space; however, all of the undeveloped land in this area is already publicly owned for open space or recreation purposes.

Flood Resilient Building

Little Ferry

The Borough adopted Flood Prevention and Protection standards in Chapter XXV of its local ordinances. This Chapter regulates, for example, standards for building construction in a flood hazard area, appeal procedures for permit denials and provisions for flood hazard reduction. Those “provisions for flood hazard reduction” (§25-15 and §25-16) address anchoring, utilities, subdivision proposals, enclosure openings, as well as residential construction, nonresidential construction and manufactured homes. The regulations provide the following statement of purpose (§25-3)

- a. To protect human life and health;
- b. To minimize expenditure of public money for costly flood control projects;
- c. To minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
- d. To minimize prolonged business interruptions;

- e. *To minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets, bridges located in areas of special flood hazard;*
- f. *To help maintain a stable tax base by providing for the second use and development of areas of special flood hazard so as to minimize future flood blight areas;*
- g. *To insure that potential buyers are notified that property is in an area of special flood hazard; and*
- h. *To ensure that those who occupy the areas of flood hazard assume responsibility for their actions.*

The Borough's Flood Prevention and Protection standards in Chapter XXV identifies five methods of reducing flood losses (§25-4):

- a. *Restricting or prohibiting uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities;*
- b. *Requiring that uses vulnerable to floods including facilities which serve such uses, be protected against flood damage at the time of initial construction;*
- c. *Controlling the alteration of natural flood plains, stream channels, and natural protective barriers, which help accommodate or channel floodwaters;*
- d. *Controlling filling, grading, dredging, and other development which may increase flood damage; and*
- e. *Preventing or regulating the construction of flood barriers which will unnaturally divert floodwaters or which may increase flood hazards in other areas.*



12. Flooding from Superstorm Sandy

The Borough's ordinance requires that a development permit be obtained for any development in a special flood hazard area. However, the ordinance does not reference the most recent flood hazard area data. Furthermore, it does not address design considerations for constructing of flood resistant buildings and these standards are not in the land use ordinance; therefore they are not within the jurisdiction of the Planning Board.

Bergen County

2008 Natural Hazard Mitigation Plan

The Plan contains one goal and several objectives which relate to flood resilient building. As part of Goal 3, “Protect public and private property”, there are several relevant objectives:

- a. Adopt and enforce public policies to minimize impacts of development and enhance safe construction in high hazard areas*
- b. Integrate new hazard and risk information into building codes, land use planning mechanisms and other public regulations*
- c. Educate public officials, developers, realtors, insurance agents, contractors, property owners, and the general public regarding hazard vulnerability and potential severity as well as potential mitigation actions*
- d. Promote hazard mitigation of all public and privately-owned property*
- e. Incorporate hazard mitigation into all community planning and projects*
- f. Promote hazard mitigation for all historic structures*

New Jersey Meadowlands Commission

The 2005 New Jersey Meadowlands Commission Floodplain Management Plan provides an overview of options for retrofitting for flood prone buildings, but does not provide recommendations or policies for municipalities. The 2004 New Jersey Meadowlands Commission Master Plan does not address flood resilient building methods.

Maintenance and Enhancement of Flood Protection Infrastructure

Little Ferry

The Borough details much of its maintenance policies for flood protection and stormwater infrastructure in its 2009 Stormwater Management Plan. One, of several, goals in this Plan is to “reduce flood damage, including damage to life and property”. The Borough’s stormwater management regulations address maintenance and repair of stormwater management measures (§35-1210.2); however, these maintenance regulations are somewhat relevant to this report, since they address site specific stormwater management measures, such as a detention basin, rather than the Borough’s stormwater and flood infrastructure, such as ditches and tide gates.

To assist with flooding in the vicinity of Main Street, Bergen County recently awarded a study of the hydraulics in Little Ferry.

2013 Master Plan Reexamination Report

The 2013 Master Plan Reexamination Report addresses this topic. It recommends that redevelopment along the Hackensack waterfront address storm and flood water management. Additionally, it recognizes that neighborhoods south of Route 46 experience flooding which has a detrimental impact on quality of life, particularly so during Superstorm Sandy. The Report recommends the Borough consider green infrastructure, such as but not limited to vegetated swales, bioretention and green roofs in its flood mitigation efforts.



13. Flooding on Route 46 from Superstorm Sandy

Bergen County

2008 Natural Hazard Mitigation Plan

The Plan contains several goals and objectives which relate to maintenance of flood protection infrastructure. As part of Goal 2, “Safeguard critical public facilities and infrastructure”, there are the following relevant objectives:

- a. *Analyze and mitigate potential impacts from hazards for all public facilities and infrastructure (new and existing)*
- b. *Implement mitigation programs that protect all critical governmental facilities and services and promote reliability of systems to minimize impacts from hazards, maintain operations and expedite recovery in emergencies*
- d. *Formalize and implement best practices for protecting systems and networks*

As part of Goal 3, “Protect public and private property”, there is one relevant objective:

- c. *Educate public officials, developers, realtors, insurance agents, contractors, property owners, and the general public regarding hazard vulnerability and potential severity as well as potential mitigation actions*

New Jersey Meadowlands Commission

The 2005 New Jersey Meadowlands Floodplain Management Plan includes as Goal 1:

Restore, replace or decommission the 31 regional tide gate, levee, and pump station systems in the District.

The Goal goes on to state, “These systems shall be evaluated by the U.S. Army Corps of Engineers based on the two-dimensional floodplain model developed for the Meadowlands District by their Waterways Experiment Station.”

The New Jersey Meadowlands has identified soft edges, defined as “edges between land and water where the land side is less than five (5) feet above sea level”, as locations for a potential breach during flooding. See Appendix E. for a map depicting these soft edges prepared by the Meadowlands Environmental Research Institute. This map depicts soft edges in Little Ferry (note that this only addresses lands under the jurisdiction of the New Jersey Meadowlands Commission), generally west, east and north of the Clay Pits and Losen Slote Creek.

Emergency Warning and Response

The Borough and the County have policies and procedures in place for addressing emergency situations. This Report will not address the jurisdictions’ emergency response plans, such as those related to evacuation routes, shelter provisions or emergency service personnel. However, this Report will address those emergency response measures which are relevant to the Borough’s post-disaster planning

Little Ferry

As stated earlier in this Report, the Borough views a tidal flooding early warning system as a critical component of storm preparedness and emergency response. An accurate early warning system during Superstorm Sandy could have avoided significant damage to public and private property and vehicles.

The Borough’s primary emergency shelter is Memorial School on Liberty Street and the secondary shelter is St. Margaret’s of Cortona Church, also on Liberty Street. The adequacy of these buildings to serve as emergency shelter is currently under review. Memorial School’s lack of a kitchen or an electric generator raises concerns for the ability of the site to be used as an



14. Little Ferry Municipal Building

emergency shelter. The Borough is considering designating the municipal building as the emergency shelter. While the municipal building does not currently have an electric generator capable of providing power to all or most of the building, funding for such a generator was requested from the New Jersey Hazard Mitigation Program. The generator is necessary regardless of whether the building serves as an emergency shelter.

Bergen County

2008 Natural Hazard Mitigation Plan

The Plan contains two goals which relate to emergency response.

Goal 1, Protect and promote public health and safety” includes three relevant objectives:

- b. Improve service to vulnerable populations; reduce harm resulting from emergencies*
- c. Educate citizens regarding sustainable development, disaster preparedness and hazard mitigation*
- d. Implement and maintain state-of-the-art disaster warning systems*

Goal 2, Safeguard critical public facilities and infrastructure” includes one relevant objective:

Create back-up facilities for critical systems such as water, sewer, digital data, electricity, and communications for all critical facilities

New Jersey Meadowlands Commission

The NJMC has implemented an early warning system in 2004 that measures water depth and weather conditions along the Hackensack River. Unfortunately, this system was not useful in alerting Little Ferry in advance of Superstorm Sandy. Sensors are placed throughout the Meadowlands region in places such as, but not limited to, Secaucus, Rutherford, Lodi and Westwood. These water level alerts are sent via email and text message to subscribers when water levels approach six (6) feet (NADV88). Note that in the past serious flooding has occurred in the Meadowlands when water levels reached seven (7) feet

As of the 2005 New Jersey Meadowlands Floodplain Management Plan, the Commission planned to install additional sensors and expand the data relied upon by the warning system. This has not yet been completed.

The 2005 New Jersey Meadowlands Floodplain Management Plan includes the following as Goal 5:

Develop and implement a District Flood Hazard Warning System that utilizes both the real-time rainfall and stream elevation data collection systems deployed by the NJMC

in District, as well as real-time systems upstream of the District.

- Warnings shall be advanced when practical and shall be designed to alert municipalities of fluvial flooding, tidal flooding, as well as hurricane-related flooding.*
- Warning levels shall include the 2-year, 10-year, and 25-year storms and tidal surges, as well as Category 1, 2, and 3 hurricanes.*
- The system should deliver a clear description of potential areas of impacts to the District's municipalities accompanied by relevant mapping in a universal digital format and be automated with user override capabilities.*

Recovery, Mitigation, Resilience & Adaptation Efforts to Date

The Borough requested funding from FEMA to repair damage from Superstorm Sandy and from the New Jersey Hazard Mitigation Grant Program to enhance resilience to future weather events. The requested funding from FEMA was received and the work has been completed. A summary of this work is as follows:

- Remove debris and clear roads. (\$702,311.24)
- Conduct search and rescue, traffic control including street barricading and closures, fill and distribute sand bags, provide food for flooded residents and rescuers, rent pumps for removing water from public facilities, use portable generators at pump stations and applicant owned facilities located at Maiden Lane pump station, Willow Lake pump station, Eckel and Adams Street pump station, Williams Street pump station, Union Ave pump station, the public safety building, the First Aid building, the Department of Public Works (DPW) building, the Hook and Ladder Building, the Hose Building. (\$121,975.80)
- Repair batting cages at Lake View Park, repair fencing and playing field surface at Pickens Park and replace rails along Mehrhof Road. (\$4,703.26)
- Replace granulated rubber surface at Willow Lake Park playground. (\$203.26)



15. Little Ferry First Aid at Willow Lake

The Borough is participating in a pilot program with PSE&G and the municipalities of Garwood and Clifton to better manage tree trimming around power lines. While downed trees and tree branches are a major contributor to power outages, the Borough experiences few power outages due to downed trees. Notwithstanding, the Borough will work with PSE&G and the selected municipalities to improve tree maintenance policies and practices.

The Borough is requesting funding for 12 mitigation and resilience projects from the New Jersey Hazard Mitigation Grant Program. These projects will lessen the adverse

impacts (such as flooding) from a significant weather event and/or better enable the Borough to recover from the effects of a flood event in a timely and efficient manner. To date, the Letters of Intent have been submitted for the following projects; funding has not been received.

- Permanent Emergency Backup Generator; Emergency Services and Sheltering – Police Department/Borough Hall. (\$700,000)
- Ditches and Slotes Remediation(cleaning and expansion). (\$4,500,000)
- First Aid Building Soil Stabilization. This application requests funds for soil stabilization of the immediate area around the First Aid Building and rebuilding the existing three vehicle aprons to ensure they do not fail. (\$150,000)
- Main Street Corridor Storm Water Upgrades. (\$500,000)
- Industrial Road/Gates Avenue Storm Water Pump Station & Check Valve. (\$2,000,000)
- Bailey Park Stormwater Facility. (\$125,000)
- Permanent Emergency Shelter Backup Generator – Memorial School. (\$1,200,000)
- Losen Slote Pump Station Automatic Self Cleaning Grating System. (\$400,000)

Recommended Action Steps

The Borough views the most important and effective method for preventing flooding from the Hackensack River in Little Ferry to be installation of flood gates at Newark Bay. As discussed earlier, it was a tidal surge at Newark Bay during Superstorm Sandy that caused the Hackensack River to inundate Little Ferry, as well as surrounding municipalities. The surge measured 8.5 to 9.5 feet, exceeding the height of the berms along the Hackensack River, which have an approximate height of five (5) feet above sea level. The height of the berms allowed water to flow into Little Ferry (and surrounding municipalities); their presence also prevented the water from receding to the Hackensack River, or other waterways, creating a “bathtub” effect until the water could be pumped out. Flood gates were first considered by the Army Corps of Engineers in a report released in 1989. The report called for a 1,900 foot long tidal barrier, berms, floodwalls and a pump station approximately 10 miles north of Newark Bay. At the time of the study, the cost, estimated to be \$289 million, was considered to be too high¹⁰. Notwithstanding, this infrastructure should be reconsidered given the recovery cost from Superstorm Sandy.

In addition to the existing funding requests described in the previous section, there are a range of actions which the Borough should take to better mitigate against future storm-related flood events, become more resilient when flood events do occur and to adapt to the changing environment. With rising sea levels, the Borough has no choice but to address all three of these goals.

The following table presents post-disaster planning Action Steps for Little Ferry. Each Action Step includes a time frame indicating the length of time needed for fulfillment. A short time frame is defined as one year or less, a medium time frame is defined as one to five years and a long time frame is defined as more than five years. The priority column ranks the potential positive impact of each action step. Those items with a high priority have the largest potential positive impact, medium priority have a lesser potential positive impact and low priority has less impact. The responsible party(s) for completing each Action Step is also identified, as well as potential partners who the Borough should consider engaging in order to complete the Action Step. A final column indicates potential funding sources.

Action Items	Time Frame	Priority	Responsible Party(s)	Partner	Potential Funding Source(s)**
<i>Enhance regional stormwater and flood infrastructure and strategies</i>					
Advocate, and coordinate to the extent possible, for Bergen County and/or the Meadowlands Commission to develop enhanced regional stormwater management and flood strategies for implementation across all jurisdictions.	Medium	High	Council, Borough Administration	Bergen County, Meadowlands Commission	
Advocate for, and coordinate to the extent possible, for the New Jersey Meadowlands Commission to expand its participation in the National Flood Insurance Program's Community Rating System so as to increase the available flood insurance discounts.					
Advocate for installation of flood gates at Newark Bay.	Long	High	Council, Borough Administration	Bergen County, Essex County, Meadowlands Commission, State of New Jersey	
Advocate for, and coordinate to the extent possible, for improvement or elimination of berms with soft edges (defined as "edges between land and water where the land side is less than five (5) feet above sea level") in Little Ferry and surrounding communities.	Long	Medium	Council, Borough Administration	Bergen County, Meadowlands Commission, State of New Jersey	
<i>Adopt enhanced Borough policies to facilitate mitigation, resilience and adaptation</i>					
Prepare new and revised master plan elements that provide the investigation and policy foundation for creating a more resilient Little Ferry. At a minimum, these master plan elements should address the following:	Medium	High	Planning Board	None	PSPAGP

Action Items	Time Frame	Priority	Responsible Party(s)	Partner	Potential Funding Source(s)*
<p>General</p> <ul style="list-style-type: none"> Increase prominence and elevate the priority of goals, objectives and policies related to a mitigation, resilience and adaptation across all relevant master plan elements and provide coordinating policies across all master plan elements. Provide greater opportunity for public and stakeholder participation in hazard mitigation, resilience and adaptation planning. 	Medium	High	Planning Board	None	PSPAGP
<p>Community Facilities</p> <ul style="list-style-type: none"> Address the need for Borough Hall to serve as an emergency shelter and what changes to the building are necessary as a result of this expanded role for the building. Address how Willow Lake Park can be used to provide temporary flood capacity during storm events. Determine if or how the public safety building can be improved to combat the subsistence that has occurred on the site and to continue to provide public safety services to the community. 	Medium	High	Planning Board	None	PSPAGP
<p>Conservation</p> <ul style="list-style-type: none"> Identify natural resources in the Borough that can provide environmental services (such as providing flood capacity) and currently provide or could provide enhanced resilience to storm events. 	Medium	High	Planning Board	None	PSPAGP

Action Items	Time Frame	Priority	Responsible Party(s)	Partner	Potential Funding Source(s)**
<p>Open Space and Recreation</p> <ul style="list-style-type: none"> Determine how the Borough’s public lands can not only provide environmental services but also recreation to Borough residents. Identify any lands in flood prone areas that should be considered for acquisition. 	Medium	High	Planning Board	None	PSPAGP
<p>Circulation</p> <ul style="list-style-type: none"> Address safe evacuation of residents in response to flood events and road improvements that would increase resiliency to flooding. 	Medium	High	Planning Board	None	PSPAGP
<p>Land Use</p> <ul style="list-style-type: none"> Addresses how redevelopment in flood prone areas can reduce risk from weather events. This may include investigation of appropriate zoning, building and site design standards. Consideration use of transfer of development rights to encourage development and redevelopment outside of flood prone areas. Consider how the zoning can be adjusted to encourage location of critical facilities in areas which have the lowest flood risk. Prepare neighborhood plans that target specific areas of the Borough such as but not limited to the Route 46 corridor, downtown, Industrial Avenue area and waterfront for tailored adaptation and resilience measures. 	Medium	High	Planning Board	None	PSPAGP

Action Items	Time Frame	Priority	Responsible Party(s)	Partner	Potential Funding Source(s)*
Utilities <ul style="list-style-type: none"> Identify infrastructure which may be at risk during natural disasters and plan for its protection, resilience and adaptation through relocation or other means. 	Medium	High	Planning Board	None	PSPAGP
Stormwater Management <ul style="list-style-type: none"> Provide an analysis, and redesign if necessary, of the Borough's stormwater management facilities to ensure they continue to function during natural disasters, such as tidal surges and regional flooding. This should give particular attention to the Route 46 corridor, downtown, Industrial Avenue area and waterfront. 	Medium	High	Planning Board	None	PSPAGP, HMGP, NJEIT
Expand participation in the FEMA Community Rating System (CRS) with Little Ferry serving as the applicant rather than the New Jersey Meadowlands	Medium	Medium	Council, Borough Administration, Planning Board	New Jersey Meadowlands Commission	
<i>Adopt ordinances that enhance mitigation, resilience & adaptation in the Borough</i>					
Update the Borough's general, Flood Prevention and Protection and Land Use ordinances to reflect the most recent flood hazard data and implement the relevant recommendations called for in the new and revised master plan elements.	Medium	High	Council, Planning Board	None	PSPAGP

Action Items	Time Frame	Priority	Responsible Party(s)	Partner	Potential Funding Source(s)**
Prepare design and zoning standards specific to flood hazard areas for the land use ordinance that will not only foster a sense of place in Little Ferry but will set standards for flood resilience at the street level for public, residential, commercial and mixed use buildings.	Medium	High	Council, Planning Board	None	PSPAGP
<i>Improve the Borough's permit & application process</i>					
Analyze the Borough enforcement procedures for the Construction office, Planning Board and Zoning Board to better enforce receipt of proper permits and approval for improvements to buildings and lands.	Medium	Medium	Council, Borough Administration	None	PSPAGP
<i>Enhance the flood & stormwater infrastructure in the Borough</i>					
Install emergency electric generators at every floodwater pump station.	Short	High	Council, Borough Administration	None	HMGP
Connect the upcoming Route 46 pump station to the Main Street pump station in order to more quickly clear Route 46 during flood events.	Short	High	Council, Borough Administration	NJ Department of Transportation	HMGP, NJEIT
Provide portable pumps for sanitary sewers to ensure they continue to function during flood events and sewer backups do not occur in homes and businesses.	Short	High	Council, Borough Administration		HMGP
Self-cleaning grates should be installed at all pump stations.	Short	High	Council, Borough Administration		HMGP

Action Items	Time Frame	Priority	Responsible Party(s)	Partner	Potential Funding Source(s)*
Oppose proposal by the FAA and Port Authority of New York and New Jersey (PANY/NJ) to pipe the ditch along Route 46 eastbound.	Medium	High	Council, Borough Administration	FAA, PANY/NJ	HMGP
Seal those portions of the Borough's sanitary sewer system which suffer from water leakage.	Long	Medium	Borough Council, Administration	County, NJ Department of Transportation	HMGP, NJEIT
Prepare an action plan for improved capacity of ditches and creeks that cannot move water fast enough due to an inherent lack of capacity, reduced capacity due to a lack of maintenance, ineffective pump stations, etc.	Short	Medium	Borough Council, Administration		HMGP, NJEIT
The Borough should consider use of riprap and/or a vertical hydraulic barrier to prevent stream bank erosion.	Medium	Medium	Borough Council, Administration		HMGP, NJEIT
<i>Prepare a Capital Facilities Plan</i>					
Prepare an updated five year Capital Facilities Plan to identify municipal capital investment necessary to implement the recommendations in the revised Borough policies (such as, but not limited to, those found in the utilities plan and community facilities plan) and those for enhancing Borough Flood Infrastructure.	Medium	Medium	Borough Council, Administration		PSPAGP

Action Items	Time Frame	Priority	Responsible Party(s)	Partner	Potential Funding Source(s)**
Miscellaneous					
During widespread power outages, encourage PSE&G to keep power on (or off) during the night and better communicate with Borough officials about when the power will be turned on/off.	Short	Medium	Borough Council, Administration	PSE&G	
Encourage PSE&G to increase pressure to their low pressure natural gas pipes.	Short	Medium	Borough Council, Administration	PSE&G	
Encourage building owners to conduct floodproofing through education about methods and funding programs. Such methods may include wet or dry floodproofing and may include filling basements that are subject to flooding.		Medim	Borough Council, Administration, Planning Board		HMGP

* Glossary of Abbreviations

PSPAG: New Jersey Department of Community Affairs (NJ DCA) Post Sandy Planning Assistance Grant Program

HMGP: Federal Emergency Management Agency (FEMA) Hazard Mitigation Grant Program

NJEIT: New Jersey Environmental Infrastructure Trust (loan program)

Photograph Credits

1. http://upload.wikimedia.org/wikipedia/commons/8/80/Sandy_Oct_28_2012_16.00%28UTC%29.jpg. Accessed March 20, 2014
2. http://www.gannett-cdn.com/-mm-/ac1394dbdcca6a36cbf486633b129cd813095ac3/r%3Dx404%26c%3D534x401/local/-/media/USATODAY/GenericImages/2012/11/05/little-ferry-sandy-new-4_3.jpg. Accessed February 19, 2014
3. AP Photo/Mike Groll. <http://www.tcpalm.com/photos/galleries/2012/oct/31/an-aerial-tour-of-hurricane-sandy-damage/111368/>. Accessed February 19, 2014
4. Craig Ruttle, Idea Stream. Posted: October 30, 2012. <http://www.ideastream.org/news/npr/163954553>. Accessed February 19, 2014.
5. Elizabeth McManus, August 15, 2013
6. William Perlman. The Star-Ledger. Posted: October 30, 2012. http://photos.nj.com/star-ledger/2012/10/1_ga1031storm_perlman_3.html. William Perlman/The Star-Ledger. Accessed February 19, 2014
7. Elizabeth McManus, August 15, 2013
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10. Vos Iz Neias. Posted November 1, 2014 <http://www.vosizneias.com/news/photos/view/388300077>. Accessed February 19, 2014
11. Elizabeth McManus, August 15, 2013
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13. William Perlman. The Star-Ledger. Posted: October 30, 2012. http://photos.nj.com/star-ledger/2012/10/1_ga1031storm_perlman_2.html. Accessed February 19, 2014
14. Elizabeth McManus, August 15, 2013
15. Elizabeth McManus, August 15, 2013

Appendix A.

Job and Job High Water Elevation Tabulation,

dated October 7, 2103

JOB AND JOB
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HACKENSACK, NEW JERSEY 07601
TEL (201) 487-8754 • FAX (201) 487-7879
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FLORIO C., JOB, P.E., P.L.S. - 1887-1870
KENNETH G.B., JOB, P.E., L.S., P.P.
KENNETH J., JOB, P.E., P.L.S., P.P.

November 20, 2012
Reissued October 7, 2013

Mayor & Council
Borough of Little Ferry
215-217 Liberty Street
Little Ferry, NJ 07643

Re: Hurricane Sandy
Borough of Little Ferry
Bergen County, New Jersey

Dear Mayor & Council:

We are writing you this letter as a followup to our November 13, 2012 correspondence concerning documenting, from a "topographical" perspective, the "severity" of the flooding which occurred as a result of Hurricane Sandy.

As we indicated in that correspondence, the purpose of this documentation is to provide a "Baseline" to establish the severity of this storm, relative to the theoretical "100 Year Storm."

As also indicated in our November 13, 2012 correspondence, this is the same type of documentation our office provided following the 1992 Nor'easter and Hurricane Irene.

The High Water Elevation Tabulation included with our November 13, 2012 report, provided elevation data for the portion of the Borough south of Main Street.

However, due to "standing water" and "debris cleanup", it was not possible to obtain elevation data for the flooded areas, north of Main Street, including Fredcrick Street, Poplar Avenue, Kaufman Avenue, Garden Street, Brandt Street and Grand Street.

Therefore, when conditions permitted, our office obtained elevations for those areas.

As we discussed in detail in our November 13, 2012 report, the 100 Year Flood Elevation for the Borough is established, relative to "Mean Sea Level," using what is known as the "National Geodetic Vertical Datum of 1929"(NGVD29).

Mayor & Council - Borough of Little Ferry
November 20, 2012
Reissued October 7, 2013
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Therefore, the first step in documenting the severity of the flooding was to establish semi-permanent control points (benchmarks) referenced to that Vertical Datum.

These semi-permanent benchmarks were then used to set a semi-permanent control point (benchmark) on Frederick Street, Kaufman Avenue and Poplar Avenue.

As with our "original" field survey work, the three (3) additional semi-permanent benchmarks were set at an even foot.

Since our office had, as part of our original topographic survey work, established benchmarks along Main Street, it was not necessary to set additional semi-permanent benchmarks to obtain elevation data for Garden Street, Brandt Street or Grand Street.

After establishing the above referenced benchmarks, we located readily discernable "High Water" marks on the above six (6) streets and established their elevations, relative to the NGVD 29 Vertical Datum.

The flooding which impacted the Borough was the result of "tidal surge". However, from a hydrologic perspective, there were some minor differences as to the "source" of this "tidal surge".

The source of the "tidal surge" was the Hackensack River. Therefore, properties in close proximity to this waterway such as Frederick Street, Kaufman Avenue and Poplar Avenue would have more of a "direct" impact from the river proper, as opposed to other drainage areas such as along the Losen Slote. Hydrologically this means that, for areas such as these streets, that are in closer proximity to the Hackensack River, we would expect a slightly higher "High Water Elevation" than in other drainage areas.

Since Brandt Street, Garden Street and Grand Street are also from a hydrologic standpoint, primarily influenced by the Hackensack River, the "High Water Surface Elevations", for those roadways, should be "in line" with those of Kaufman Avenue, Poplar Avenue and Frederick Street.

The enclosed tabulation confirms that, in fact this was the case with the "High Water Elevations" for the above roadways, averaging 8.93' NGVD 29. As we indicated in previous correspondence, the 100 Year Flood Elevation for the Borough is 9.0' NGVD 29.

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Page Three

Since, as indicated, Poplar Avenue, Kaufman Avenue, Frederick Street, Garden Street, Brandt Street and Grand Street are, from a hydrologic standpoint, primarily influenced by the Hackensack River, showing the High Water Elevations from those areas as a separate tabulation provides a "line of demarcation" for the High Water Elevations based on the tidal influence of the Hackensack River or Losen Slote.

This additional topographic survey data has been plotted on our "Base Map" which was prepared using the Borough's Tax Map.

This additional topographic survey data basically "ties in" the areas of the Borough south of New Jersey State Highway Route 46 which were flooded as a result of the tidal surge from Hurricane Sandy.

Our office is now moving forward with obtaining the same type of topographic survey documentation of the "High Water Elevations" for the portion of the Borough north of New Jersey State Highway Route 46, primarily in the Bergen Turnpike/Lakeview Avenue area.

As we indicated in our previous correspondence, the Tabulation Data and Map is available to residents of the Borough, as well as the Federal Emergency Management Agency as required.

Our office has been contacted by residents concerning the issue of the flood levels. This is due to the fact that they undertook a "clean-up" of their properties, dwellings, etc., prior to an inspection by FEMA. We were told that FEMA representatives indicated that they were having difficulty establishing the level of flooding in their particular residence.

I advised the property owners that our office had documented, topographically, the High Water Elevations throughout the Borough and that this information was available for their use.

In accordance with the discussion at the November 19, 2012 Council Meeting, our office will determine the feasibility/construction cost to install a permanent emergency standby generator for the Main Street Pump Station.

We hope to have this information available, for the week of November 26, 2012.

We will, of course, continue to keep the Governing Body advised as to the status of this matter.

Also enclosed is our voucher covering additional professional services rendered to date in connection with this storm.

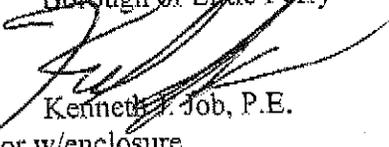
Mayor & Council - Borough of Little Ferry
November 20, 2012
Reissued October 7, 2013
Page Four

As we indicated in our previous correspondence, it is our understanding, based on our experience with similar events that these costs are reimbursable through the Federal Emergency Management Agency.

If you have any questions or require any additional information, please do not hesitate to contact me.

Yours very truly,

JOB & JOB CONSULTING ENGINEERS
Borough Engineer
Borough of Little Ferry



Kenneth F. Job, P.E.

KJJ:jmm

cc: Michael Capabianco, Administrator w/enclosure
William Holley, w/enclosure
Joseph Monaghan, Esq.

Enclosures

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Visit our website: www.jobandjob.org

Florio C. Job, P.E., L.S., 1897-1970
Kenneth G.B. Job, P.E., L.S., P.P.
Kenneth J. Job, M.S., P.E., L.S., P.P.

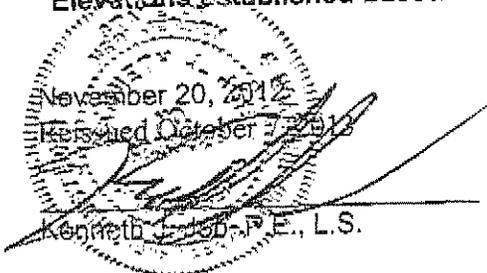
BOROUGH OF LITTLE FERRY
BERGEN COUNTY, NEW JERSEY
HURRICANE SANDY
HIGHWATER ELEVATION TABULATION
(AREAS PRIMARILY INFLUENCED BY HACKENSACK RIVER TIDAL SURGE)

<u>LOCATION</u>	<u>HIGH WATER ELEVATION*</u>
30 Brandt Street	8.74'
41 Brandt Street	8.79'
15 Frederick Street	9.01'
35 Frederick Street	8.93'
70 Frederick Street	9.01'
67 Frederick Street	9.05'
18 Garden Street	8.82'
30 Garden Street	8.84'
22 Grand Street	8.97'
33 Grand Street	8.88'
37 Grand Street	8.97'
28 Kaufman Avenue	9.06'
27 Kaufman Avenue	9.02'
58 Kaufman Avenue	8.87'
30 Poplar Avenue	9.05'
34 Poplar Avenue	9.02'
37 Poplar Avenue	8.94'
10 Werneking Place	8.97'
36 Werneking Place	8.92'

Average Elevation High Water Mark 8.93' NGVD 29

*All Elevations based on N.G.V.D. 29 Datum

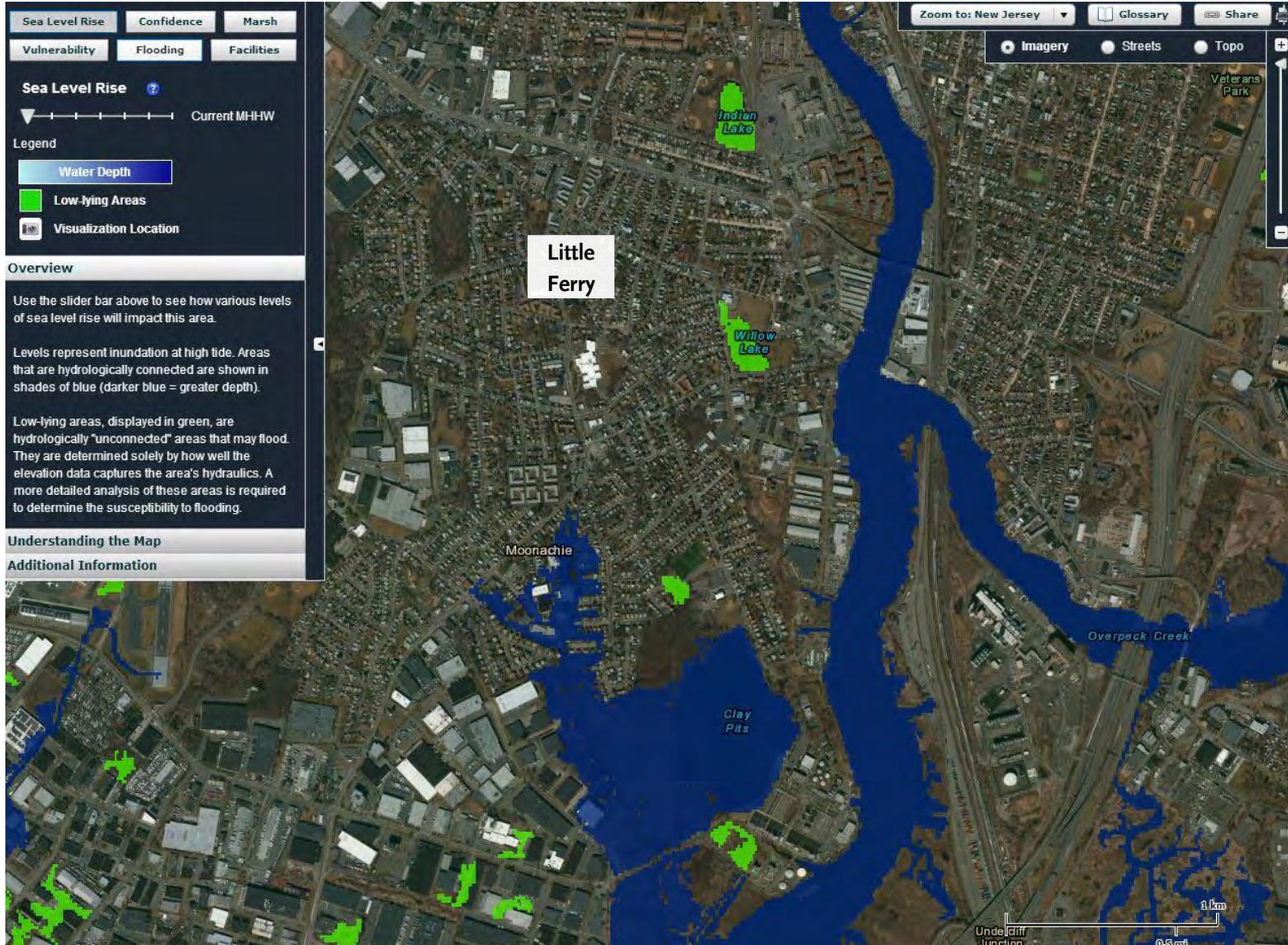
Elevations established based on readily discernable "High Water Marks".



Appendix B.

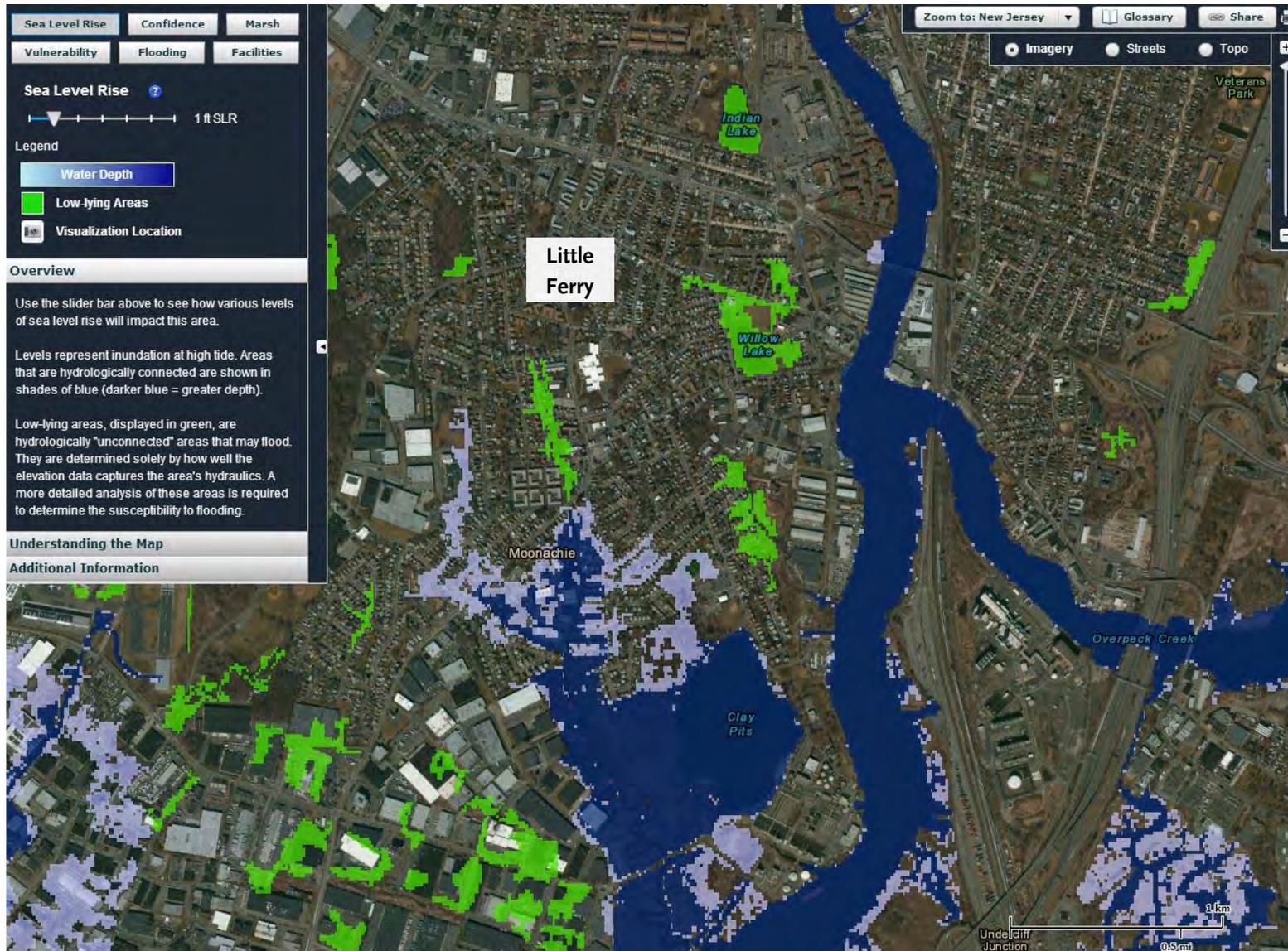
NJ FloodMapper Climate Change Maps

0 FOOT SEA LEVEL RISE: WATER INUNDATION



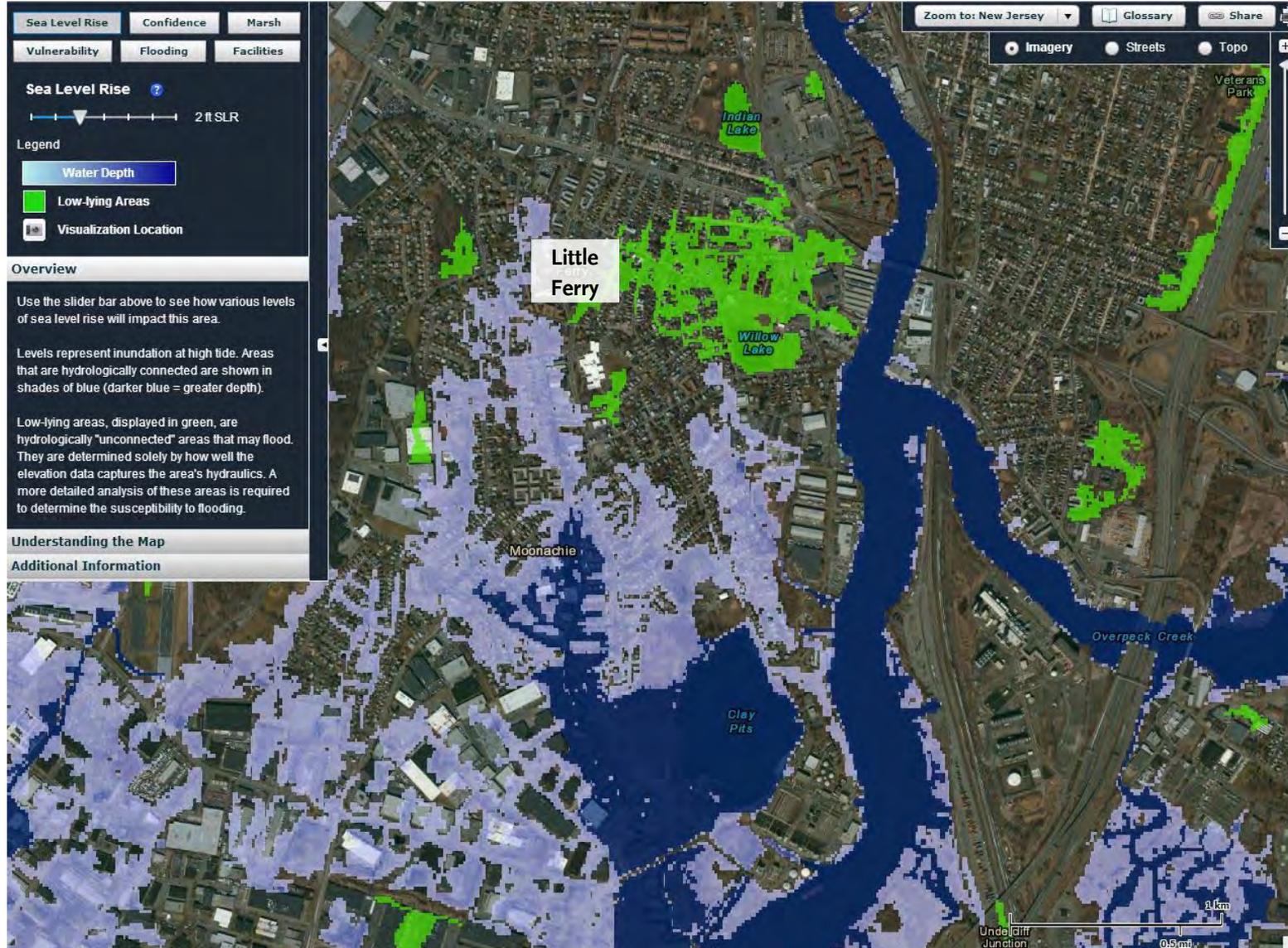
Data source: NJ Flood Mapper (<http://njfloodmapper.org/>). Produced in collaboration with the NOAA Coastal Services Center (CSC) through a partnership with the Jacques Cousteau National Estuarine Research Reserve (JCNER) and the Grant F. Walton Center for Remote Sensing and Spatial Analysis (CRSSA), Rutgers University

1 FOOT SEA LEVEL RISE: WATER INUNDATION



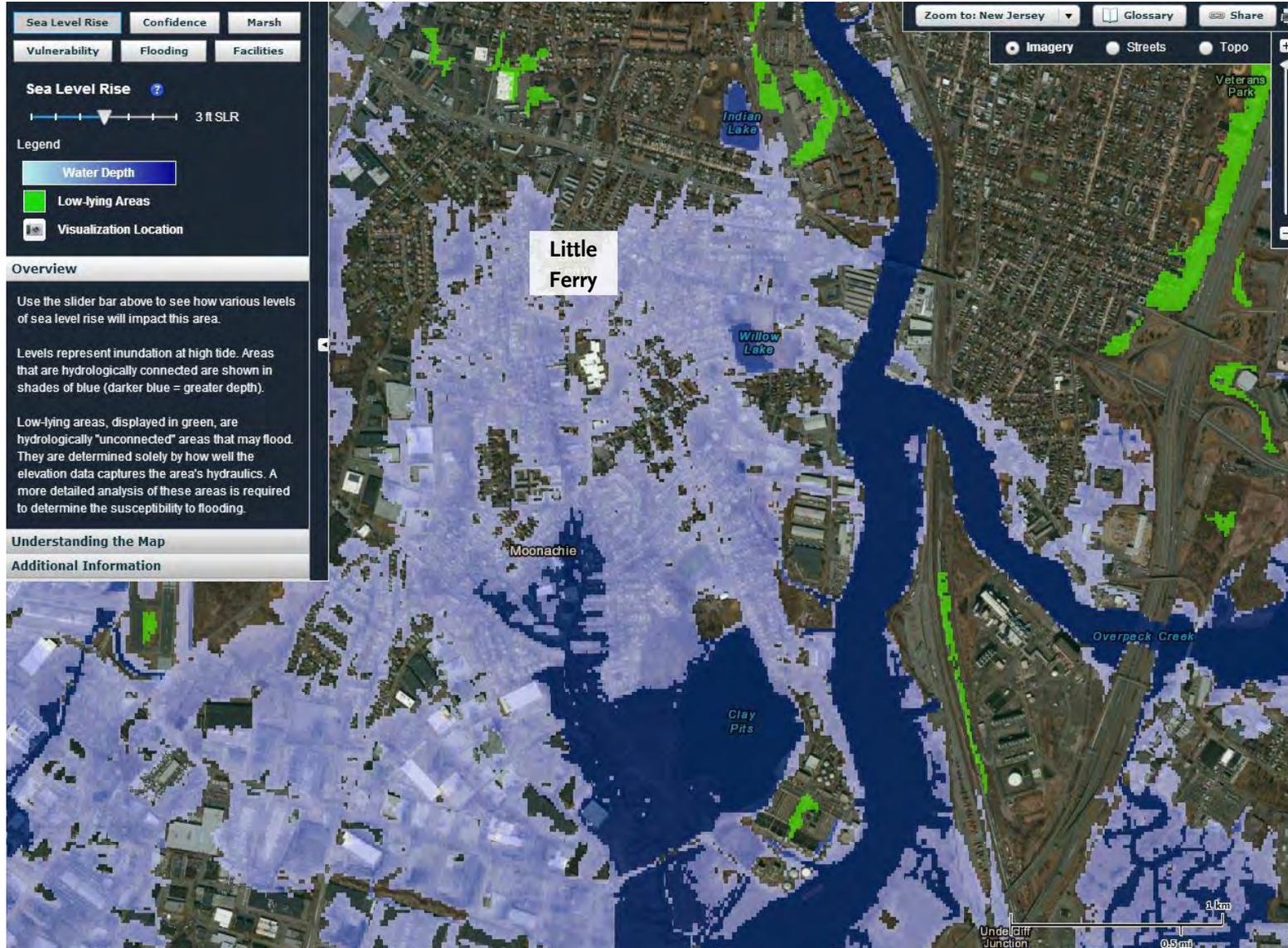
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2 FOOT SEA LEVEL RISE: WATER INUNDATION



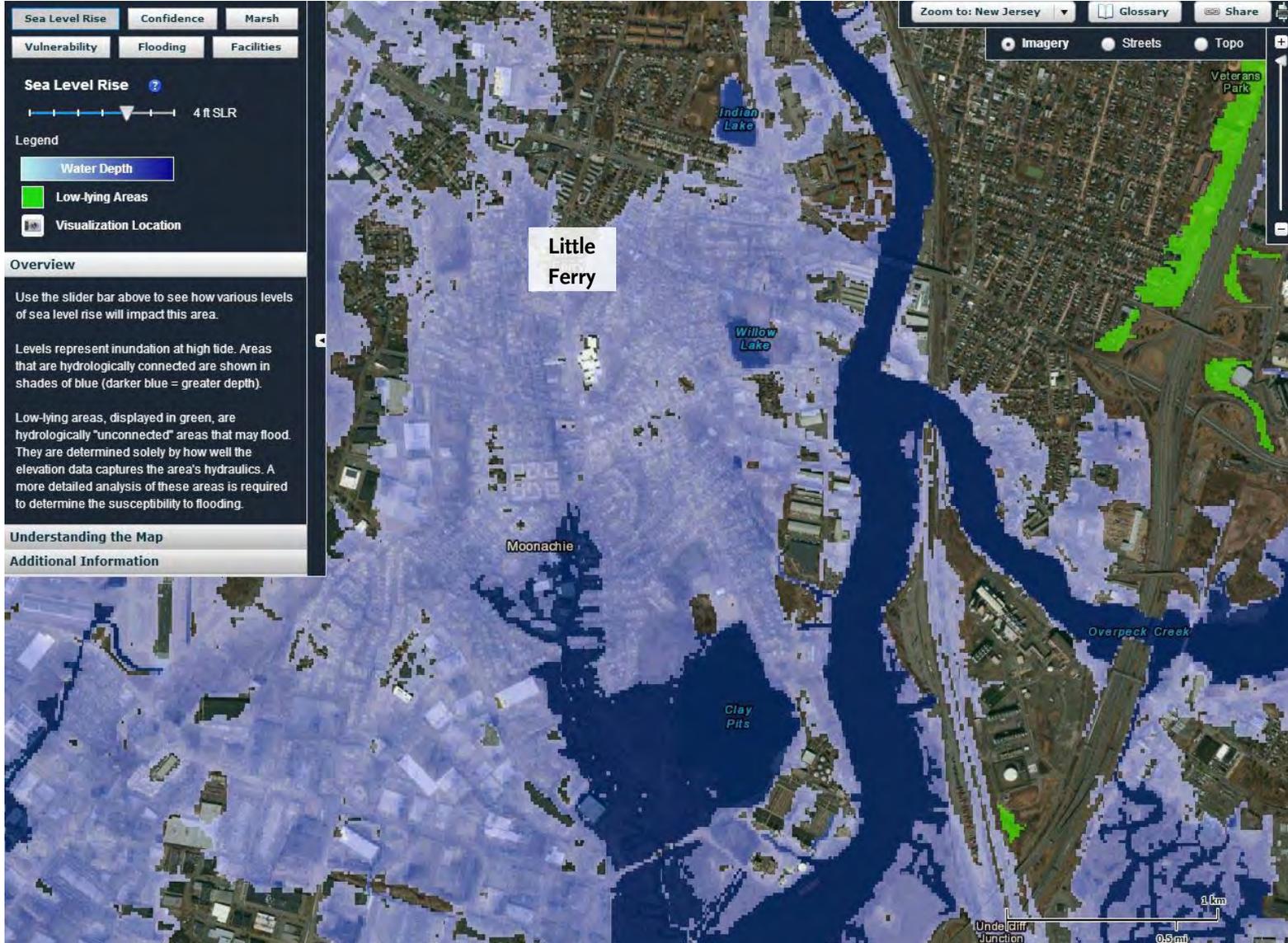
Data source: NJ Flood Mapper (<http://njfloodmapper.org/>). Produced in collaboration with the NOAA Coastal Services Center (CSC) through a partnership with the Jacques Cousteau National Estuarine Research Reserve (JCNERR) and the Grant F. Walton Center for Remote Sensing and Spatial Analysis (CRSSA), Rutgers University

3 FOOT SEA LEVEL RISE: WATER INUNDATION



Data source: NJ Flood Mapper (<http://njfloodmapper.org/>). Produced in collaboration with the NOAA Coastal Services Center (CSC) through a partnership with the Jacques Cousteau National Estuarine Research Reserve (JCNERR) and the Grant F. Walton Center for Remote Sensing and Spatial Analysis (CRSSA), Rutgers University

4 FOOT SEA LEVEL RISE: WATER INUNDATION



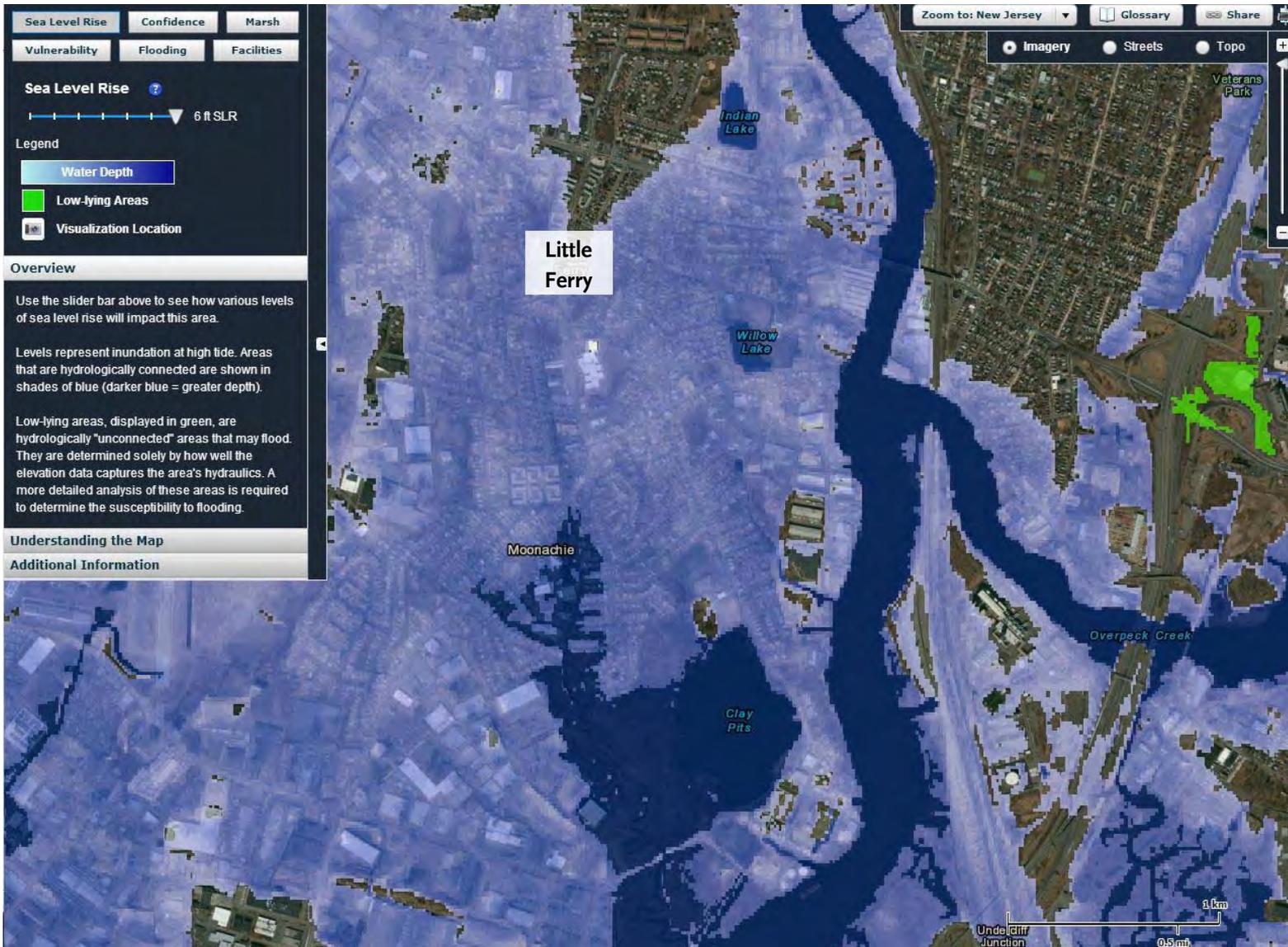
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5 FOOT SEA LEVEL RISE: WATER INUNDATION



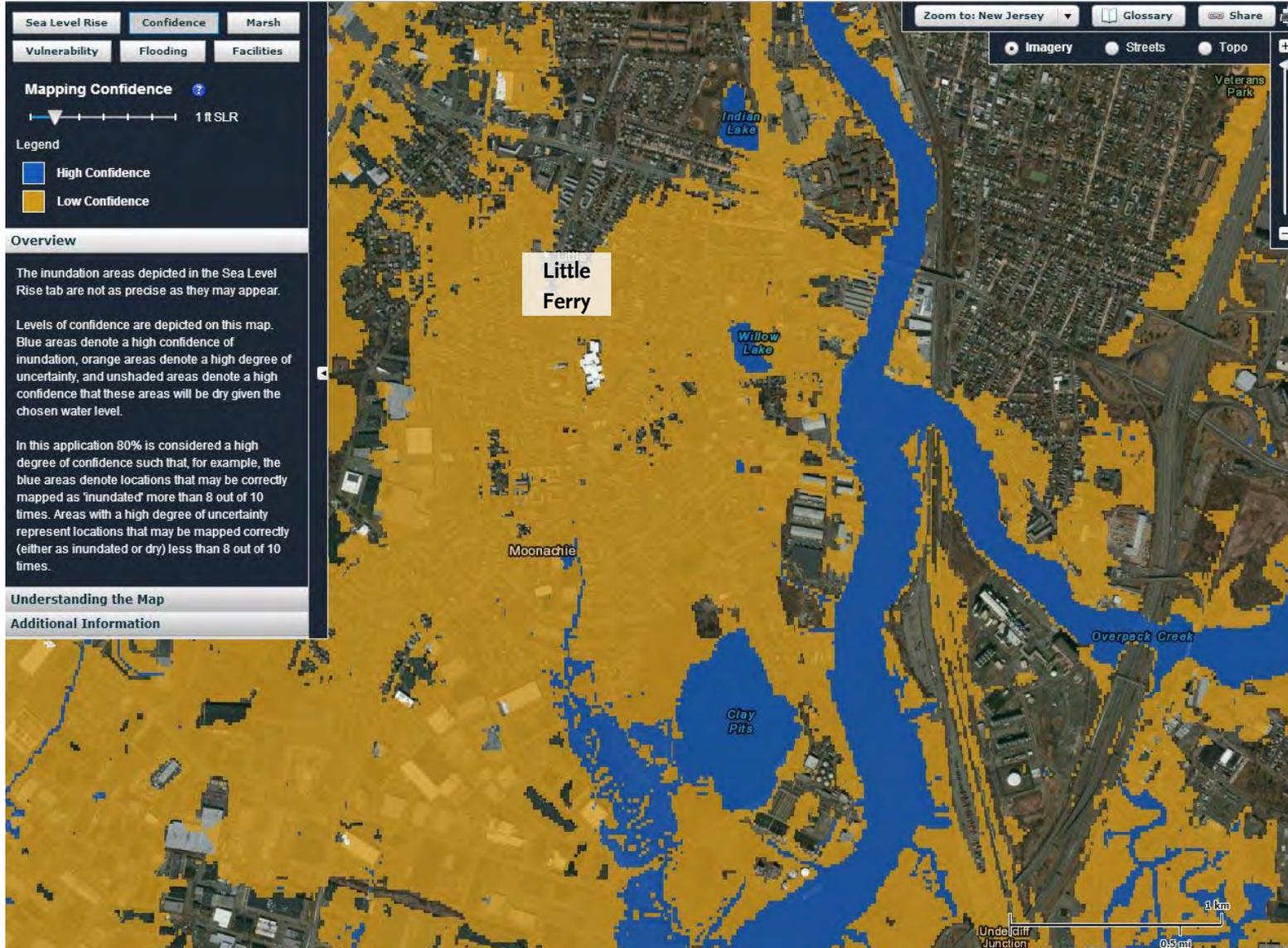
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6 FOOT SEA LEVEL RISE: WATER INUNDATION



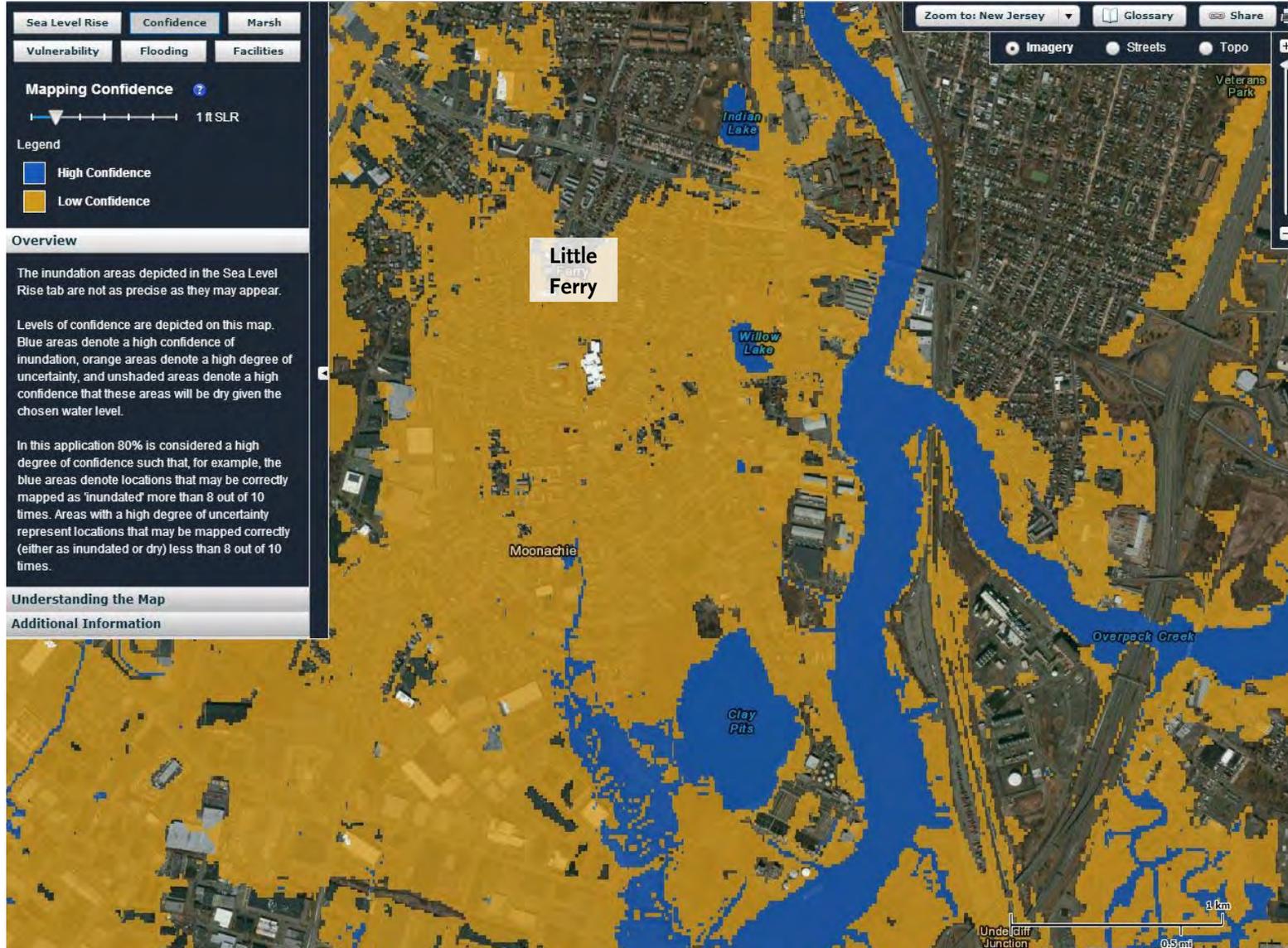
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0 FOOT SEA LEVEL RISE: CONFIDENCE



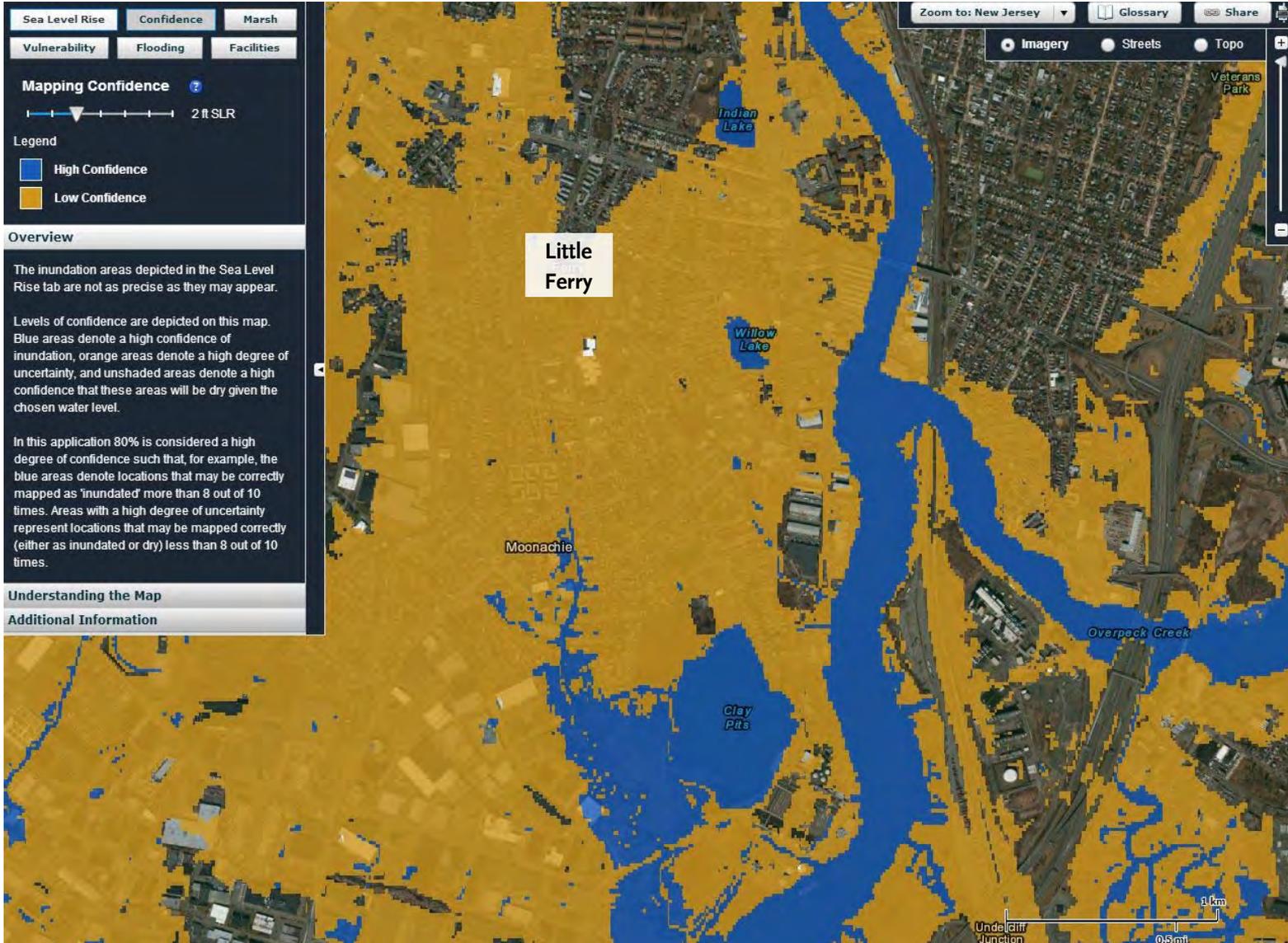
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1 FOOT SEA LEVEL RISE: CONFIDENCE



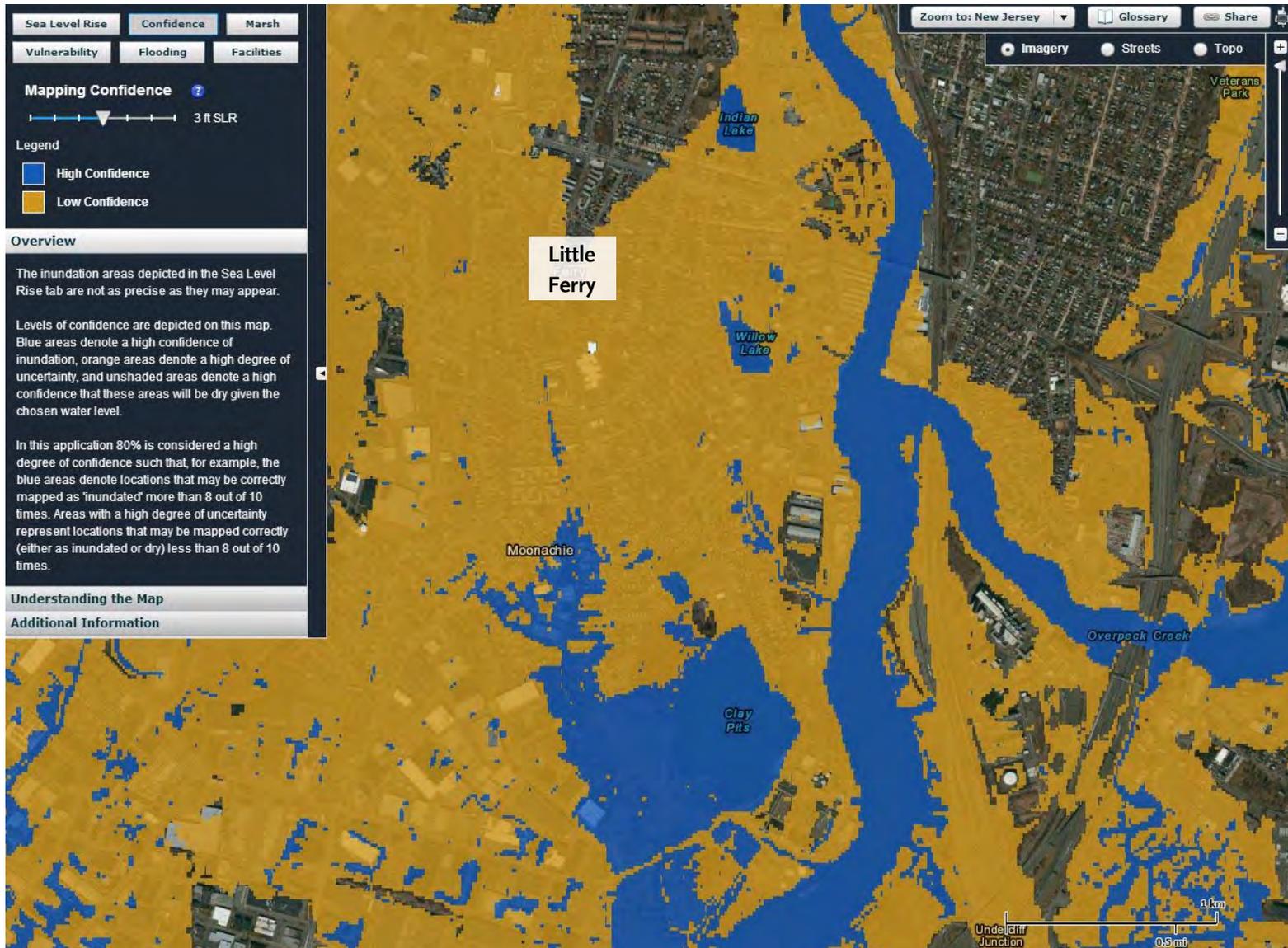
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2 FOOT SEA LEVEL RISE: CONFIDENCE



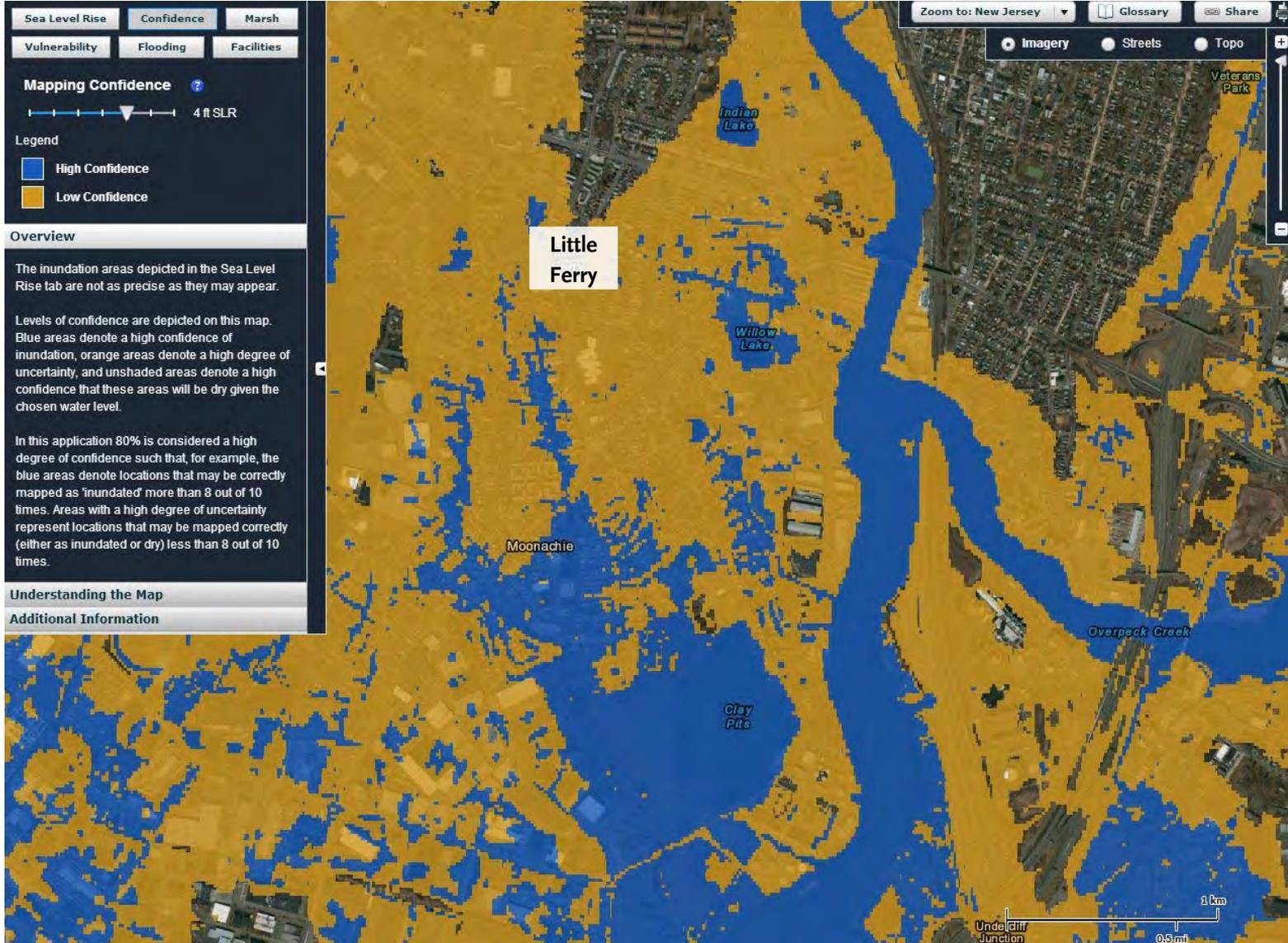
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3 FOOT SEA LEVEL RISE: CONFIDENCE



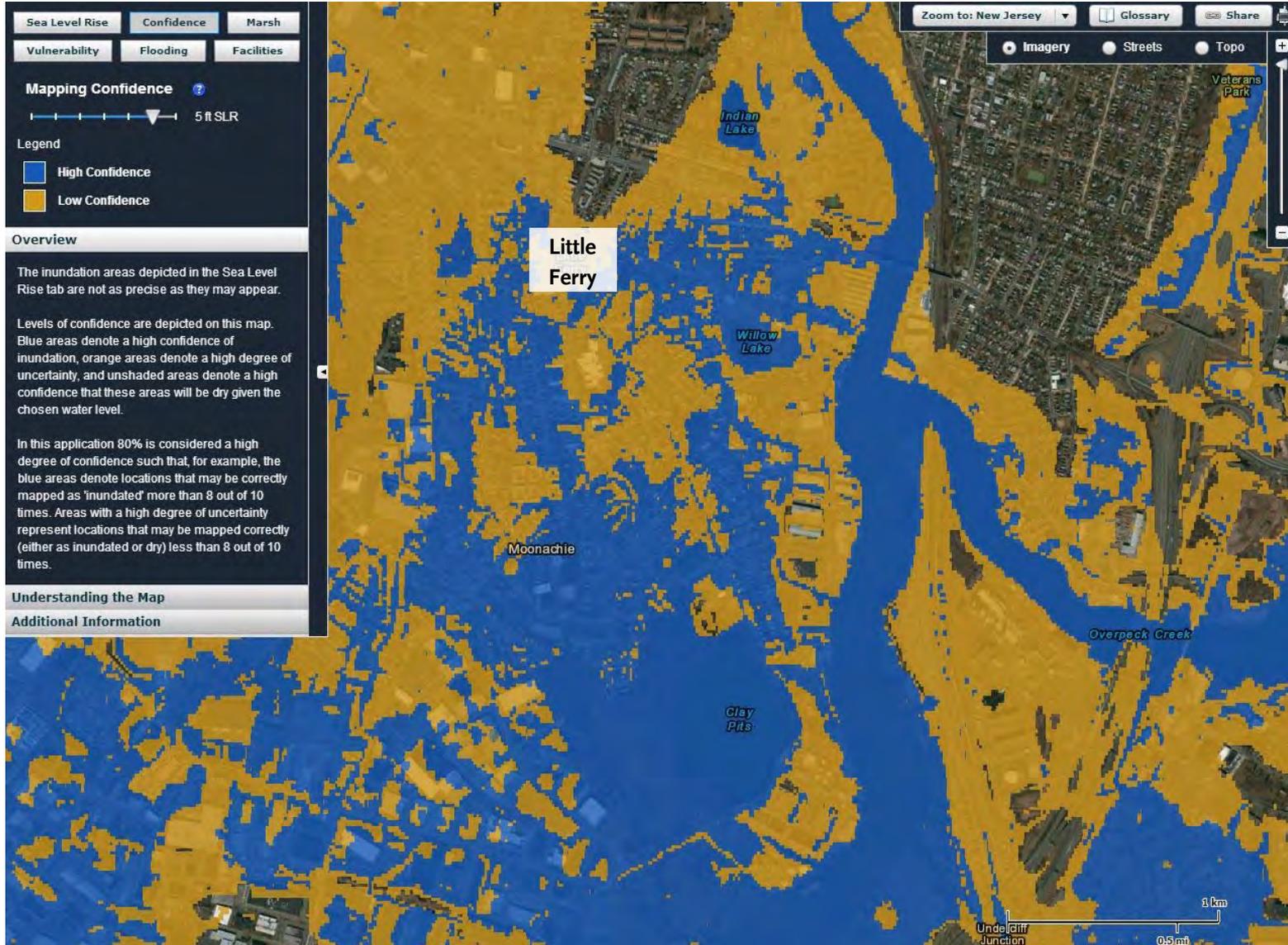
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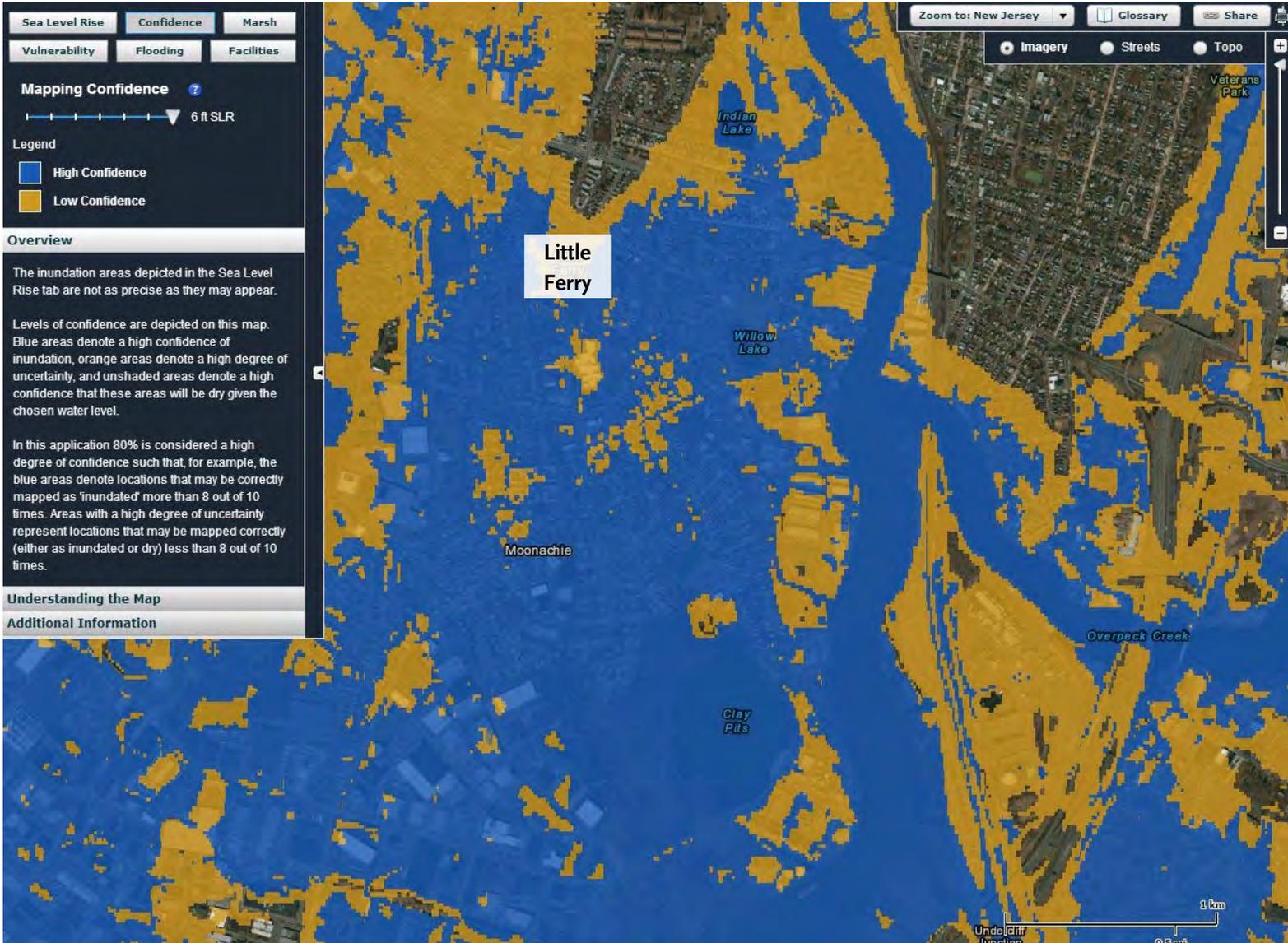
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5 FOOT SEA LEVEL RISE: CONFIDENCE



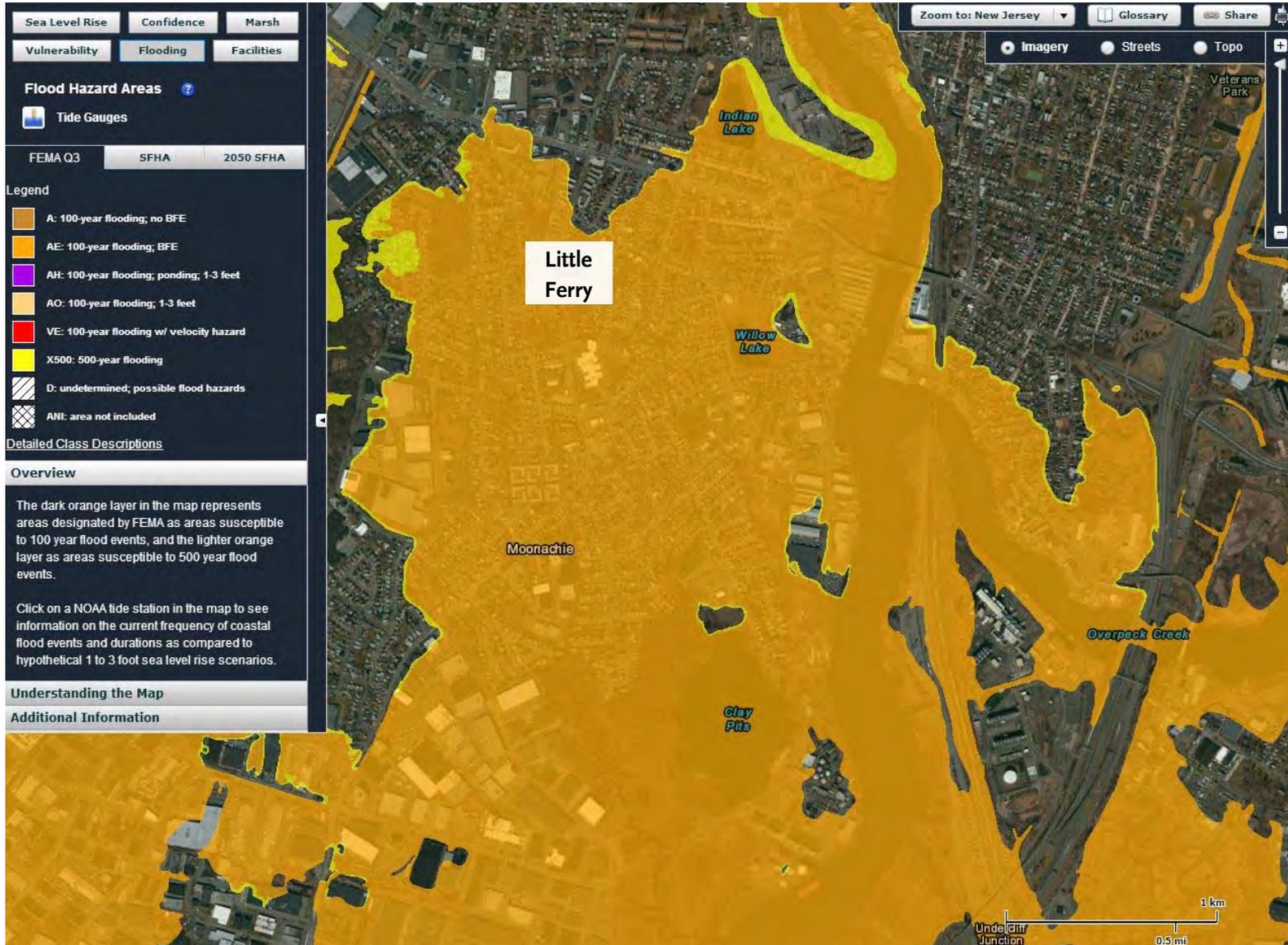
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6 FOOT SEA LEVEL RISE: CONFIDENCE



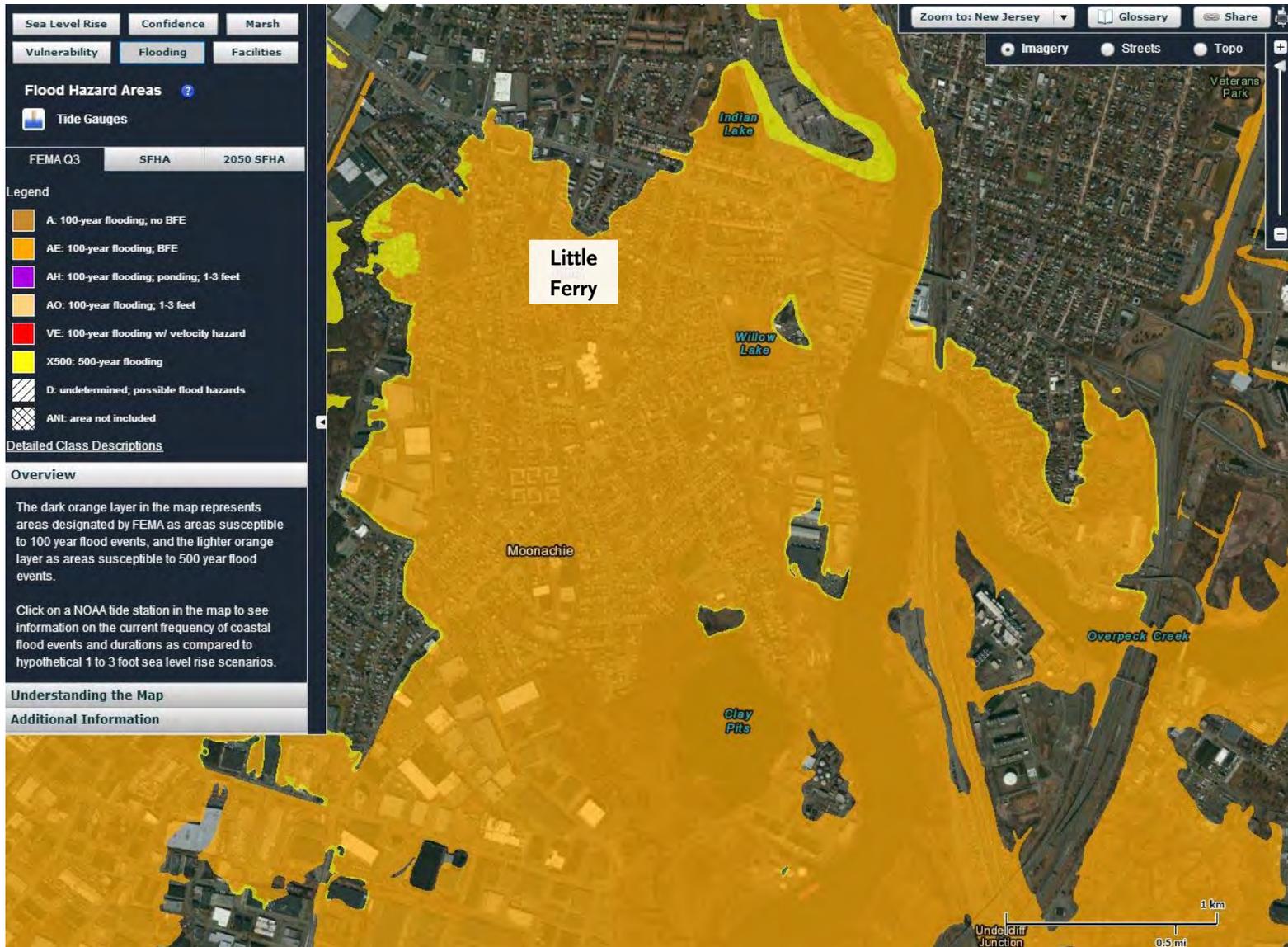
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0 FOOT SEA LEVEL RISE: FLOOD HAZARD AREA



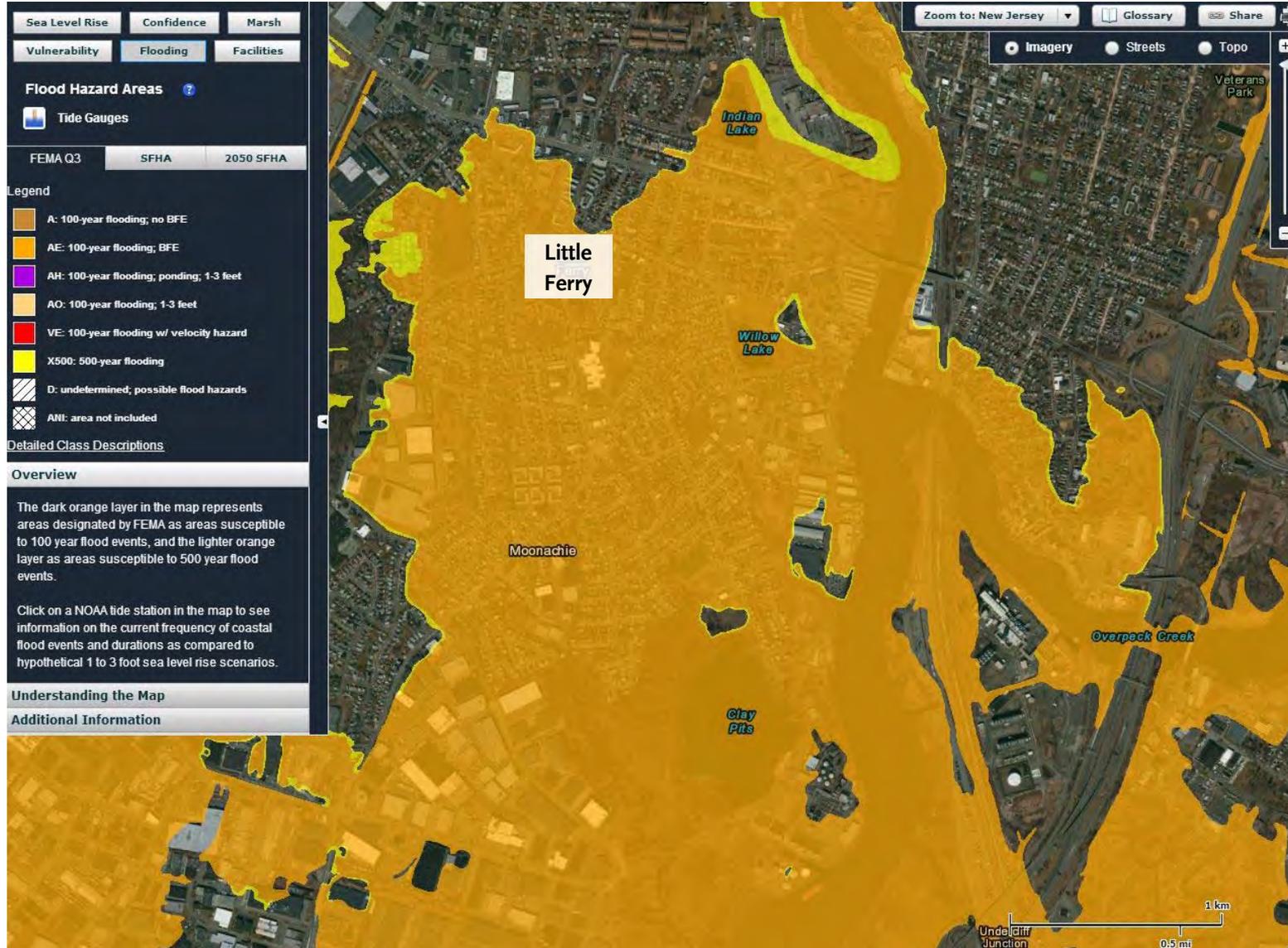
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1 FOOT SEA LEVEL RISE: FLOOD HAZARD AREAS



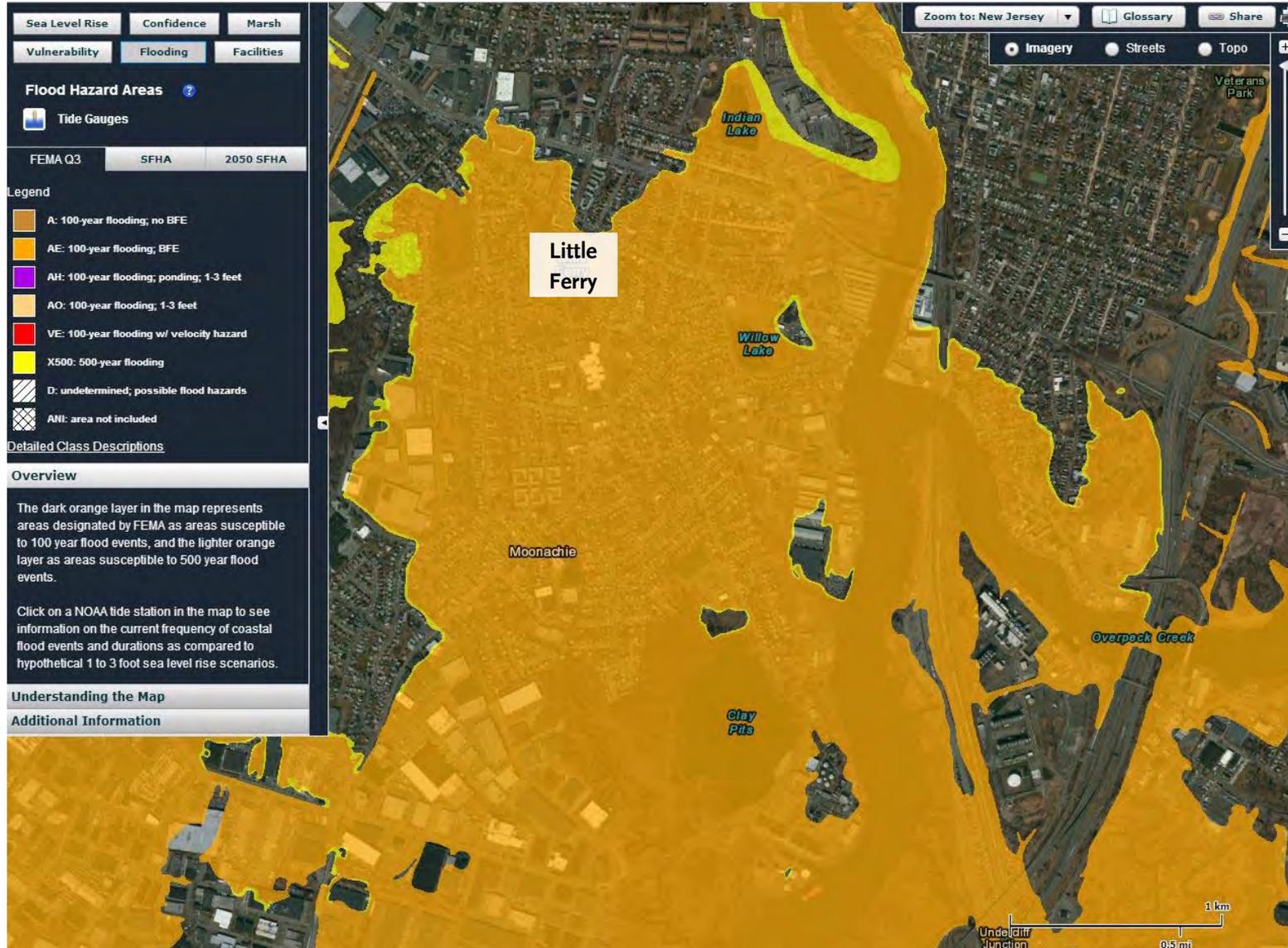
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2 FOOT SEA LEVEL RISE: FLOOD HAZARD AREAS



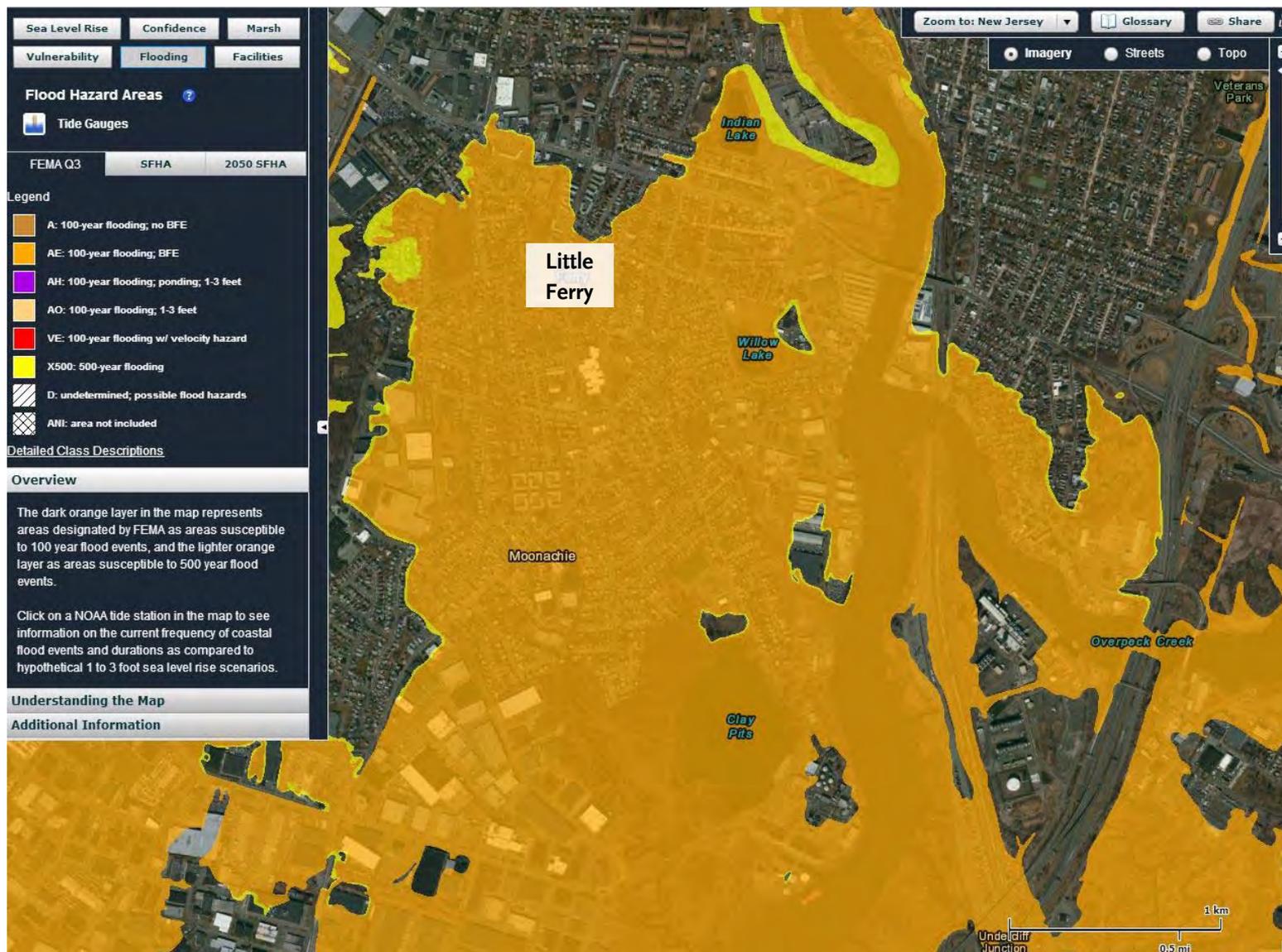
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3 FOOT SEA LEVEL RISE: FLOOD HAZARD AREAS



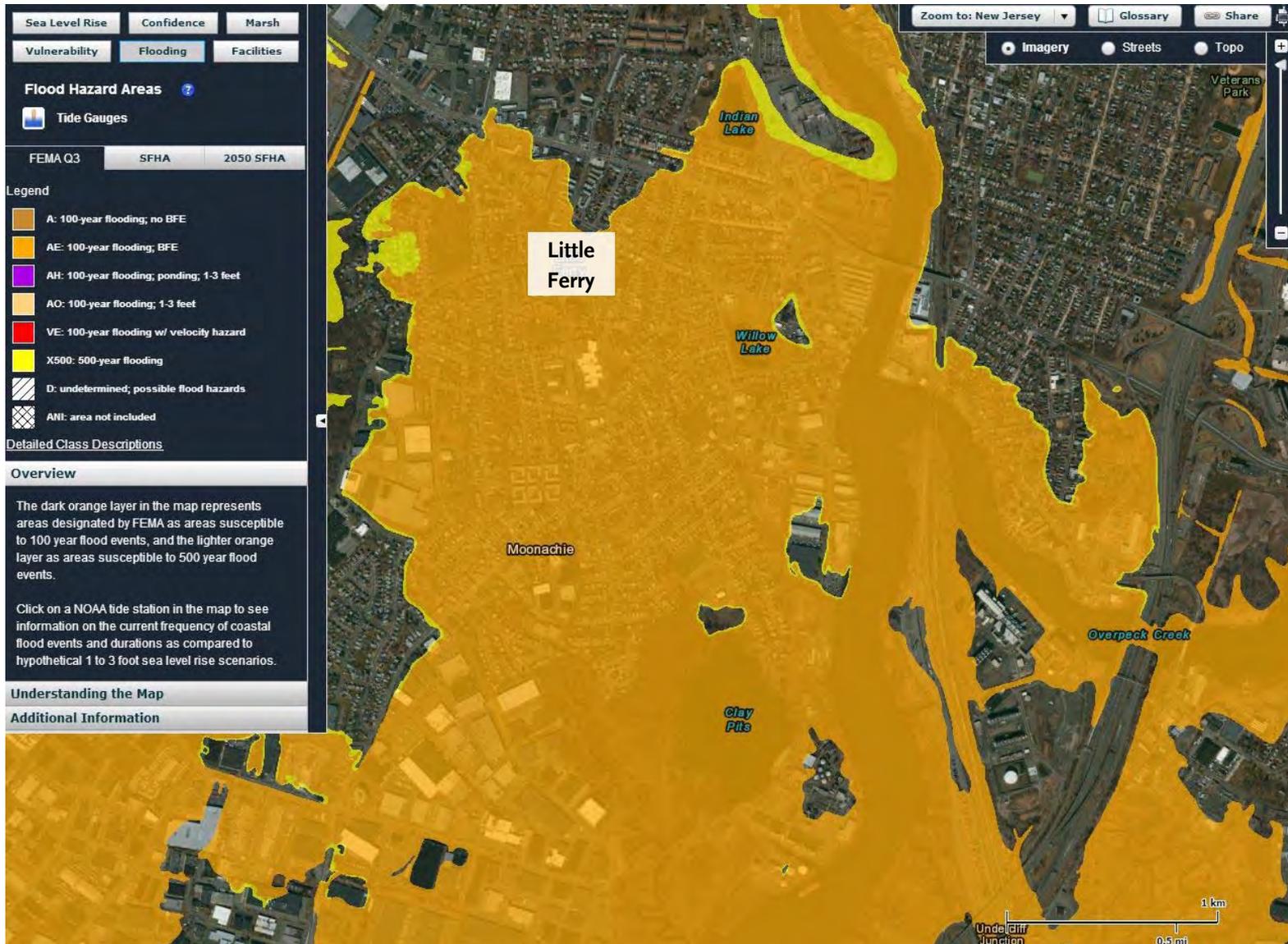
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4 FOOT SEA LEVEL RISE: FLOOD HAZARD AREAS



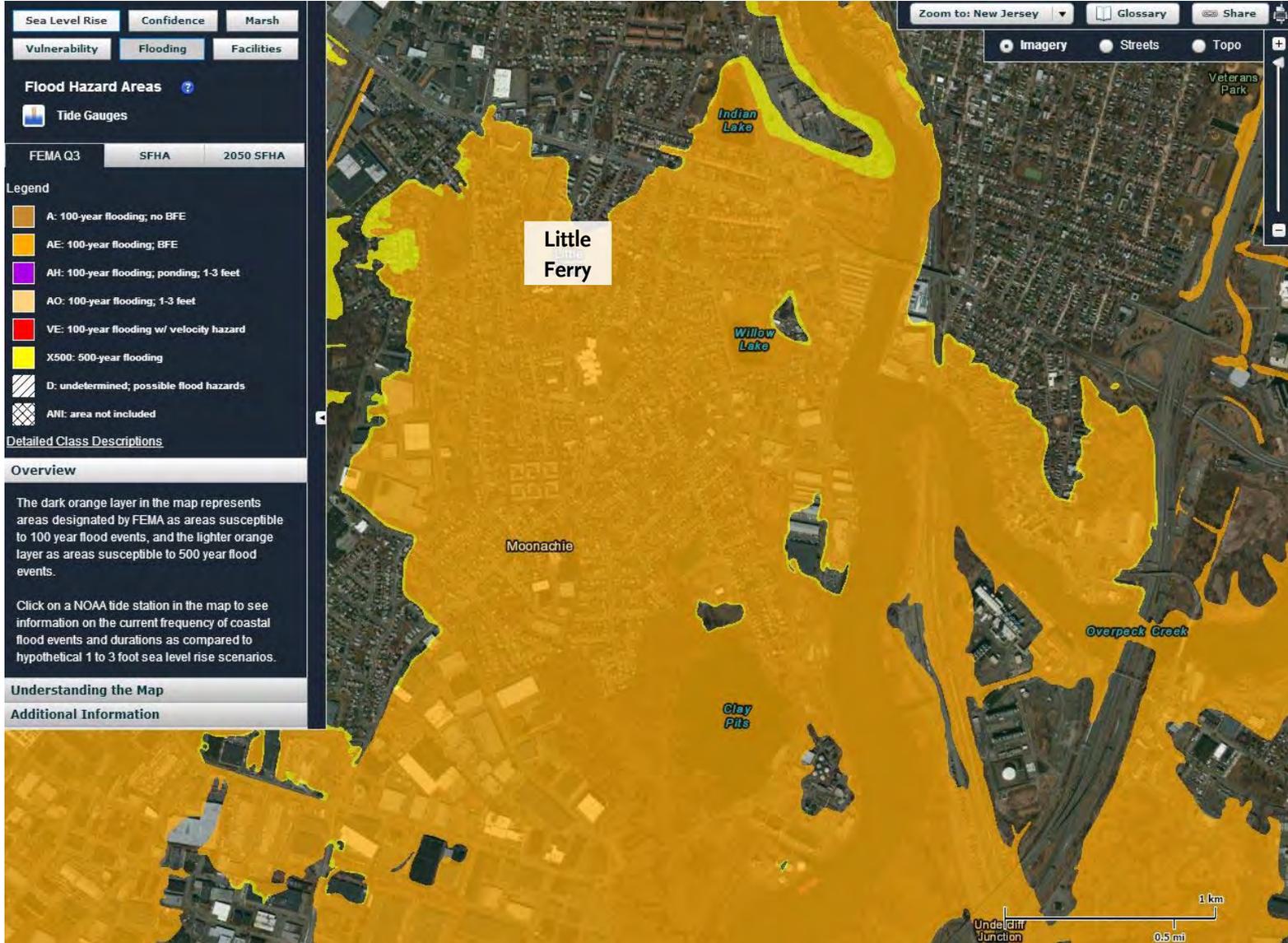
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5 FOOT SEA LEVEL RISE: FLOOD HAZARD AREAS



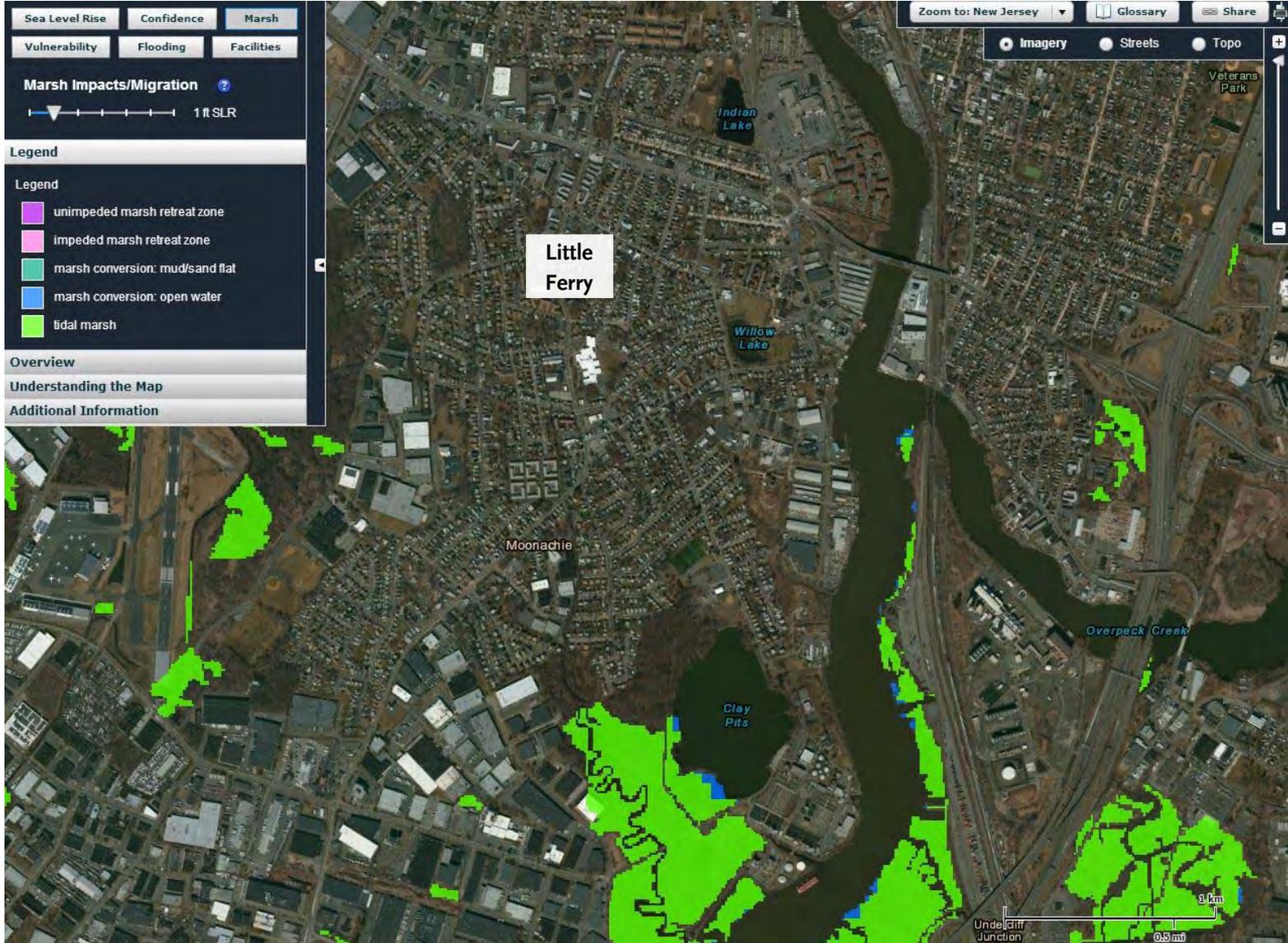
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6 FOOT SEA LEVEL RISE: FLOOD HAZARD AREAS



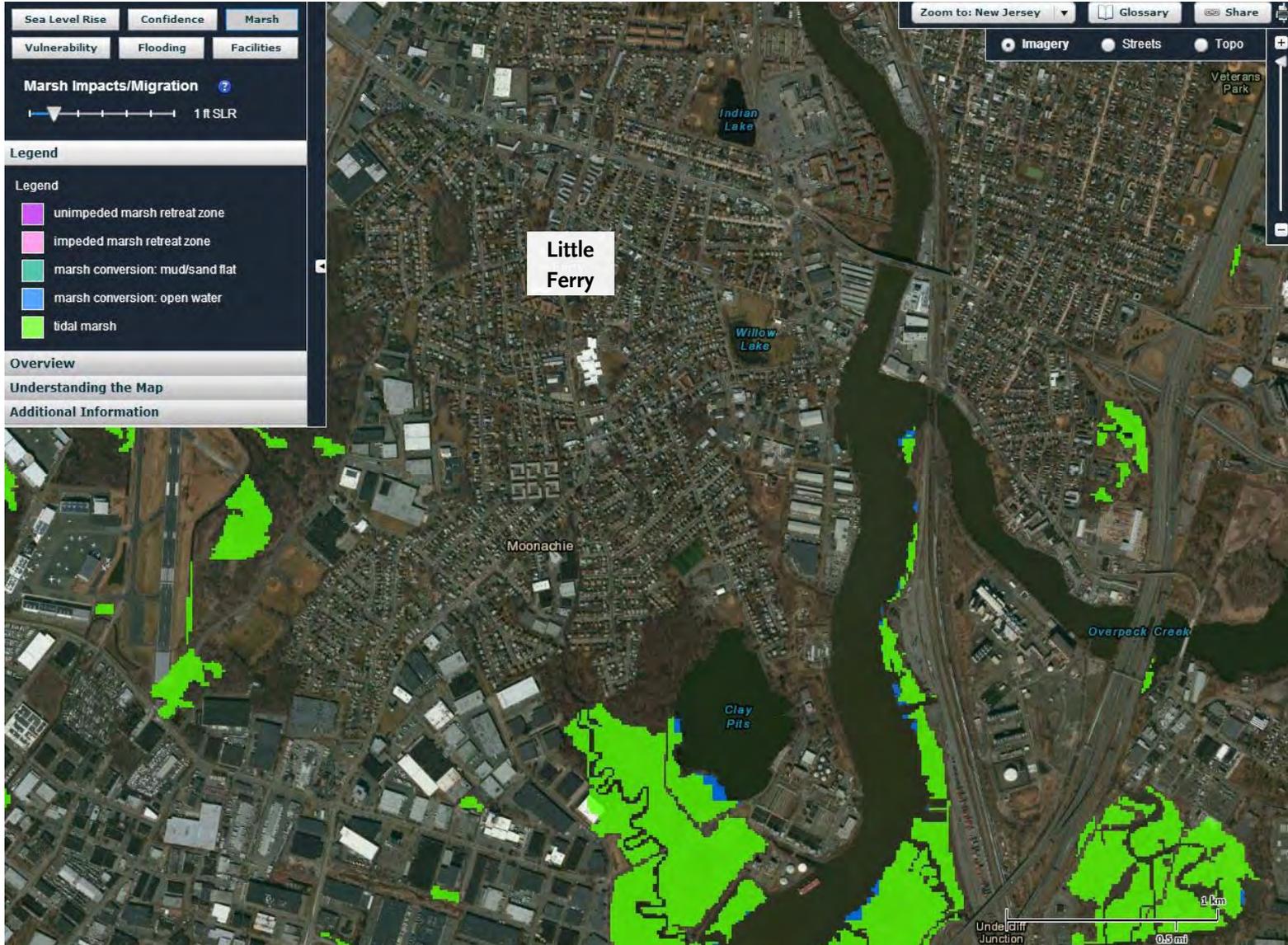
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0 FOOT SEA LEVEL RISE: MARSH LANDS



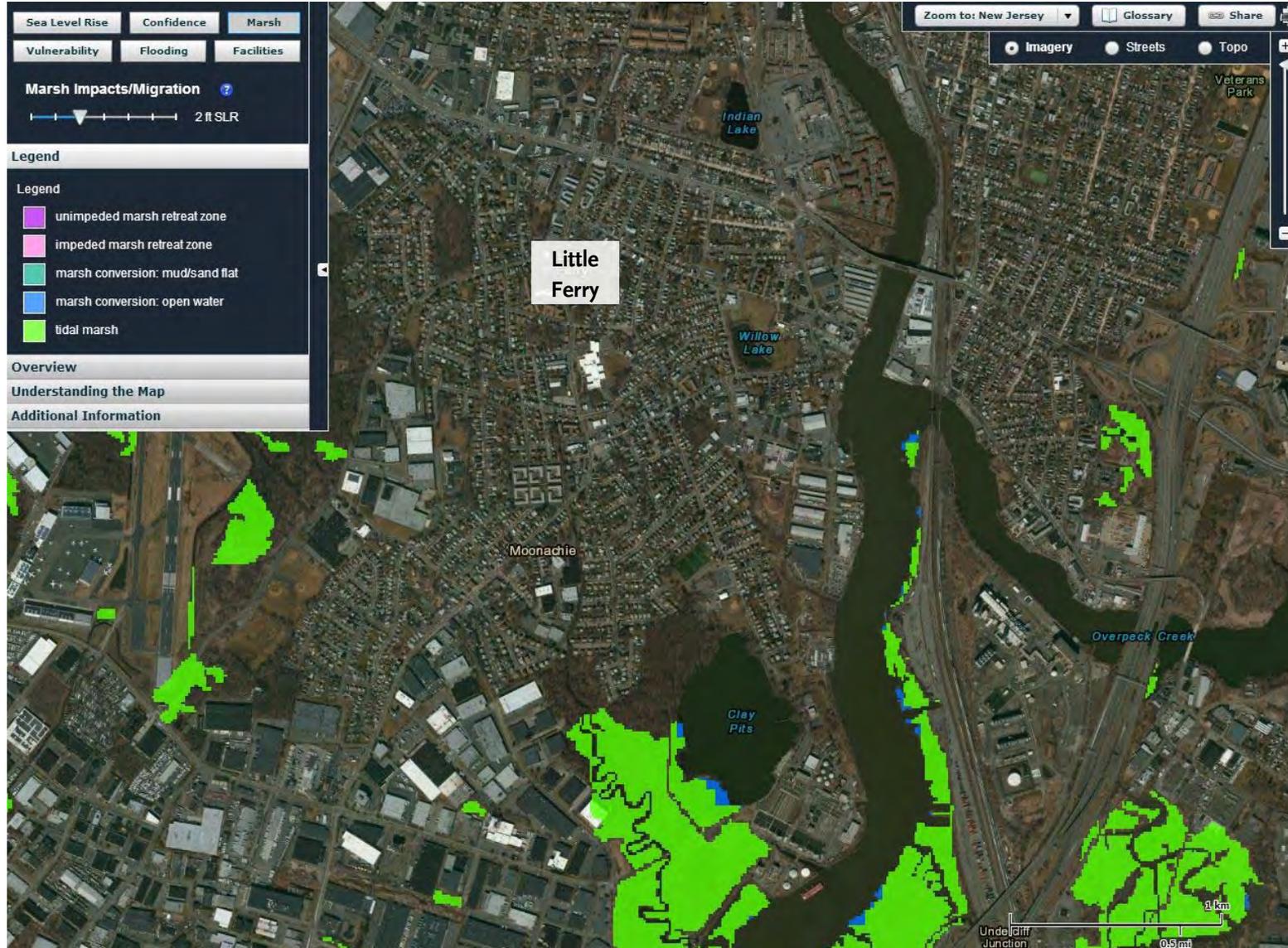
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1 FOOT SEA LEVEL RISE: MARSH LANDS



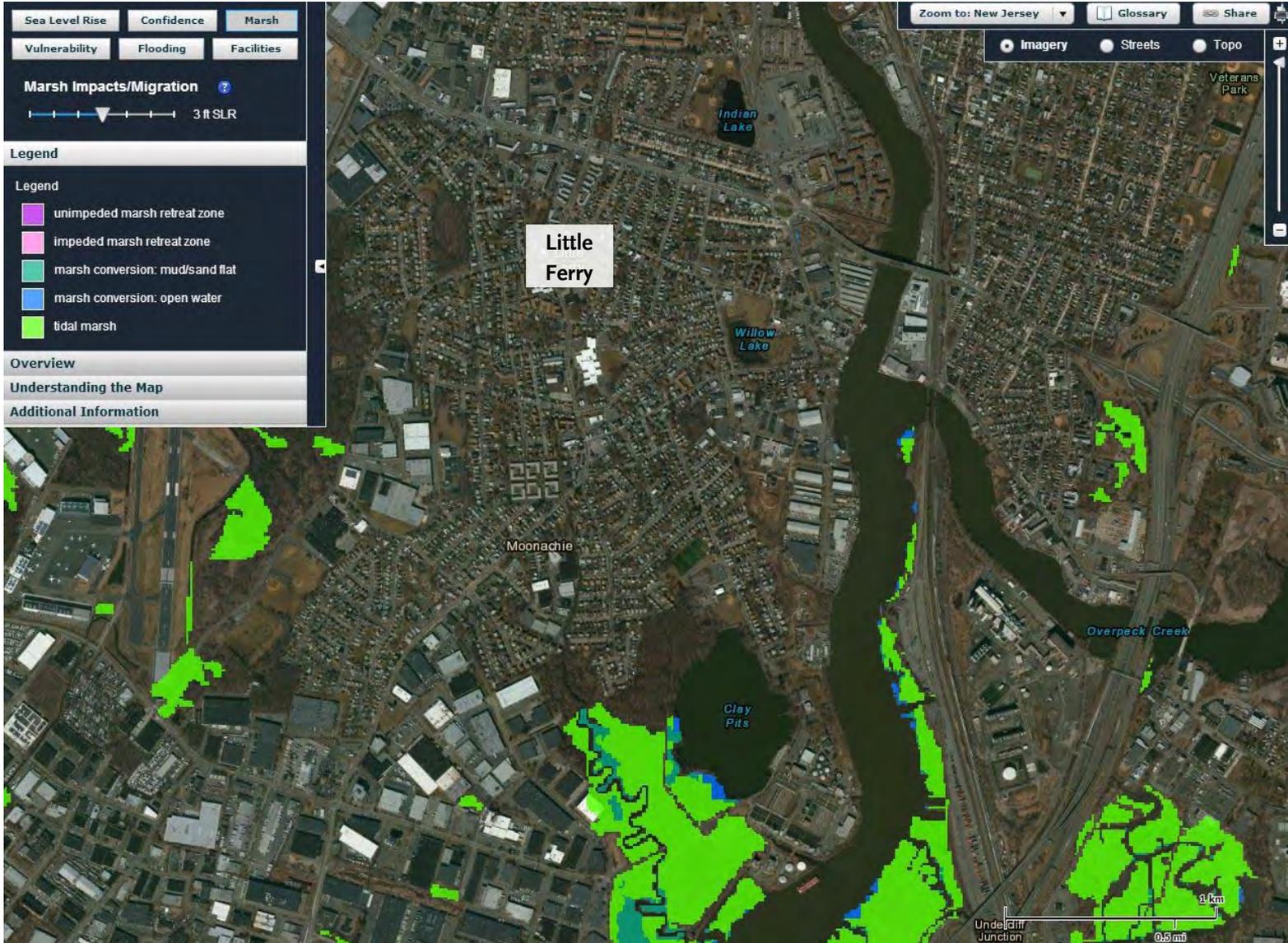
Data source: NJ Flood Mapper (<http://njfloodmapper.org/>). Produced in collaboration with the NOAA Coastal Services Center (CSC) through a partnership with the Jacques Cousteau National Estuarine Research Reserve (JCNER) and the Grant F. Walton Center for Remote Sensing and Spatial Analysis (CRSSA), Rutgers University

2 FOOT SEA LEVEL RISE: MARSH LANDS



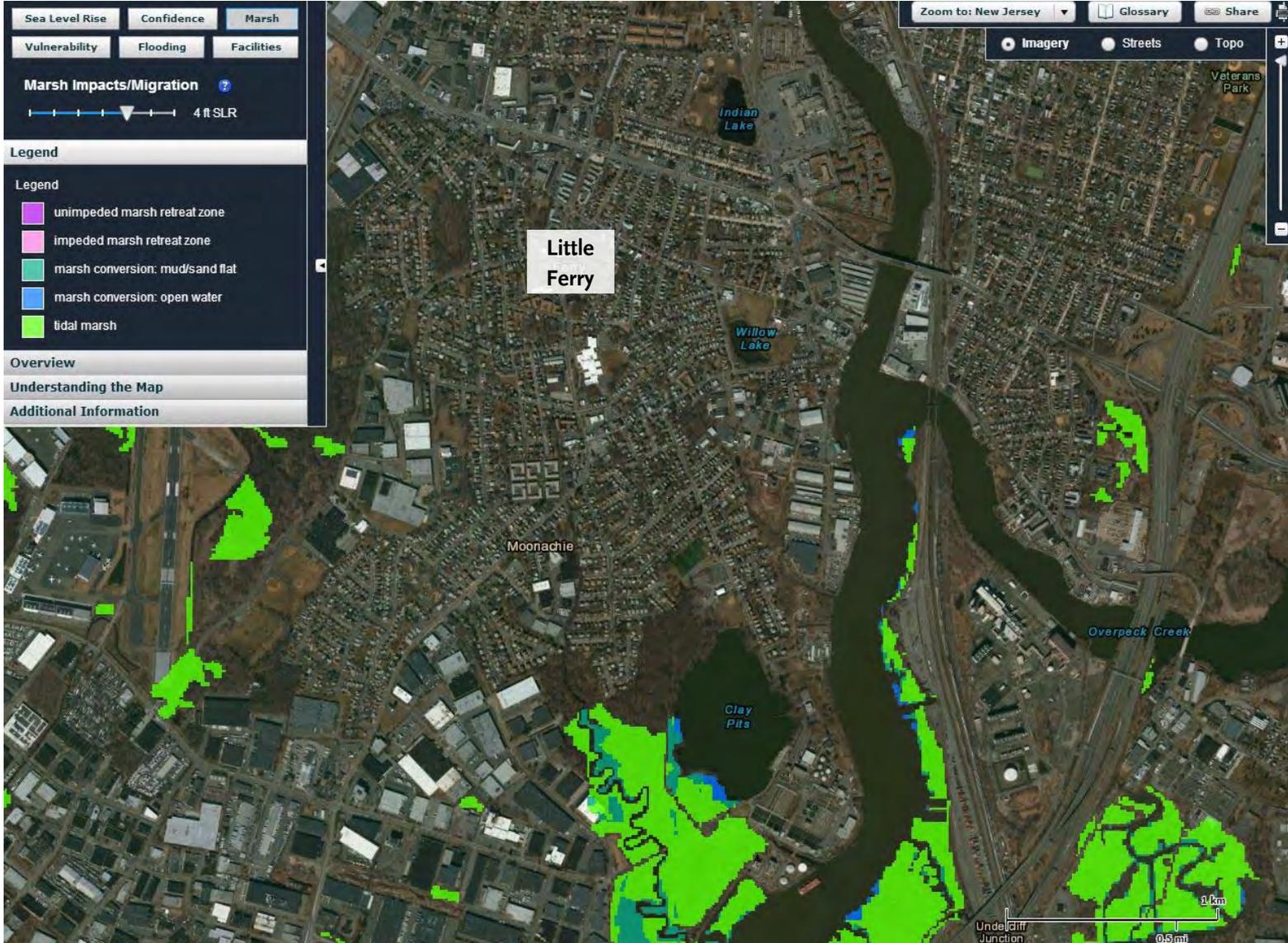
Data source: NJ Flood Mapper (<http://njfloodmapper.org/>). Produced in collaboration with the NOAA Coastal Services Center (CSC) through a partnership with the Jacques Cousteau National Estuarine Research Reserve (JCNER) and the Grant F. Walton Center for Remote Sensing and Spatial Analysis (CRSSA), Rutgers University

3 FOOT SEA LEVEL RISE: MARSH LANDS



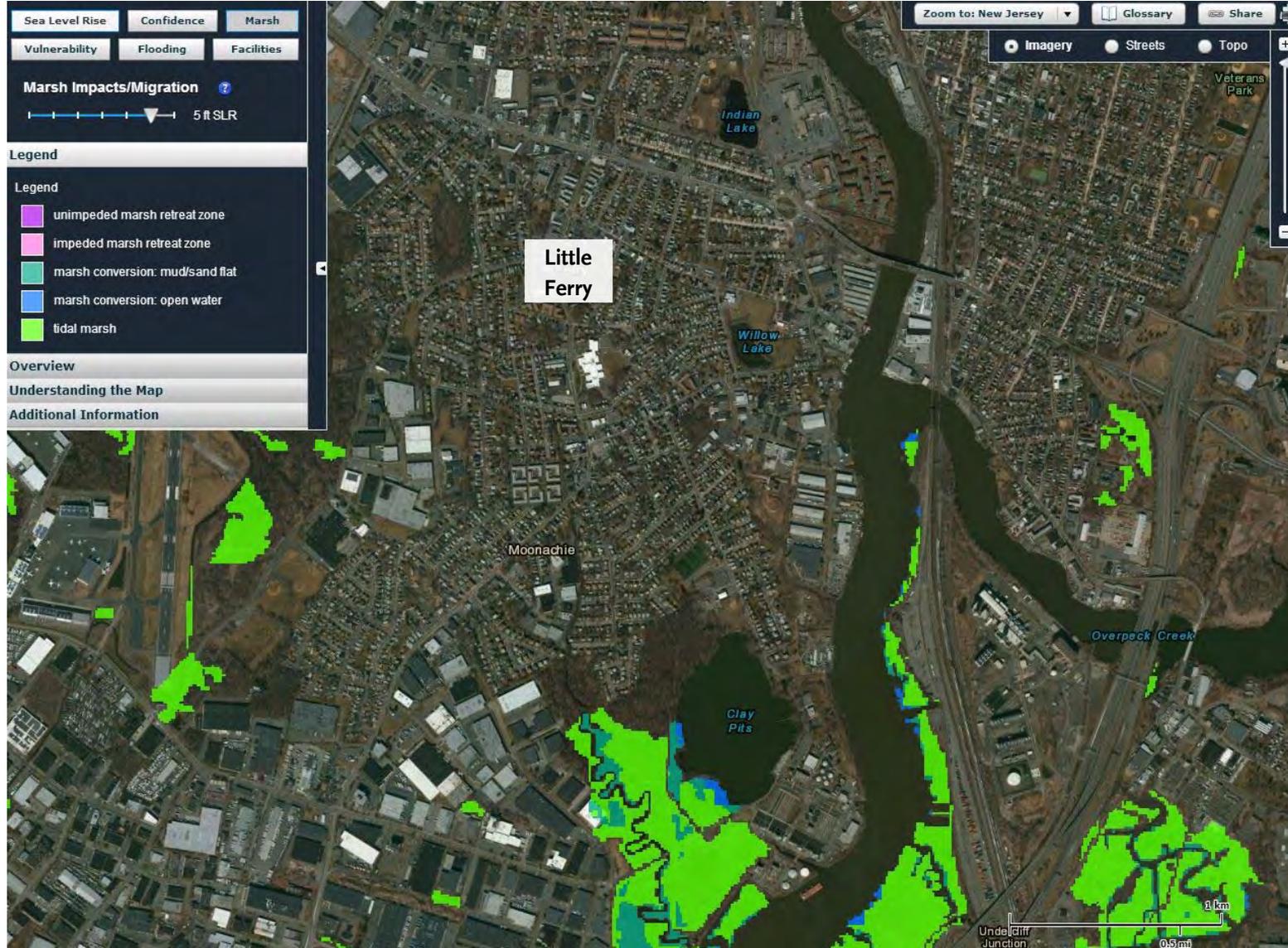
Data source: NJ Flood Mapper (<http://njfloodmapper.org/>). Produced in collaboration with the NOAA Coastal Services Center (CSC) through a partnership with the Jacques Cousteau National Estuarine Research Reserve (JCNERR) and the Grant F. Walton Center for Remote Sensing and Spatial Analysis (CRSSA), Rutgers University

4 FOOT SEA LEVEL RISE: MARSH LANDS



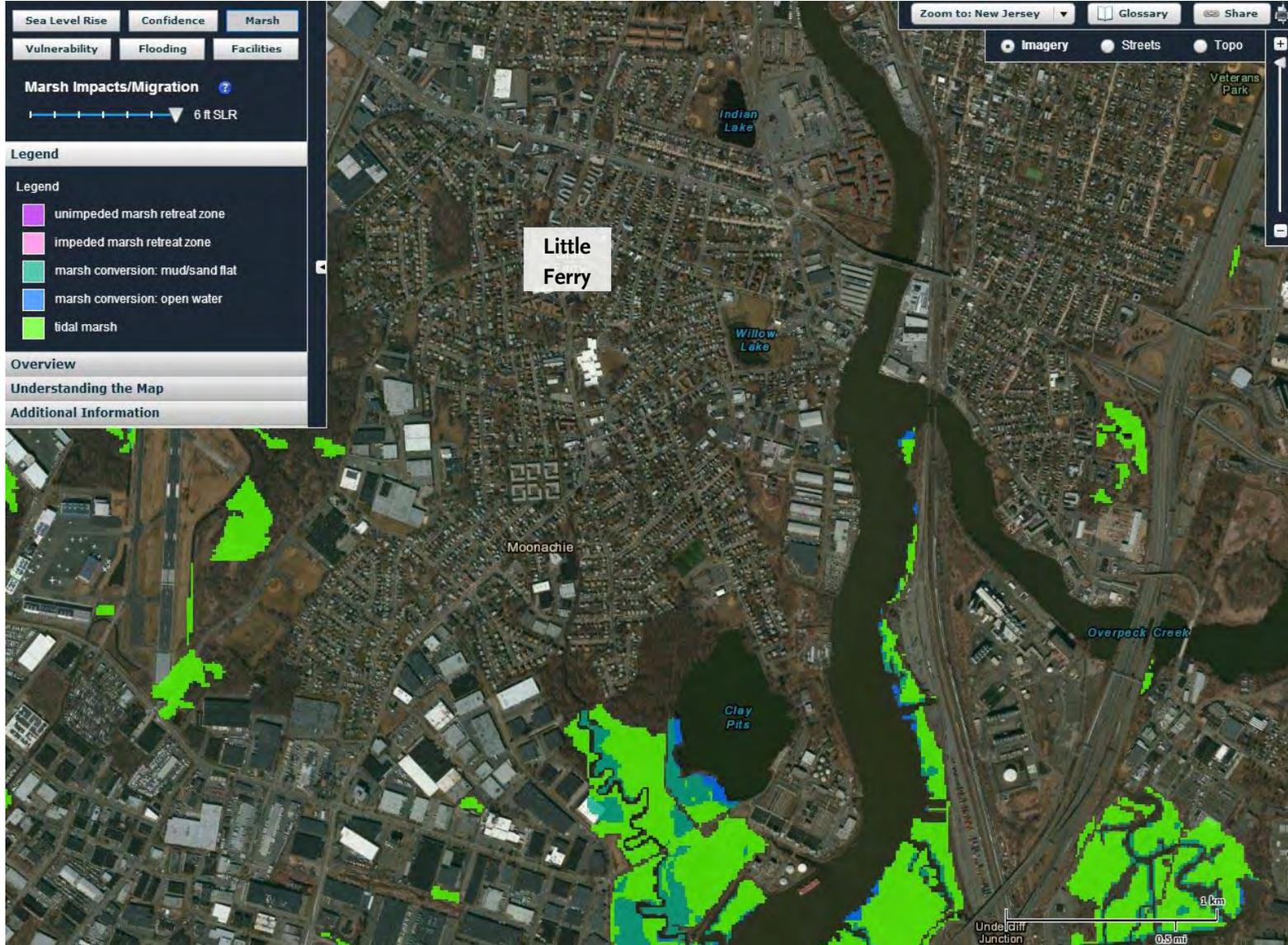
Data source: NJ Flood Mapper (<http://njfloodmapper.org/>). Produced in collaboration with the NOAA Coastal Services Center (CSC) through a partnership with the Jacques Cousteau National Estuarine Research Reserve (JCNER) and the Grant F. Walton Center for Remote Sensing and Spatial Analysis (CRSSA), Rutgers University

5 FOOT SEA LEVEL RISE: MARSH LANDS



Data source: NJ Flood Mapper (<http://njfloodmapper.org/>). Produced in collaboration with the NOAA Coastal Services Center (CSC) through a partnership with the Jacques Cousteau National Estuarine Research Reserve (JCNER) and the Grant F. Walton Center for Remote Sensing and Spatial Analysis (CRSSA), Rutgers University

6 FOOT SEA LEVEL RISE: MARSH LANDS



Data source: NJ Flood Mapper (<http://njfloodmapper.org/>). Produced in collaboration with the NOAA Coastal Services Center (CSC) through a partnership with the Jacques Cousteau National Estuarine Research Reserve (JCNER) and the Grant F. Walton Center for Remote Sensing and Spatial Analysis (CRSSA), Rutgers University

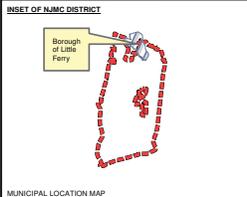
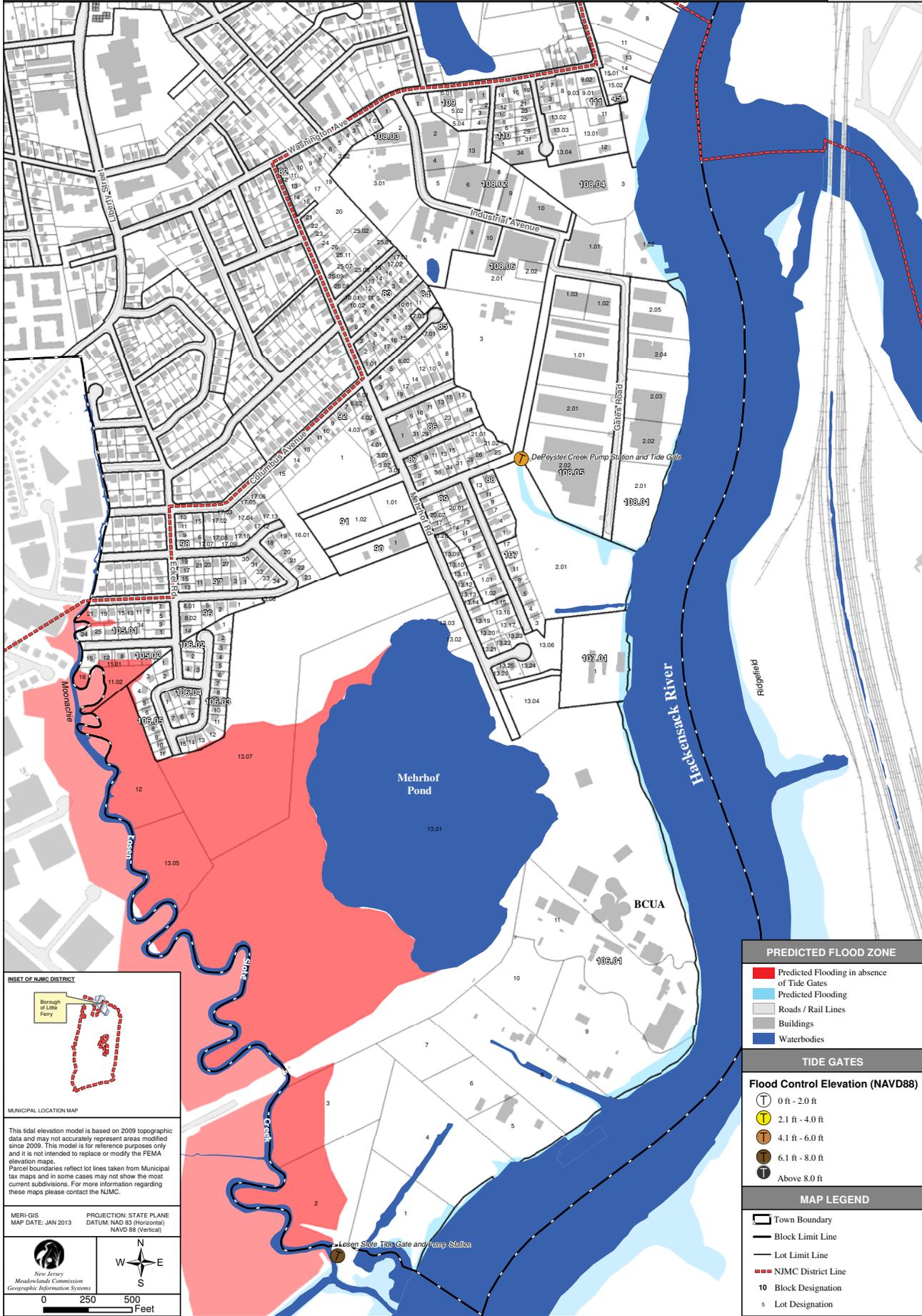
Appendix C.

New Jersey Meadowlands Commission Storm Surge Maps

Borough of Little Ferry

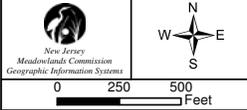
Sea Surge Flood Map

2 Feet
(NAVD 88)



This tidal elevation model is based on 2009 topographic data and may not accurately represent areas modified since 2009. This model is for reference purposes only and it is not intended to replace or modify the FEMA elevation maps.
Parcel boundaries reflect lot lines taken from Municipal tax maps and in some cases may not show the most current subdivisions. For more information regarding these maps please contact the NJMC.

MERI-GIS MAP DATE: JAN 2013 PROJECTION: STATE PLANE DATUM: NAD 83 (Horizontal) NAVD 88 (Vertical)

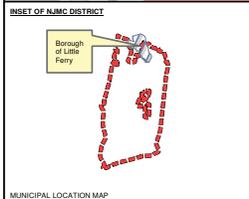
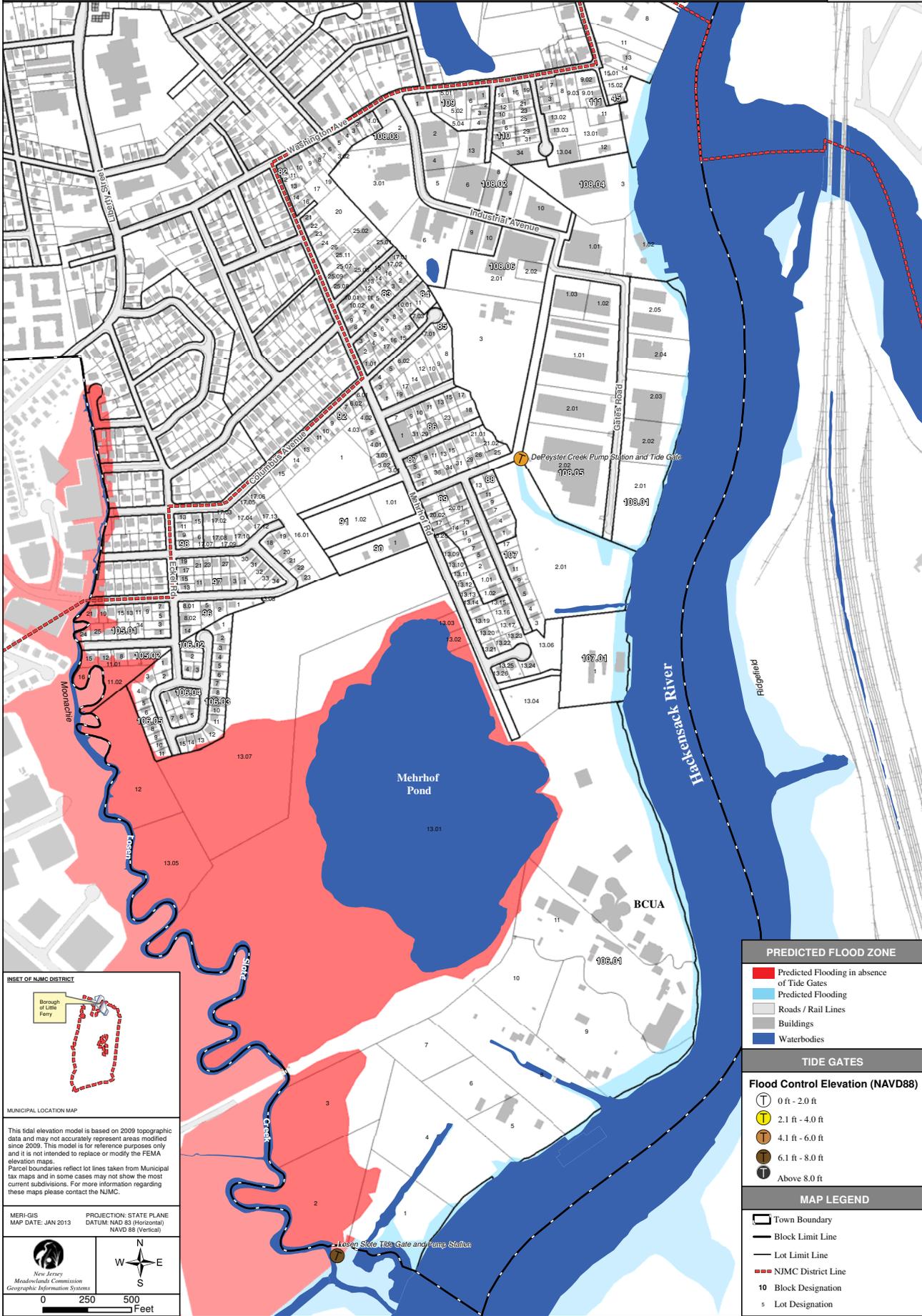


PREDICTED FLOOD ZONE	
■	Predicted Flooding in absence of Tide Gates
■	Predicted Flooding
■	Roads / Rail Lines
■	Buildings
■	Waterbodies
TIDE GATES	
Flood Control Elevation (NAVD88)	
T	0 ft - 2.0 ft
T	2.1 ft - 4.0 ft
T	4.1 ft - 6.0 ft
T	6.1 ft - 8.0 ft
T	Above 8.0 ft
MAP LEGEND	
	Town Boundary
	Block Limit Line
	Lot Limit Line
	NJMC District Line
10	Block Designation
5	Lot Designation

Borough of Little Ferry

Sea Surge Flood Map

3 Feet
(NAVD 88)



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MERI-GIS
MAP DATE: JAN 2013

PROJECTION: STATE PLANE
DATUM: NAD 83 (Horizontal)
NAVD 88 (Vertical)

New Jersey
Meadowlands Commission
Geographic Information Systems

0 250 500 Feet

North Arrow

PREDICTED FLOOD ZONE

- Predicted Flooding in absence of Tide Gates
- Predicted Flooding
- Roads / Rail Lines
- Buildings
- Waterbodies

TIDE GATES

Flood Control Elevation (NAVD88)

- 0 ft - 2.0 ft
- 2.1 ft - 4.0 ft
- 4.1 ft - 6.0 ft
- 6.1 ft - 8.0 ft
- Above 8.0 ft

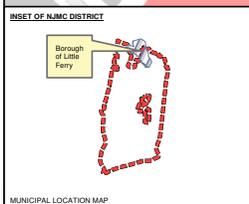
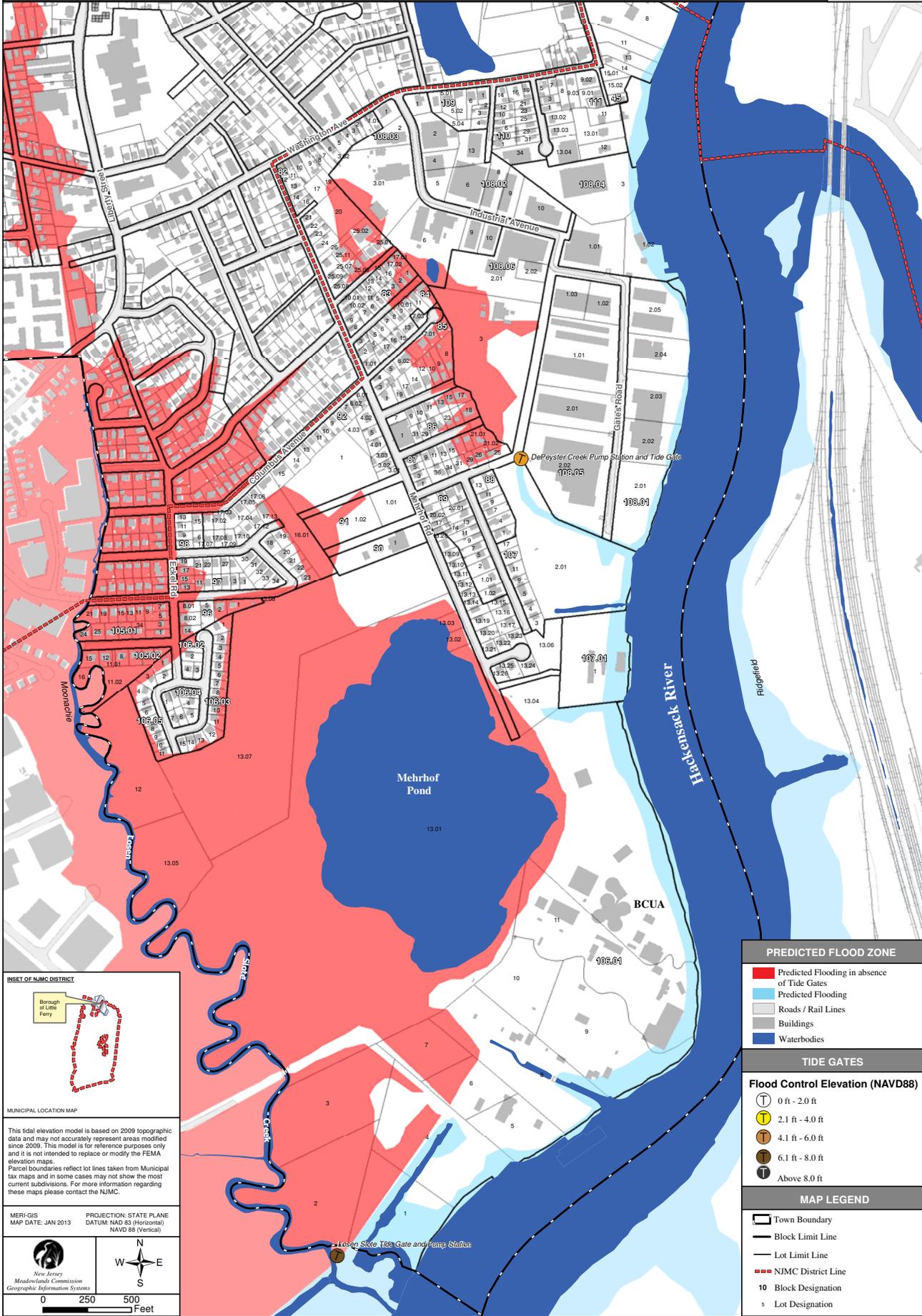
MAP LEGEND

- Town Boundary
- Block Limit Line
- Lot Limit Line
- 10 Block Designation
- 5 Lot Designation

Borough of Little Ferry

Sea Surge Flood Map

4 Feet
(NAVD 88)



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MERI-GIS
MAP DATE: JAN 2013
PROJECTION: STATE PLANE
DATUM: NAD 83 (Horizontal)
NAVD 88 (Vertical)

0 250 500 Feet

New Jersey Meadowlands Commission
Geographic Information Systems

PREDICTED FLOOD ZONE

- Predicted Flooding in absence of Tide Gates
- Predicted Flooding
- Roads / Rail Lines
- Buildings
- Waterbodies

TIDE GATES

Flood Control Elevation (NAVD88)

- 0 ft - 2.0 ft
- 2.1 ft - 4.0 ft
- 4.1 ft - 6.0 ft
- 6.1 ft - 8.0 ft
- Above 8.0 ft

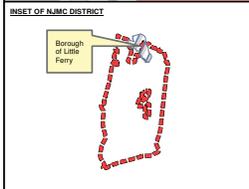
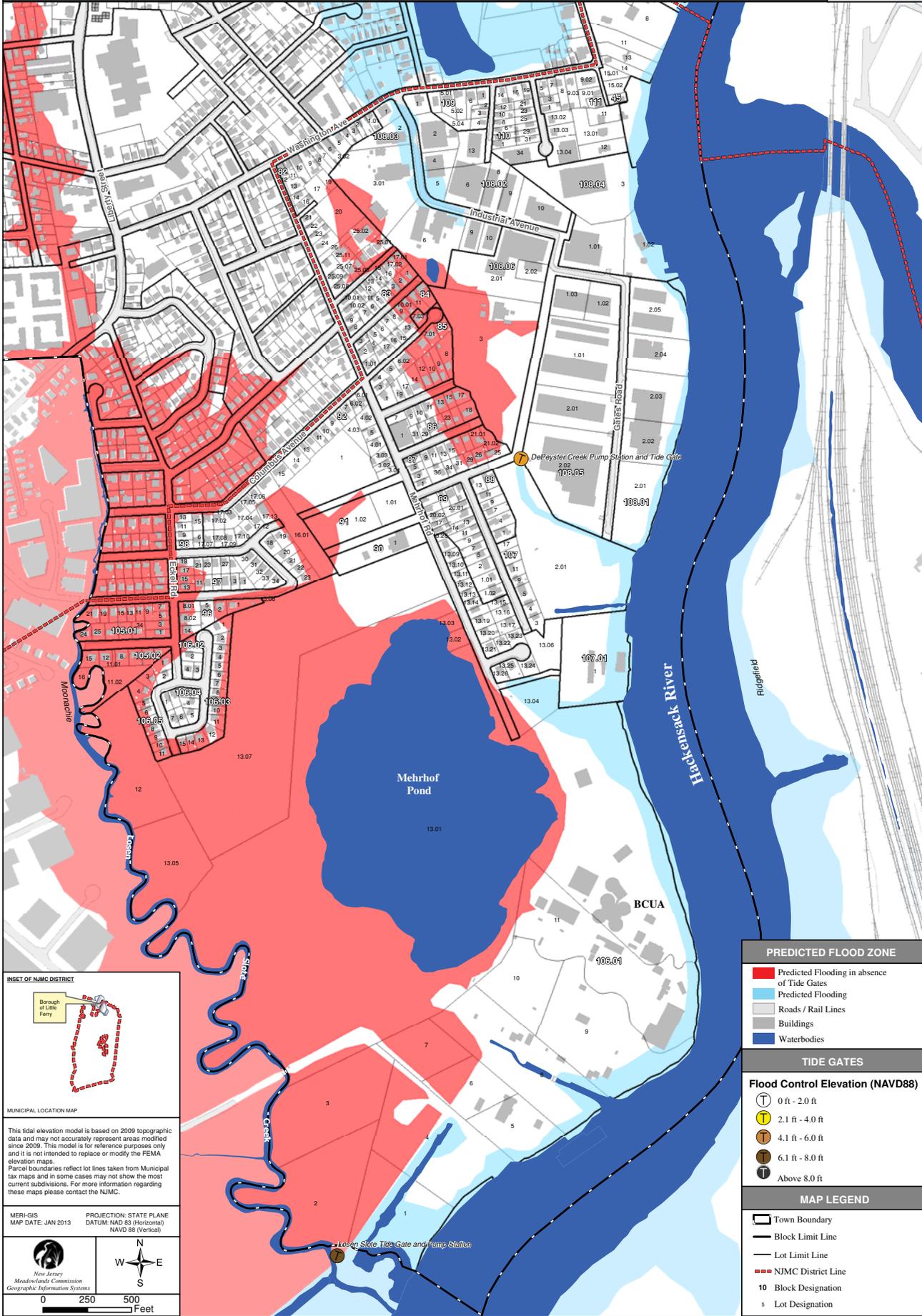
MAP LEGEND

- Town Boundary
- Block Limit Line
- Lot Limit Line
- 10 Block Designation
- 5 Lot Designation

Borough of Little Ferry

Sea Surge Flood Map

5 Feet
(NAVD 88)



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MERI-GIS
MAP DATE: JAN 2013

PROJECTION: STATE PLANE
DATUM: NAD 83 (Horizontal)
NAVD 88 (Vertical)

New Jersey
Meadowlands Commission
Geographic Information Systems

0 250 500 Feet

North Arrow

PREDICTED FLOOD ZONE

- Predicted Flooding in absence of Tide Gates
- Predicted Flooding
- Roads / Rail Lines
- Buildings
- Waterbodies

TIDE GATES

Flood Control Elevation (NAVD88)

- 0 ft - 2.0 ft
- 2.1 ft - 4.0 ft
- 4.1 ft - 6.0 ft
- 6.1 ft - 8.0 ft
- Above 8.0 ft

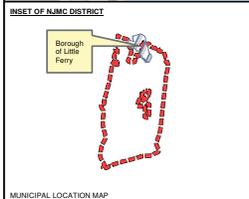
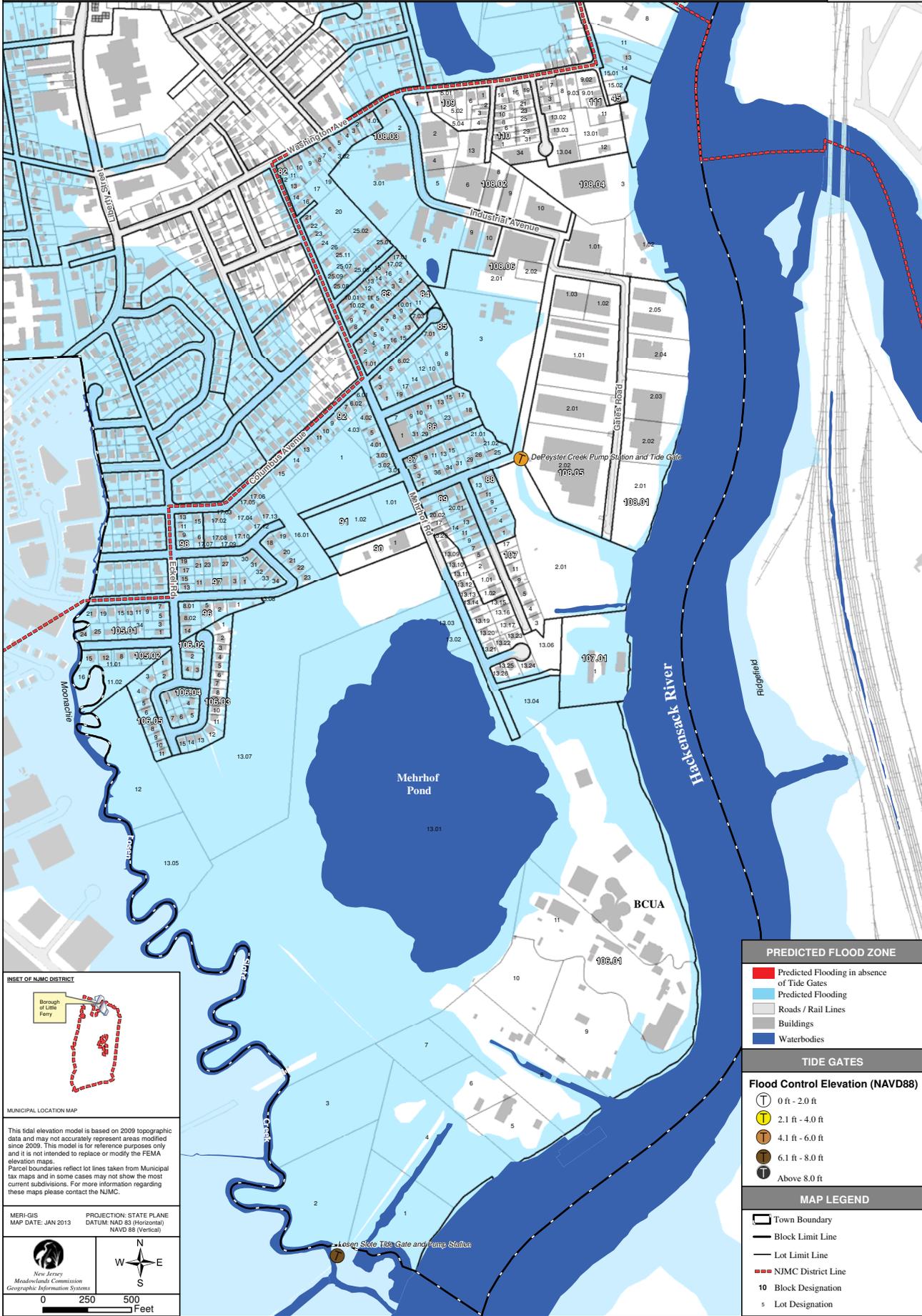
MAP LEGEND

- Town Boundary
- Block Limit Line
- Lot Limit Line
- 10 Block Designation
- 5 Lot Designation

Borough of Little Ferry

Sea Surge Flood Map

6 Feet
(NAVD 88)



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MERI-GIS
MAP DATE: JAN 2013
PROJECTION: STATE PLANE
DATUM: NAD 83 (Horizontal)
NAVD 88 (Vertical)

New Jersey
Meadowlands Commission
Geographic Information Systems

0 250 500 Feet

PREDICTED FLOOD ZONE

- Predicted Flooding in absence of Tide Gates
- Predicted Flooding
- Roads / Rail Lines
- Buildings
- Waterbodies

TIDE GATES

Flood Control Elevation (NAVD88)

- 0 ft - 2.0 ft
- 2.1 ft - 4.0 ft
- 4.1 ft - 6.0 ft
- 6.1 ft - 8.0 ft
- Above 8.0 ft

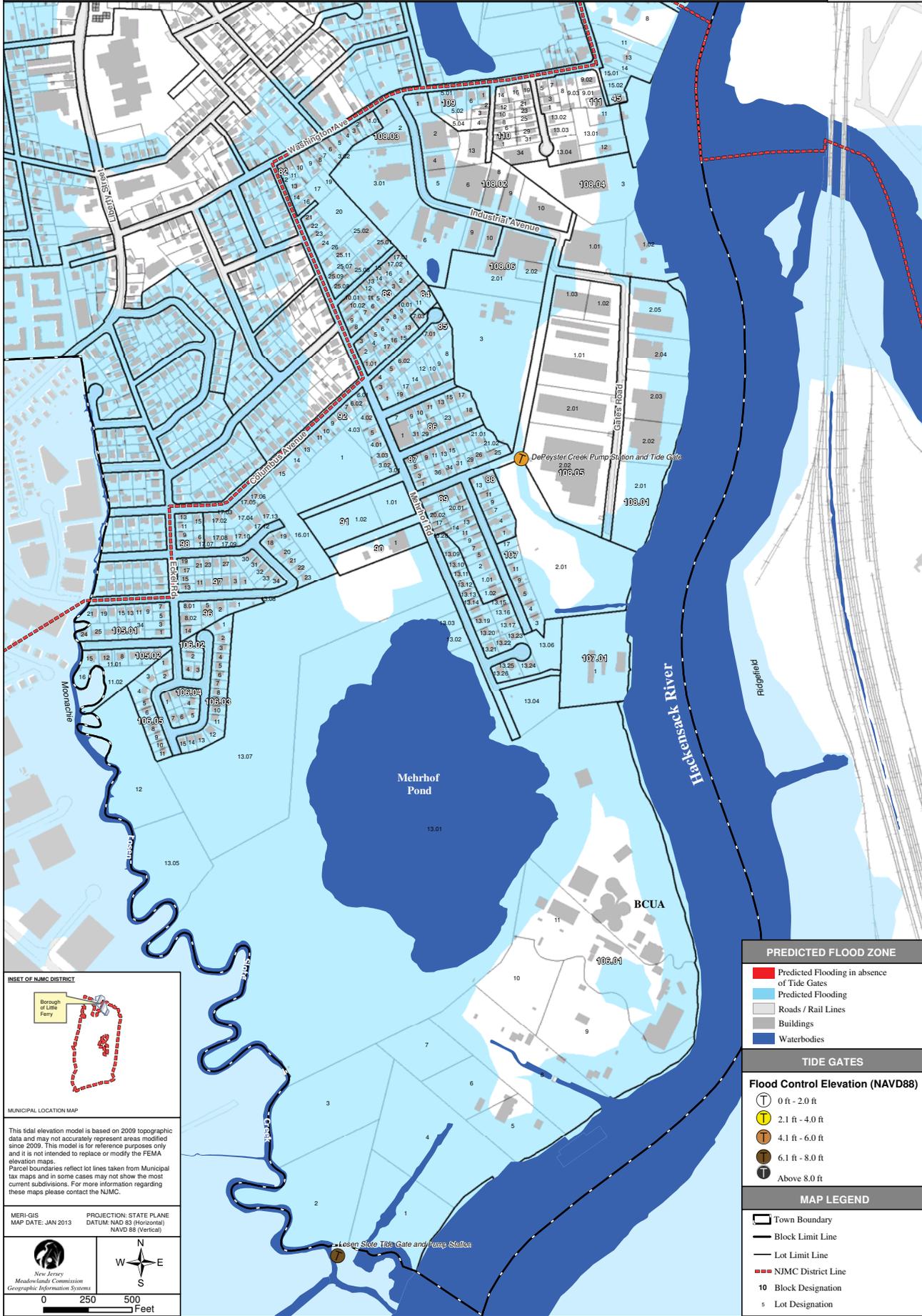
MAP LEGEND

- Town Boundary
- Block Limit Line
- Lot Limit Line
- 10 Block Designation
- 5 Lot Designation

Borough of Little Ferry

Sea Surge Flood Map

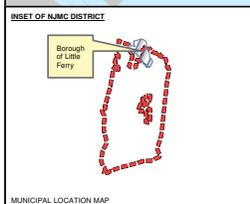
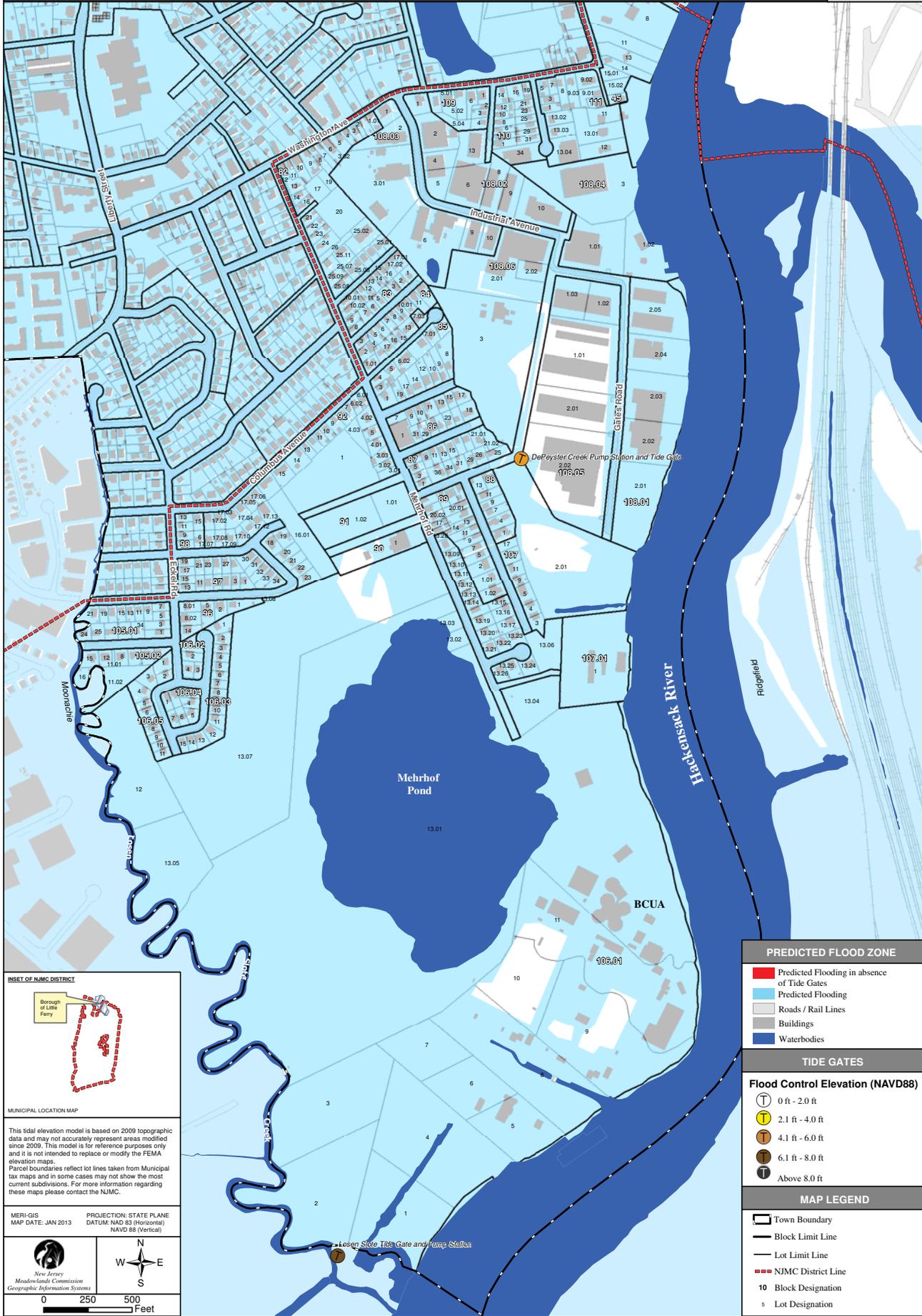
7 Feet
(NAVD 88)



Borough of Little Ferry

Sea Surge Flood Map

8 Feet
(NAVD 88)



MUNICIPAL LOCATION MAP
 This tidal elevation model is based on 2009 topographic data and may not accurately represent areas modified since 2009. This model is for reference purposes only and it is not intended to replace or modify the FEMA elevation maps.
 Parcel boundaries reflect lot lines taken from Municipal tax maps and in some cases may not show the most current subdivisions. For more information regarding these maps please contact the NJMC.

MERI-GIS
 MAP DATE: JAN 2013
 PROJECTION: STATE PLANE
 DATUM: NAD 83 (Horizontal)
 NAVD 88 (Vertical)

0 250 500 Feet

New Jersey Meadowlands Commission
 Geographic Information Systems

PREDICTED FLOOD ZONE

- ▬ Predicted Flooding in absence of Tide Gates
- ▬ Predicted Flooding
- ▬ Roads / Rail Lines
- ▬ Buildings
- ▬ Waterbodies

TIDE GATES

Flood Control Elevation (NAVD88)

- T 0 ft - 2.0 ft
- T 2.1 ft - 4.0 ft
- T 4.1 ft - 6.0 ft
- T 6.1 ft - 8.0 ft
- T Above 8.0 ft

MAP LEGEND

- Town Boundary
- Block Limit Line
- Lot Limit Line
- NJMC District Line
- 10 Block Designation
- 5 Lot Designation

Appendix D.

Little Ferry Critical Facilities & Map

Little Ferry Critical Facilities
As Identified in the 2013 Bergen County Natural Hazard Mitigation Plan Update

Facility	Location	Facility Category:	Access Limitations	Operational Category	Facility Vulnerable Assessment*
Willow Lake Pump Station	Washington Avenue	Utility: Wastewater control facility	Blockage to the single access and egress route, heavy rainfall / localized flooding, snow and ice, tree fall	3: most not lose operational capacity	<ul style="list-style-type: none"> • Structure is in a floodplain or flood prone area and has experienced some limited flood damage in the past • Located in storm surge zone for a category 3 hurricane or is located just inside a designated tsunami risk zone, but has no prior damage • Disruption of facility operations has the potential to cause minor health/safety impact on adjacent populated areas but not the community • Facility damage/disruption would release materials that would have a short-term effect on the natural environment of adjacent areas • Dependent on continuing electricity or gas supply, and damage or loss of function to the facility itself could occur • Facility has single route of access/egress with some adjacent trees, power lines, or areas that flood in severe storms

Little Ferry Critical Facilities
As Identified in the 2013 Bergen County Natural Hazard Mitigation Plan Update

Facility	Location	Facility Category:	Access Limitations	Operational Category	Facility Vulnerable Assessment*
Williams Street Pump Station	Williams Street	Utility: Water system facility	Blockage to the single access and egress route, heavy rainfall / localized flooding, snow and ice	2: must be operationally capable within 24 hours or less	<ul style="list-style-type: none"> • Structure is in a floodplain or flood prone area and has experienced some limited flood damage in the past • Located in storm surge zone for a category 3 hurricane or is located just inside a designated tsunami risk zone, but has no prior damage • Disruption of facility operations has the potential to cause minor health/safety impact on adjacent populated areas but not the community • Facility damage/disruption would release materials that would have a short-term effect on the natural environment of adjacent areas • Dependent on continuing electricity or gas supply, and damage or loss of function to the facility itself could occur • Facility has single route of access/egress with some adjacent trees, power lines, or areas that flood in severe storms

Little Ferry Critical Facilities
As Identified in the 2013 Bergen County Natural Hazard Mitigation Plan Update

Facility	Location	Facility Category:	Access Limitations	Operational Category	Facility Vulnerable Assessment*
Washington School	123 Liberty Street	General: School / Library	Blockage to the single access and egress route, heavy rainfall / localized flooding, snow and ice	o: Can be more than 72 hours before retaining capacity	<ul style="list-style-type: none"> • Structure is in a floodplain or flood prone area and has experienced some limited flood damage in the past • Located in storm surge zone for a category 3 hurricane or is located just inside a designated tsunami risk zone, but has no prior damage • Disruption of facility operations has the potential to cause minor health/safety impact on adjacent populated areas but not the community • Facility damage/disruption would release materials that would have a short-term effect on the natural environment of adjacent areas • Dependent on continuing electricity or gas supply, and damage or loss of function to the facility itself could occur • The facility would have to curtail operations somewhat without its normal water supply, with some limited economic consequences • The facility would have to curtail operations somewhat without sewer service, with some limited economic consequences • Provides services/products frequently used by the community and disruption of operations would cause significant public inconvenience

Little Ferry Critical Facilities
As Identified in the 2013 Bergen County Natural Hazard Mitigation Plan Update

Facility	Location	Facility Category:	Access Limitations	Operational Category	Facility Vulnerable Assessment*
Union Avenue Pump Station	Union Avenue	Utility: waste water control facility	Blockage to the single access and egress route, heavy rainfall / localized flooding, snow and ice	3: most not lose operational capacity	<ul style="list-style-type: none"> • Structure is in a floodplain or flood prone area and has experienced some limited flood damage in the past • Located in storm surge zone for a category 3 hurricane or is located just inside a designated tsunami risk zone, but has no prior damage • Disruption of facility operations has the potential to cause minor health/safety impact on adjacent populated areas but not the community • Facility damage/disruption would release materials that would have a short-term effect on the natural environment of adjacent areas • Dependent on continuing electricity or gas supply, and damage or loss of function to the facility itself could occur • Facility has single route of access/egress with some adjacent trees, power lines, or areas that flood in severe storms

Little Ferry Critical Facilities
As Identified in the 2013 Bergen County Natural Hazard Mitigation Plan Update

Facility	Location	Facility Category:	Access Limitations	Operational Category	Facility Vulnerable Assessment*
Scientific Design	Industrial Avenue	Private/commercial: hazardous materials storage	Blockage to the single access and egress route, heavy rainfall / localized flooding, snow and ice	o: Can be more than 72 hours before retaining capacity	<ul style="list-style-type: none"> • Structure is in a floodplain or flood prone area and has experienced some limited flood damage in the past • Located in storm surge zone for a category 3 hurricane or is located just inside a designated tsunami risk zone, but has no prior damage • Facility could be damaged by electricity or gas outage, and onsite electric generator or standby gas supply can only support limited operations • Facility has single route of access/egress with some adjacent trees, power lines, or areas that flood in severe storms • The facility would have to curtail operations somewhat without its normal water supply, with some limited economic consequences • The facility would have to curtail operations somewhat without sewer service, with some limited economic consequences • Disruption of facility operations has the potential to cause minor health/safety impact on adjacent populated areas but not the community • A mid-sized employer and is one of many in the community, and is only slightly responsible for direct/indirect community revenue • Released from damage/disruption would have long term effect on valuable adjacent resources, or irreparably harm the adjacent environment

Little Ferry Critical Facilities
As Identified in the 2013 Bergen County Natural Hazard Mitigation Plan Update

Facility	Location	Facility Category:	Access Limitations	Operational Category	Facility Vulnerable Assessment*
PSE&G Substation	Intersection of Bergen Turnpike and Poplar Avenue	Utility: Energy facility or system	Blockage to the single access and egress route, heavy rainfall / localized flooding, snow and ice	3: most not lose operational capacity	<ul style="list-style-type: none"> • Structure is in a floodplain or flood prone area and has experienced some limited flood damage in the past • Located in storm surge zone for a category 4 or 5 hurricane, or is located at the edge of a designated tsunami risk zone • Dependent on electricity or gas supply, and loss of function would causes large community economic losses or health/safety risks • Disruption of facility operations immediately endangers adjacent populated areas or has a substantial community health and safety impact
Losen Slote Drain Station	Mehrhof Road (B106.1, L1)	Utility: Water system facility	Blockage to the single access and egress route, heavy rainfall / localized flooding, snow and ice	3: Must not lose operational capacity	<ul style="list-style-type: none"> • Structure is in a floodplain or flood prone area and has experienced some limited flood damage in the past • Located in storm surge zone for a category 3 hurricane or is located just inside a designated tsunami risk zone, but has no prior damage • Facility has single route of access/egress with some adjacent trees, power lines, or areas that flood in severe rainstorms • Disruption of operations would have a health/safety impact on adjacent populated areas or would have a moderate effect on the community • Facility damage/disruption would release materials that would have short-term effect on the natural environment of adjacent areas

Little Ferry Critical Facilities
As Identified in the 2013 Bergen County Natural Hazard Mitigation Plan Update

Facility	Location	Facility Category:	Access Limitations	Operational Category	Facility Vulnerable Assessment*
Little Ferry Municipal Building	215-217 Liberty Street (B49, L24)	General: Government offices	Blockage to the single access and egress route, heavy rainfall / localized flooding, snow and ice	3: Must not lose operational capacity	<ul style="list-style-type: none"> • Structure is in a floodplain or flood prone area and has experienced some limited flood damage in the past • Located in storm surge zone for a category 3 hurricane or is located just inside a designated tsunami risk zone, but has no prior damage • Facility could be damaged by electricity or gas outage, and onsite electric generator or standby gas supply can only support limited operations • Facility has single route of access/egress with some adjacent trees, power lines or areas that flood in severe rainstorms • The facility would have to curtail operations somewhat without sewer service, with some limited economic consequences • Communications system failure would halt operations with a significant economic loss to the community and/or would endanger health/safety

Little Ferry Critical Facilities
As Identified in the 2013 Bergen County Natural Hazard Mitigation Plan Update

Facility	Location	Facility Category:	Access Limitations	Operational Category	Facility Vulnerable Assessment*
Memorial School	130 Liberty Street (B63, L9.01)	General: School / library	Blockage to the single access and egress route, heavy rainfall / localized flooding, snow and	o: Can be more than 72 hours before regaining operational capacity	<ul style="list-style-type: none"> • Structure is in a floodplain or flood prone area and has experienced some limited flood damage in the past • Located in storm surge zone for a category 3 hurricane or is located just inside a designated tsunami risk zone, but has no prior damage • Dependent on continuing electricity or gas supply, and damage or loss of function to the facility itself could occur • The facility would have to curtail operations somewhat without its normal water supply, with some limited economic consequences • The facility would have to curtail operations somewhat without sewer service, with some limited economic consequences • A mid-sized employer and is one of many in the community, and is only slightly responsible for direct/indirect community revenue • Provides services/products frequently used by the community and disruption of operations would cause significant public inconvenience

Little Ferry Critical Facilities
As Identified in the 2013 Bergen County Natural Hazard Mitigation Plan Update

Facility	Location	Facility Category:	Access Limitations	Operational Category	Facility Vulnerable Assessment*
Main Street Pump Station	End of Main Street	Utility: Water system facility	Blockage to the single access and egress route, heavy rainfall / localized flooding, snow and ice	3: Must not lose operational capacity	<ul style="list-style-type: none"> • Structure is in a floodplain or flood prone area and has experienced some limited flood damage in the past • Located in storm surge zone for a category 3 hurricane or is located just inside a designated tsunami risk zone, but has no prior damage • Dependent on electricity or gas supply, an loss of function would cause large community economic losses or health/safety risks • Facility has single route of access/egress with some adjacent trees, power lines, or areas that flood in severe rainstorms • Disruption of facility operations has the potential to cause minor health/safety impact on adjacent populated areas but not the community • Facility damage/disruption would release materials that would have short-term effect on the natural environment of adjacent areas

Little Ferry Critical Facilities
As Identified in the 2013 Bergen County Natural Hazard Mitigation Plan Update

Facility	Location	Facility Category:	Access Limitations	Operational Category	Facility Vulnerable Assessment*
Main Street & Franklin Street Sanitary Pump Station	Intersection of Main Street and Franklin Street	Utility: Water system facility	Blockage to the single access and egress route, heavy rainfall / localized flooding, snow and ice	1: Must be operationally capable within 24 to 72 hours	<ul style="list-style-type: none"> • Structure is in a floodplain or flood prone area and has experienced some limited flood damage in the past • Located in storm surge zone for a category 3 hurricane or is located just inside a designated tsunami risk zone, but has no prior damage • Dependent on continuing electricity or gas supply, and damage or loss of function to the facility itself could occur • Facility has single route of access/egress with some adjacent trees, power lines, or areas that flood in severe rainstorms • Disruption of facility operations immediately endangers adjacent populated areas or has a substantial community health and safety impact • Facility damage/disruption would release materials that would have a short-term effect on the natural environment of adjacent areas

Little Ferry Critical Facilities
As Identified in the 2013 Bergen County Natural Hazard Mitigation Plan Update

Facility	Location	Facility Category:	Access Limitations	Operational Category	Facility Vulnerable Assessment*
Little Ferry Nursery School	165 Liberty Street (B58, L11)	Private/commercial: School / library	Blockage to the single access and egress route, heavy rainfall / localized flooding, snow and ice	o: Can be more than 72 hours before regaining operational capability	<ul style="list-style-type: none"> • Structure is in a floodplain or flood prone area but has no prior history of flood damage • Structure is located in a storm surge area for a category 4 or 5 hurricane, or is located at the edge of a designated tsunami risk zone • Facility could be damaged by electricity or gas outage, and onsite electric generator or standby gas supply can only support limited operations • Facility has single route of access/egress with some adjacent trees, power lines, or areas that flood in severe rainstorms • The facility would have to curtail operations somewhat without its normal water supply, with some limited economic consequences • The facility would have to curtail operations somewhat without sewer services, with some limited economic consequences • Provides services/products frequently used by the community and disruption of operations would cause significant public inconvenience

Little Ferry Critical Facilities
As Identified in the 2013 Bergen County Natural Hazard Mitigation Plan Update

Facility	Location	Facility Category:	Access Limitations	Operational Category	Facility Vulnerable Assessment*
Hook & Ladder Fire Department	124 Main Street (B19, L6)	Public Safety: Emergency Services Center	Blockage to the single access and egress route, heavy rainfall / localized flooding, snow and ice	3: Must not lose operational capacity	<ul style="list-style-type: none"> • Structure is in a floodplain or a flood prone area and has experienced significant flood damage, or the property is an NFIP repetitive loss property • Structure is located in a storm surge area for a category 4 or 5 hurricane, or is located at the edge of a designated tsunami risk zone • Facility could be damaged by electricity or gas outage, and onsite electric generator or standby gas supply can only support limited operations • Facility has single route of access/egress with some adjacent trees, power lines, or areas that flood in severe rainstorms • Communications system failure would halt operations with a significant economic loss to the community and/or would endanger health/safety • Disruption of operations would have a health/safety impact on adjacent populated areas or would have a moderate effect on the community • Provides important services/products needed continually and disruption of facility operations could cause health/safety impacts

Little Ferry Critical Facilities
As Identified in the 2013 Bergen County Natural Hazard Mitigation Plan Update

Facility	Location	Facility Category:	Access Limitations	Operational Category	Facility Vulnerable Assessment*
Little Ferry Hose Company Fire Dept.	Marshall Avenue	Public Safety: Emergency Services Center	Blockage to the single access and egress route, heavy rainfall / localized flooding, snow and ice	3: Must not lose operational capacity	<ul style="list-style-type: none"> • Structure is in a floodplain or flood prone area and has experienced some limited flood damage in the past • Located in storm surge zone for a category 3 hurricane or is located just inside a designated tsunami risk zone, but has no prior damage • Facility could be damaged by electricity or gas outage, and onsite electric generator or standby gas supply can only support limited operations • Facility has single route of access/egress with some adjacent trees, power lines, or areas that flood in severe rainstorms • Disruption of operations would have a health/safety impact on adjacent populated areas or would have a moderate effect on the community • Provides important services/products needed continually and disruption of operations would cause significant public inconvenience

Little Ferry Critical Facilities
As Identified in the 2013 Bergen County Natural Hazard Mitigation Plan Update

Facility	Location	Facility Category:	Access Limitations	Operational Category	Facility Vulnerable Assessment*
Public Safety Building	95 Main Street	Public Safety: Emergency Services Center	Blockage to the single access and egress route, heavy rainfall / localized flooding, snow and ice	3: Must not lose operational capacity	<ul style="list-style-type: none"> • Structure is in a floodplain or a flood prone area and has experienced significant flood damage, or the property is an NFIP repetitive loss property • Located in storm surge zone for a category 3 hurricane or is located just inside a designated tsunami risk zone, but has no prior damage • Dependent on continuing electricity or gas supply, and damage or loss of function to the facility itself could occur • Facility has single route of access/egress with some adjacent trees, power lines, or areas that flood in severe rainstorms • Communications system failure would require facility operations to be curtailed with a moderate economic loss to the facility • Disruption of facility operations immediately endangers adjacent populated areas or has a substantial community health and safety impact • Provides critically needed services or products on a daily basis and disruption of facility operations would cause health and safety impacts

Little Ferry Critical Facilities
As Identified in the 2013 Bergen County Natural Hazard Mitigation Plan Update

Facility	Location	Facility Category:	Access Limitations	Operational Category	Facility Vulnerable Assessment*
Eckel Road Pump Station	Intersection of Eckels and Adams Streets	Utility: Water system utility	Blockage to the single access and egress route, heavy rainfall / localized flooding, snow an	3: Must not lose operational capacity	<ul style="list-style-type: none"> • Structure is in a floodplain or flood prone area and has experienced some limited flood damage in the past • Located in storm surge zone for a category 3 hurricane or is located just inside a designated tsunami risk zone, but has no prior damage • Facility could be damaged by electricity or gas outage, and onsite electric generator or standby gas supply can only support limited operations • Facility has single route of access/egress with some adjacent trees, power lines, or areas that flood in severe rainstorms • Disruption of facility operation has the potential to cause minor health/safety impact on adjacent populated areas but not the community
Early Learner Child Care	201 Redneck Avenue	Private/ commercial: School / library	Blockage to the single access and egress route, heavy rainfall / localized flooding, snow and ice	o: Can be more than 72 hours before regaining operational capacity	<ul style="list-style-type: none"> • Structure in a floodplain or flood prone areas but has not prior history of flood damage • Structure is located in a storm surge area for a category 4 or 5 hurricane, or is located at the edge of a designated tsunami risk zone • Dependent on electricity or gas supply, and loss of function would cause large community economic losses or health/safety risks • Facility has single route of access/egress with some adjacent trees, power lines, or areas that flood in severe rainstorms • Facility would have to stop operations without its normal water supply, with significant economic or potential health and safety consequences • The facility would have to stop operations without sewer service, with significant economic consequences

Little Ferry Critical Facilities
As Identified in the 2013 Bergen County Natural Hazard Mitigation Plan Update

Facility	Location	Facility Category:	Access Limitations	Operational Category	Facility Vulnerable Assessment*
Little Ferry Department of Public Works	179 Mehrhof Road	General: Public Works Facility	Blockage to the single access and egress route, heavy rainfall / localized flooding, snow and ice	1: Must be operationally capable within 24 to 72 hours	<ul style="list-style-type: none"> • Structure is in a floodplain or flood prone area and has experienced some limited flood damage in the past • Located in storm surge zone for a category 3 hurricane or is located just inside a designated tsunami risk zone, but has no prior damage • Facility could be damaged by electricity or gas outage, and onsite electric generator or standby gas supply can only support limited operations • Facility has single route of access/egress with some adjacent trees, power lines, or areas that flood in severe rainstorms
Depyster Creek Pump Station	End of Dietrich Street	Utility: waste water control facility	Blockage to the single access and egress route, heavy rainfall / localized flooding, snow and ice	2: Must be operationally capable within 24 hours or less	<ul style="list-style-type: none"> • Structure is in a floodplain or flood prone area and has experienced some limited flood damage in the past • Structure is located in a storm surge area for a category 4 or 5 hurricane, or is located at the edge of a designated tsunami risk zone • Facility has single route of access/egress with some adjacent trees, power lines, or areas that flood in severe rainstorms • Disruption of operations would have a health/safety impact on adjacent populated areas or would have a moderate effect on the community • Facility would release materials that would have a short-term effect on the natural environment of adjacent areas

Little Ferry Critical Facilities
As Identified in the 2013 Bergen County Natural Hazard Mitigation Plan Update

Facility	Location	Facility Category:	Access Limitations	Operational Category	Facility Vulnerable Assessment*
Little Ferry Public Library	239 Liberty Street (B38 L28)	General: School/ library	Blockage to the single access and egress route, heavy rainfall / localized flooding, snow and ice	0: Can be more than 72 hours before regaining operational capacity	<ul style="list-style-type: none"> • Structure is in a floodplain or flood prone area and has experienced some limited flood damage in the past • Structure is located in a storm surge area for a category 4 or 5 hurricane, or is located at the edge of a designated tsunami risk zone • Dependent on continuing electricity or gas supply, and damage or loss of function to the facility itself could occur • Facility has single route of access/egress with some adjacent trees, power lines, or areas that flood in severe rainstorms • The facility would have to curtail operations somewhat without its normal water supply, with some limited economic consequences • The facility would have to curtail operations somewhat without its sewer service, with some limited economic consequences
Maiden Lane Drainage Station	Foot of Maiden Lane	Utility: water system facility	Blockage to the single access and egress route, heavy rainfall / localized flooding, snow and ice	3: Must not lose operational capability	<ul style="list-style-type: none"> • Structure is in a floodplain or flood prone area and has experienced some limited flood damage in the past • Located in storm surge zone for a category 3 hurricane or is located just inside a designated tsunami risk zone, but has no prior damage • Dependent on electricity or gas supply, and loss of function would cause large community economic losses or health/ safety risks • Facility has single route of access/egress with some adjacent trees, power lines, or areas that flood in severe rainstorms • Disruption of facility operations immediately endangers adjacent populated areas or has a substantial community health and safety impact

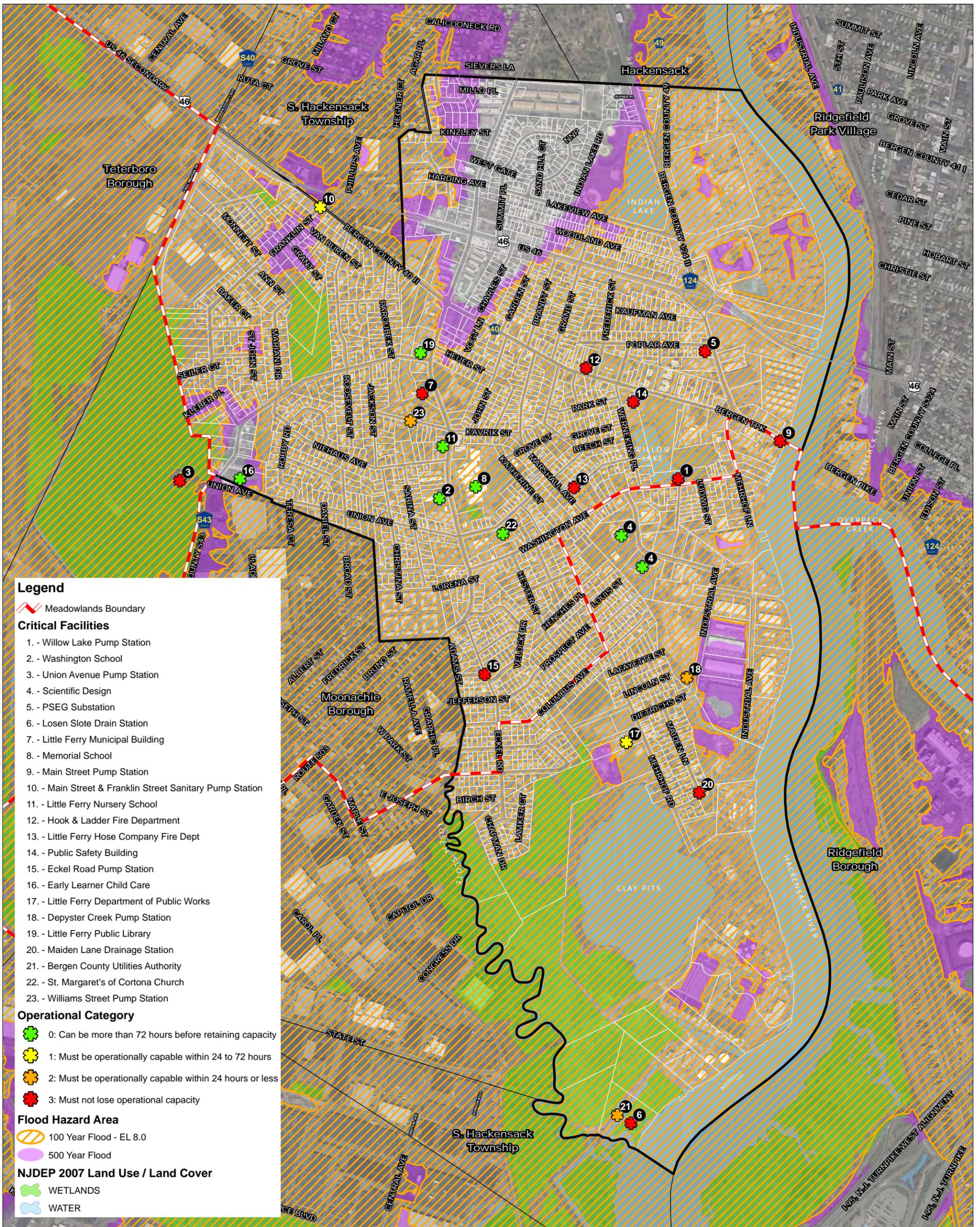
Little Ferry Critical Facilities
As Identified in the 2013 Bergen County Natural Hazard Mitigation Plan Update

Facility	Location	Facility Category:	Access Limitations	Operational Category	Facility Vulnerable Assessment*
Bergen County Utilities Authority	Mehrhof Road (B.106.1, L1)	Industrial: Hazardous materials facility	Heavy rainfall / localized flooding, snow and ice	2: Must be operationally capable within 24 hours or less	<ul style="list-style-type: none"> • Structure is in a floodplain or flood prone area and has experienced some limited flood damage in the past • Structure is located in a storm surge area for a category 4 or 5 hurricane, or is located at the edge of a designated tsunami risk zone • Disruption of operations would have a health/ safety impact on adjacent populated areas or would have a moderate effect on the community • A mid-size employer and is one of the many in the community, and is only slightly responsible for direct/indirect community revenue • Provides critically needed services or products on a daily basis and disruption of facility operations would cause health and safety impacts • Releases from damage/ disruption would have short-term effect on valuable adjacent resources or a long-term effect on the adjacent environment

Little Ferry Critical Facilities
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Facility	Location	Facility Category:	Access Limitations	Operational Category	Facility Vulnerable Assessment*
St. Margaret's of Cortona Church	31 Chamberlain Avenue	Private/commercial: Religious facility	Heavy rainfall / localized flooding, snow and ice	o: Can be more than 72 hours before regaining capacity	<ul style="list-style-type: none"> • Structure is in a floodplain or flood prone area and has experienced some limited flood damage in the past • Located in storm surge zone for a category 3 hurricane or is located just inside a designated tsunami risk zone, but has no prior damage • Dependent on continuing electricity or gas supply, and damage or loss of function to the facility itself could occur • Facility has single route of access/egress with some adjacent trees, power lines, or areas that flood in severe rainstorms • The facility would have to curtail operations somewhat without its normal water supply, with some limited economic consequences • The facility would have to curtail operations somewhat without its sewer service, with some limited economic consequences

*Note that only those vulnerabilities relevant to Hurricane Sandy are identified



Parcel Source: NJGIN Tax Parcels for Atlantic County 2012
 Aerial Source: 2012 High Resolution Orthophotography, NAD83 NJ State Plane Feet, MrSID Tiles
 Published by NJ Office of Information Technology (NJGIT), Office of Geographic Information Systems (OGIS) 3/2013

0 175 350 700 1,050 1,400 Feet



STRATEGIC RECOVERY PLANNING REPORT

Critical Facilities

Little Ferry Borough, Bergen County, NJ March 2014

Clarke Caton Hintz

Architecture
 Planning
 Landscape Architecture

Appendix E.

New Jersey Meadowlands

Soft Edges Map

Soft edges < 5 feet

