Town of Nahant

Community Resilience Building Workshop
Summary of Findings

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Overview

The Town of Nahant, incorporated in 1853, is a resort town of rocky coasts in the southernmost part of Essex County. It is a peninsula, surrounded on three sides by the Atlantic Ocean only connected by the Causeway road to Lynn. With 1 square mile of land area it is the smallest municipality by area in Massachusetts. It features multiple beaches and a small boating and fishing community. Based on the 2010 census, Nahant had a population of 3,410 and a median income of $71,776. Nahant is primarily a residential community with a few small businesses. It is home to a marina located on its southern side opening to Nahant Harbor.

In the early colonial days Nahant was used by Lynn residents as grazing area for cattle, sheep and goat flocks. It soon developed into a maritime community with a small portion of the population devoted to fishing. Before 1640, settlers were granted land if they spent time fishing as well. It later became a resort mecca with the first hotel being built in 1803. Agriculture, tourism and associated businesses were the major economic drivers until a construction phase of summer residences started in 1870 which continued for four decades. Today, Nahant is a mainly residential community (Town of Nahant, 2019.)

The Town of Nahant is governed by a Board of Selectmen with a Town Administrator. It has over 25 different committees.

Nahant has a long history of being exposed to the ocean, destructive storms and coastal erosion along its coastline. Since the devastating January 2018 and March 2018 storms, there is a growing awareness that climate change has been exacerbating the effects of these events. The Municipal Vulnerability Preparedness (MVP) Committee was formed in May 2018 based on the thought and need to plan and begin implementing adaptation measures for climate change resiliency and to better prepare Nahant for future storm events. On June 12, 2018, the Town was awarded a grant from the Executive Office of Energy and Environmental Affairs (EEA) to work with an MVP provider to plan for and conduct an MVP workshop as part of the MVP Planning Program.

The objective of the MVP Workshop has been to

- Define top natural and climate-related hazards

- Identify existing and future strengths and vulnerabilities
- Develop prioritized actions for the community
- Identify opportunities to advance measures to increase resilience.

The MVP process has helped Nahant to bring together key stakeholders and advance their understanding of potential impacts of natural hazards and climate change on the town's infrastructural, societal and environmental assets and how its community, businesses and town services may be impacted. Several interviews with key stakeholders were conducted including with the Department of Public Works (DPW) staff, Police, Fire/ Emergency Management (EM) Department and the Town Administrator to gain their feedback on critical issues and opportunities to improve resilience against natural hazards in Nahant. Furthermore, a community survey with 27 questions was developed by Clarendon Hill Consulting in collaboration with the MVP Committee. Over 210 stakeholders responded and shared their understanding of natural hazards, climate change, and preparedness issues affecting Nahant. Recommendations for actionable measures have been developed to mitigate impacts identified by stakeholders throughout the MVP process and during the MVP workshop and are included in this report.

Community Resilience Building Workshop

A Community Resilience Building (CRB) workshop was held at Nahant Town Hall on Saturday, February 9, 2019 in collaboration with the Municipal Vulnerability Preparedness (MVP) Committee. A copy of the workshop agenda and maps used at the workshop is contained in Appendix A. The CRB workshop was based on the CRB process[1] and is referred to as MVP workshop in the following. Clarendon Hill Consulting facilitated this workshop as the Town's MVP provider. A variety of stakeholders from Nahant were invited including representatives from Fire and Police/Emergency Management, the Planning Board, Town staff and Selectmen, as well as Town Committees including the Conservation Committee, Finance Committee, Green Committee, MVP Committee, and FEMA Committee, along with key community groups such as the Council of Aging, Senior Housing, the local school representative, public health nurse, the harbormaster, Golf Course and Real Estate representatives, scientists from Northeastern University, and finally residents from each of the neighborhoods. Representatives from the Department of Conservation (DCR) were invited as well. Twenty-seven participants including the Town Administrator attended (compare sign in sheet Appendix C).

Figures 1 & 2: Workshop participants during table discussions and while sharing their findings

Summary of Findings

Workshop participants were presented with a summary of the Town of Nahant's current planning efforts pertaining to hazard mitigation planning and climate change along with the latest climate projections developed for Massachusetts by the Northeast Climate Science Center at UMass Amherst (Climate Change Clearinghouse for the Commonwealth, resilientma.org). Climate projections for Nahant include forecasts for precipitation, temperature and sea level rise. Furthermore, results from the community survey developed by Clarendon Hill Consulting in collaboration with the MVP Committee were shared; for example, relating to most pressing natural hazards and their impacts. Participants then had the opportunity to relate their experiences from past hazard events, with memories of the January

[1] Retrievable from www.communityresiliencebuilding.com.

and March 2018 severe winter storms still fresh in everyone's minds. Even a year later, storm cleanup work is still ongoing. The timing of the March 2018 storm with astronomical high tides over eight elevated high tide cycles had severe impacts as it led to serious flooding of several parts of the town; the storm damaged seawalls which included damages to the Town Wharf seawall and caused the only connector to the mainland – the Carney Causeway – to be temporarily closed for up to 3-4 hours during three consecutive days due to debris being pushed onto the road (Compare Table 3).

Participants were then asked to identify the top four natural hazards for Nahant that will be driven by climate change. Divided into four small table groups, participants identified their top four hazards which can be distinguished into five distinct hazards. Participants reached agreement that coastal flooding, e.g. flooding exacerbated by storm surges and high tides and inland flooding due to high amounts of precipitation along with storm events, such as winter storms and high wind events are a significant threat. Furthermore, sea level rise/shoreline change and extreme temperature changes have been identified as top hazards. All of these hazards are linked to climate change.

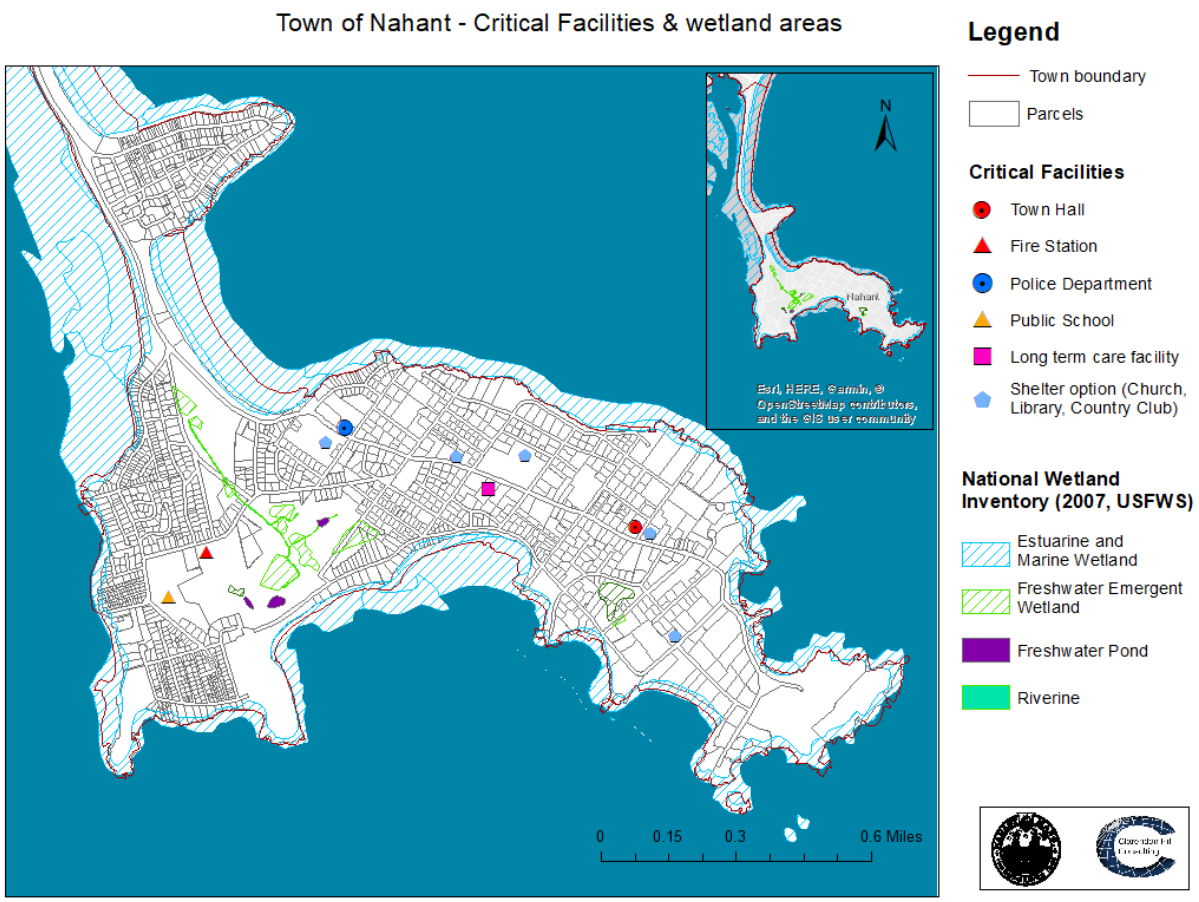

Figure 3: Town of Nahant - Critical Facilities and wetland areas

In line with the CRB process, the top hazards were grouped into four categories; coastal flooding, inland

flooding, extreme weather events, and shoreline change. All identified top hazards can be attributed to the impacts of climate change. Changes in temperature are also linked to climate change but can be considered more of an overlay hazard. Warmer temperature allows air to hold more moisture which can create larger (more intense) and more frequent storm systems. (This is due to saturation humidity; per every one additional degree C, the air can hold seven percent more moisture.) Thus, temperature changes may be considered as an integrated driver of the other identified hazards.

Coastal flooding – exacerbated by storm surges and high tides – and inland flooding e.g. from intense precipitation events have been identified as the two greatest hazards in Nahant. Inland flooding is a particular concern in the Lowlands area and in the Furbush Road area. This is due to these areas having the lowest elevations, their geomorphologic forms and associated restrained drainage options in those areas. Coastal flooding and (at-times) restrained access from Lynn through the Causeway are significant issues during major storm events.

Figures 4 & 5: Left: Nahant Women's Softball field and flooded parking lot (Lowlands Park, March 2018), right: natural gas substation in Lowlands area

Participants identified storms, such as winter storms with ice and snow and high wind events, as another top hazard. High wind events are a special concern due to utility lines being located above ground.

Shoreline change including coastal erosion has been identified as another top concern. As shown on Table 2, coastal protection infrastructure such as armored walls, seawalls etc. have been damaged to a large extent during the winter 2018 storms.

Climate projections of sea level rise by mid-century range of 1.1 feet to 3 feet (worst case of up to 9.7 feet by 2100) will only worsen the experienced impacts to date (UMass Amherst). Storm events with astronomical high tides which previously only occurred with a 0.2 % annual chance, will become a more frequent normality in the future (UMass Amherst).

Top hazards in Nahant (past, current and future hazards)

This section provides an overview on past hazards and describes the top hazards identified in stakeholder interviews and at the MVP workshop.

Past hazards

The 2014 Hazard Mitigation Plan ("HMP", referenced as HMP) identified the following hazards.

Table 1: Hazard Risk Summary (amended from Nahant Hazard Mitigation Plan 2014, pg. 17)

Hazard	Frequency	Severity
Flood related hazards (urban/coastal)	High	Minor/Serious
Winter-Related Hazards	High	Serious
Wind-Related Hazards	Medium-Low	Serious
Geologic-Related Hazards	Low	Minor/Extensive
Brush-Fire	Medium	Minor

As noted in the Hazard Mitigation Plan (HMP), the vast majority of hazards that triggered disaster declarations for Nahant (since 1991) have been related to flooding caused by hurricanes, nor'easters, severe rainstorms and thunderstorms. The HMP notes that areas of most frequent flooding comprise "54 % of the Town's land area, and account for approximately 744 buildings worth an estimated $182 million" (Town of Nahant, 2014).

Previous Federal and State Disaster Declarations related to flooding included the ones depicted in Table 2 below.

Table 2: Past Federal/State Disaster declarations

Category	Hazard Name	Date
Tropical storms and Hurricanes	Hurricane Bob	August 1991
	No-Name Storm	Oct 1991
	Hurricane Katrina	Aug 2005
	Tropical Storm Irene	Aug 2011
	Hurricane Sandy	Oct 2012
Blizzards and snow storms	January Blizzard	Jan 1996
	February Snowstorm	Feb 2003
	January Blizzard	Jan 2005
	March Blizzard	March 2013
Floods	October Flood	Oct 1996
	June Flood	June 1998
	March Flood	March 2001
	May Rainstorm/Flood	May 2006
	March Flooding	March 2010
Nor'easter	April Nor'easter	April 2007

Furthermore, significant historic flood events in Nahant have included (HMP, 2014):

- March 1968
- The Blizzard of 1978
- January 1979
- April 1987
- October 1991 ("The Perfect Storm")
- October 1996
- June 1998
- March 2001
- April 2004
- May 2006
- April 2007
- March 2010

The January and March 2018 storms resulted in FEMA declaration DR-4372 (Massachusetts Severe Winter Storm and Flooding):

- Incident Period: March 02, 2018 - March 03, 2018
- Disaster declared on June 25, 2018

Figures 6 & 7: Left: Pumpout during March 2018 Nor'Easter in Nahant, right: Stormwater outfall pipe on Nahant Road, Nahant (Photo Credit: MVP Committee)

Overall, 23 storm damages have been linked to the March 2018 storm (compare Table 3). Storm damage evaluation is currently underway with FEMA inspectors (Clarendon Hill Consulting, 2019). Based on the Towns November 2018 damage inventory, the 23 storm damage items resulted in a **total (preliminary) cost estimate of $3,745.000 in repair work** (Town of Nahant, 2018)**.** Table 3 details the storm damage items.

Table 3: March 2018 storm damage details (Town of Nahant Storm Inventory, adapted).

Item	**Location**	**Description**
Debris removal	Town-wide	Town-wide debris removal
Emergency Protective Measures	Town-wide	Emergency Access, security, placing barricades for safety, sandbagging, flood fighting, emergency pumping, search and rescue, emergency medical care & support, emergency operations center, safety inspections, provision of supplies and commodities, medical care support, sheltering, evacuations, use of generators for power loss, and temporary facilities.
Culvert damage	Doggie Beach, Castle Road	Partial collapse, plugged, non-functional

Sink wholes	Wharf, Crystal Beach Parking Area	cavities in seawall
Damage to road and bridges	multiple locations	pavement, walkways and bituminous berm destroyed
Portable pump	Ward Road	Older pump failed
Stormwater Outfall pump clogged	Bear Pond	Gravity flood control outfall pipe and tide gate structure was plugged with sands and stones preventing opening under surge conditions.
Pump Station Failure / Damage	Lowlands; Bear Pond	Lowlands: Flooding caused sands, stones and debris to enter sewer system via dislodged covers in flooded areas; Bear Pond: control cabinet damaged from flying cobbles
Building Damage	Damages at Nahant Life Saving Station, Kelley Greens (Golf Course Building)	Exterior and interior damage to buildings
Infrastructure Damage	Golf course; Short Beach Play area	Golf course damage: debris, erosion, pipes clogged w/ debris etc.; Short Beach play area: debris removal, regrading after area was washed away
Revetment Damage	Willow Rd, Marginal Rd, Parrott Rd, Fallon Way	Revetment toe further shifted; @ Parrott Rd: additional collapse of roadway shoulder; Town sewer and water infrastructure may have been impacted
Coastal Armor Damage	40 Steps Beach Slope, Crystal Beach damage	Waves and surge impact displaced seawall stones armor and caused increased erosion and destabilization of the slope; @ Crystal Beach: seawall collapse
Seawall Damage	Town Wharf and Tudor Beach seawall	Waves and surge impact displaced seawall stones and opened up cavities behind the stone blocks causing piping of materials.
Environmental: Dune erosion (incl. revetment damage)	Short Beach, Doggie Beach	Dune erosion, including 500 linear ft of revetment stones partially or wholly displaced.

Property damage from flood events:
The HMP cites twenty-two coastal flood events from 1940 to April, 2014. These events incurred a property damage of $7.015 million.

Repetitive Loss Structures (RLP):
Based on the HMP there were 46 repetitive loss structures in Nahant (February 28, 2014). As defined by the National Flood Insurance Program's (NFIP) Community Rating System (CRS), a repetitive loss property (RLP) is any property which the NFIP has paid two or more flood claims of $1,000 or more in any given 10-year period since 1978 (FEMA). Nahant's repetitive loss properties consist of 30 single-family residential structures, with six two to four family structures, six other residential structures and four non-residential structures.

Current and Future Hazards and Challenges Presented by Hazards

The following top hazards are based on stakeholder interviews and outcomes from the MVP workshop and demonstrate an understanding of past, current and potential future community impacts.

Based on key stakeholder interviews, the community survey results and the workshop, the following top five hazards have been identified:

- Coastal flooding (includes storm surge, high tides)
- Inland flooding (due to high precipitation events)
- Storms (winter storms [ice and snow and high wind events])[2]
- SLR/ shoreline change
- Extreme temperatures*

*Extreme temperatures as a hazard were brought up in discussions at two tables during the workshop; Temperatures are atmospheric in nature and driven by climate change. All other identified hazards are driven by extreme temperatures and the changing climate. Based on this logic we identified extreme temperatures as an overarching theme and prioritized the stand-alone hazards shown above.

TOP FOUR HAZARDS
We grouped these hazards into the following four stand-alone categories which are depicted on the master risk matrix (Appendix B), these will be referred to as Top Four Hazards moving forward:

- Coastal flooding from storm surges
- (Inland) flooding due to high precipitation
- Extreme weather events / storms (winter storms, ice, snow), high wind events
- Sea level rise / shoreline change (incl. coastal erosion)

Coastal flooding accounts for episodic/shock events from storm events and associated storm surges, whereas shoreline change hazards are more long-term in nature and based on chronic stresses imposed by sea level rise.[3] Extreme temperatures are reviewed as an integrated overlay feature.

[2] Wind direction was a concern.
[3] This temporal differentiation aims to develop mitigation/adaptation approaches based on the hazard differences.

As can be seen, Nahant is subject to two kinds of flooding; **inland flooding** caused by high numbers of amounts of precipitation or high-frequency precipitation events, and **coastal flooding** created by winds and tides along tidal waterways. Inland and coastal flooding in Nahant are often combined. In the low-laying areas, notably the Lowlands and Furbush areas, existing topography, geomorphology and changed drainage pattern hinder drainage. Especially during extreme events sufficient natural drainage cannot occur sufficiently nor are existing sewer systems able to handle the total precipitation capacity in a timely fashion when wind- and tide-driven coastal waters push into already flooded low-lying areas. Drainage of additional water from precipitation goes to zero even with added auxiliary pumping. Key stakeholders reported that the January and March 2018 events inundated large areas of town, as water was not able to dissipate anywhere. Both types of flooding can be caused by major storms (Clarendon Hill Consulting, 2018 Stakeholder Interviews.) Severe storms – which may take the form of nor'easters, blizzards, hurricanes, thunderstorms and tornadoes – not only lead to coastal and inland flooding but can also cause damaging high winds.

Figure 8: Flooding at Baseball Field near Ward Road in the Lowlands Area (Photo Credit: MVP Committee)

Storms have varying impacts on Nahant's coastal area depending on the astronomical cycle; during a full moon, astronomical high tides occur which cause larger impacts. In case of a major storm such as a nor'easter, hurricane or tropical storm, the resulting major storm surges are exacerbated by astronomical high tides. Then, major **storm surges** develop their highest impact and cause devastating damages. Stakeholders reported that the March 2018 storm event (exacerbated by the astronomical high tide) inundated larger areas than previously reported. According to Police Chief Dwyer, the flood impacts on Willow Road homes doubled during the March storm; while past astronomical high tide events flooded Willow Road house numbers 0-90, during the March 2018 storm, houses numbers 90 to 172 were flooded in addition to this (Clarendon Hill 2018 Stakeholder Interviews). Several parts of the seawall have been damaged (and pending repair) including Willow Road 93-144 (including walkway & fencing, compare Table 3). Damage was associated with storms stone debris that was lifted over the seawall by storm surge wave action and pushed onto roads. Particularly, Bass Point Road and Willow Road received road damage during the 2018 January and March storms (Clarendon Hill. Stakeholder

Interviews, compare Table 3). Previously, the debris problem was noted to occur only "about once a year" in the Bear Pond neighborhood (HMP, p. 19), thus debris removal is becoming an increasingly frequent task for an already overburdened Town public work staff to address quickly.

Figures 9 &10: Castle Road, Nahant during March 2018 Nor'easter (Photo Credit: MVP Committee)

It was recognized that **climate change** projections indicate that these weather events may intensify and/or be more frequent, which may lead to even greater damages being sustained by the community. Furthermore, this effect is increased by the rising sea levels. Projections for sea level rise are based on assumptions how greenhouse gas emissions will continue to rise; extreme scenarios forecast 1.4 feet by 2030, 3.1 feet by 2050, 5.4 feet by 2070 and up to 10.2 feet by 2100 for Boston (UMass Amherst).

Current Strengths and Assets

Nahant has a committed leadership exhibited by elected officials and Town staff as well as by committee members and various volunteers who have contributed to the success of the MVP program to date. Workshop participants identified strong social infrastructural in the community, particularly as it relates to emergency preparedness and response capabilities. Successful collaboration and engagement already led to an impressive participation in the community survey co-developed by Clarendon Hill Consulting and the MVP Committee. Ongoing collaboration and engagement of residents (volunteers) will help to advance comprehensive solutions to mitigate coastal and inland flooding and increase resilience.[4] Furthermore, participants noted that Nahant has a well-functioning fire and police network, and the Town's public works staff were described as proactive in terms of taking protective or remedial actions in advance of and immediately following storm events. In addition to the many seawalls and other armored shoreline assets, several generators, bunkers, and towers exist around town. [5]

[4] Volunteer activities that were discussed during the workshop include the development of a comprehensive communications plan, beach cleanup / tree planting activities, outreach and education on residential rain water collection measures etc. (compare Recommendations).

[5] According to the MVP Committee the bunkers and towers are mostly located on private property and are not always well maintained.

Nahant has a strong societal capacity. It is a small-town community where neighbors are acquainted with each other and help each other. Workshop participants identified this as a major strength for the town, especially when it comes to local emergencies or other adverse events impacting the community.

Elements of Nahant's physical environment were identified as assets. Its solid, rocky shoreline is a resilient protection against wave impacts. Its highland area and natural springs (compare Figure 11) were identified as strengths as well. Furthermore, the offshore seagrass bed was noted as one of the nicest in Massachusetts.

Open spaces, wetlands, beaches and dunes, and the Lowlands park area as well as the ocean were identified as both environmental strengths and weaknesses. While they are prone to coastal erosion and impacts of salt water, they offer opportunities for the creation of water storage such as detention basins and green infrastructure solutions that improve natural water infiltration and storage.

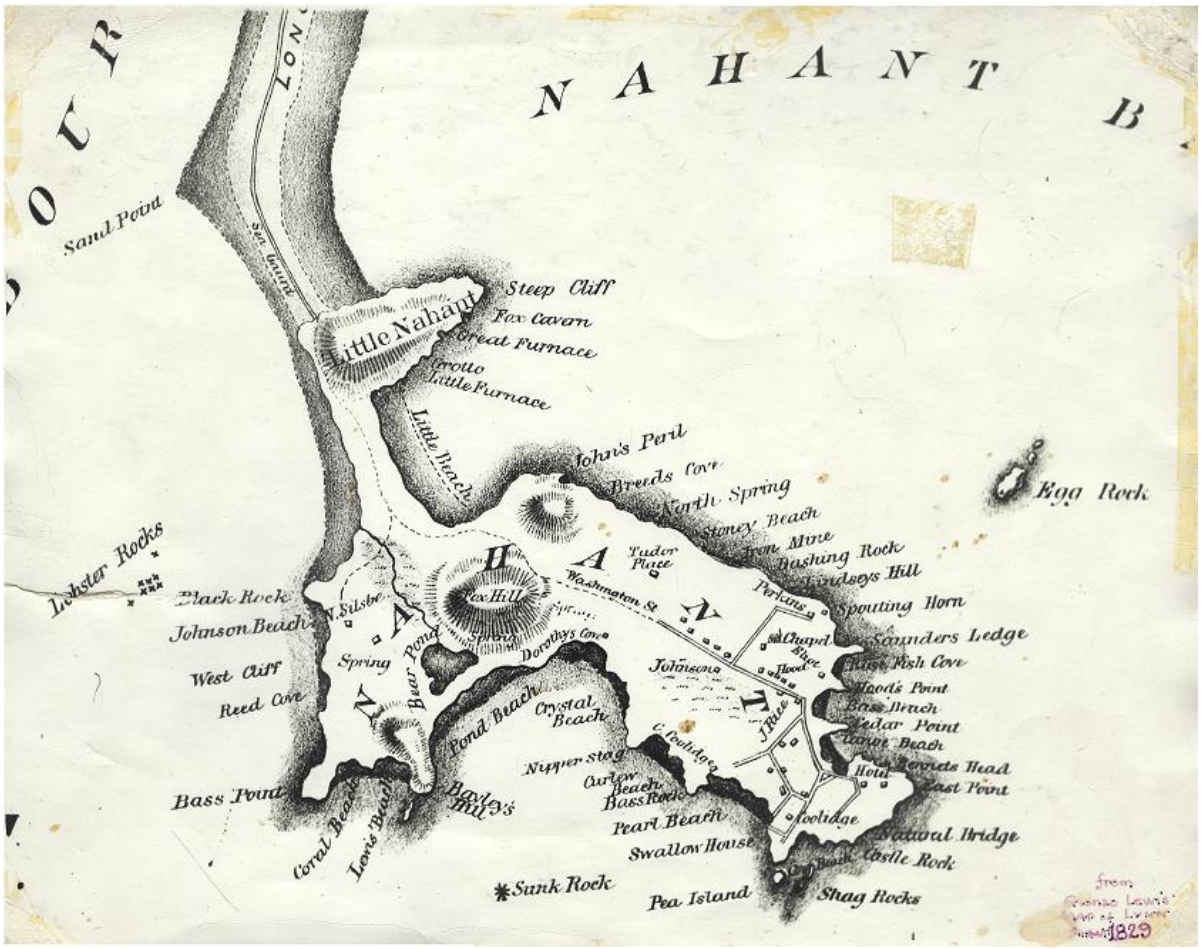

Figure 11: Historic Map of Nahant 1829 (Credit: MVP Committee)

Areas of Concern – Vulnerable Areas

General areas of concern:

Access/Transportation:
Nahant is connected to the mainland only by one road, the Carney Causeway which ties into the community of Lynn. While the Town of Nahant has had previous experience with coastal storms and associated damage and seems well prepared for those instances, it faces the danger of being cut off from the mainland. Stakeholder outreach has shown that there are some concerns for residents associated with lack of access to the mainland, especially for residents with medical issues (e.g. access to medication or special medical treatment needs) or acute needs e.g. to reach hospitals on the mainland quickly. Furthermore, discontinued access to resources and nutrition is also a concern. The March 2018 storm event inundated parts of the Nahant Causeway; for three consecutive days the Causeway had to be temporarily closed for up to three to four consecutive hours due to debris being pushed onto the roadway from the elevated King Tide storm surges. Three King Tides accounted for eight high tide cycles which set a new record high tide of 15.3 feet, four feet above the normal high tide (NOAA).

Neighborhoods:

The majority of houses are located on hills and are relatively well-protected from any coastal flooding. However, several areas are subject to frequent flooding. More recently the impacts from storm surges have worsened.

Stakeholders have identified these areas as most vulnerable to flooding:

- the “Lowlands” area
- the Furbush Road area
- Coastal areas

Figures 12 & 13: Left and right: Mass Audubon Thicket in the Furbush Road area.

The Lowlands and the Furbush Road area are shaped like “a bowl” and flood easily. The Furbush Road area includes the Mass Audubon thicket (Figures 12, 13), a four-acre wildlife sanctuary. Residential

structures and roadways in these three areas of the community are subject to frequent flooding both from inland and coastal flooding.

Based on the outcomes of the stakeholder workshop, MVP Survey results and numerous MVP committee meetings the Lowland areas has been identified as the top priority for Nahant.

The major concern is that the drainage pumps in the Lowlands area become ineffective in storm situations. As a standard practice, water is typically pumped out of the Lowlands area into the ocean. However, when wave surges press water into the concave-shaped areas, there are no options for the pumps to dispose of the excess water.

Lowlands Area:

The drainage situation in the Lowlands has been changed in the past which has made the area highly vulnerable to flooding. The MVP Committee and stakeholders note that the construction of the Kelley Greens Golf Course changed the areas water and drainage patterns. While water would previously drain into Lynn Harbor, stakeholder participants noted that since the golf course was built, drainage has been directed into the opposite direction towards drainage ditches that are intended to flow in the opposite direction toward the Golf Course/conservation area. In earlier times water would flow from Nahant's natural springs located to the east and west of the Bear Pond area as a stream into Lynn Harbor; the stream and springs are depicted on the historic map of Nahant (Figure 11).[6] The areas surrounding the stream were since filled in and a golf course was created on the conservation land. The stream was transformed into a ditch with a drainage pipe running under Castle Road [7]. However, water flow in the drainage ditch is stagnant. This created a weakness in the infrastructure system. During the March 2018 storm, the stormwater outflow pipe designed to allow water to recede from the Lowland neighborhood as well as the drainage ditches on Ward Rd, was not able to cope with the storm surges during the King Tides. Storm water pressed into the neighborhood and water in the Lowland area stayed and increased in volume, unable to retreat to the ocean at low tide, as designed (Appendix D, Public Comment #2). According to a participant, her house in the Lowlands was flooded for five consecutive days during the March 2018 storm. This causes unhealthy conditions and prohibits emergency access.

According to the MVP Committee, the Town of Nahant approved Article 32 at their April 2018 Town Meeting. This article approved funds to evaluate and repair the Castle Road Storm drain and other drains in the Lowlands. To date the Storm Drain has been evaluated but not repaired/replaced as a way to mitigate flooding and improve drainage. In addition, Article 32 approved a, "permanent/temporary" pump in the Lowlands. To date, this has not been procured. Finally, improving other drainage issues in the Lowlands and Bear Pond, was also included in Article 32, however these issues have not been addressed yet (Appendix D, Public Comment #3).

The MVP Committee stresses that the longstanding drainage and flooding issues in the Lowlands need to be addressed as a way to improve Nahant's preparedness as a community.

[6] Furthermore, a bridge was located on Castle Road near Doggie Beach which was later removed.
[7] Based on a public comment, the Castle Road discharge pipe was capped and encased (Appendix D, Public Comment #2).

Furbush Road area: This area was previously open to the sea, carrying Willow Road over this opening. Sometime in the early 20th century, Willow Road was converted into a causeway (Mass Audubon, 2017). In 1978, the bridge on Willow Road was flooded by a major storm event where the "sea washed right through" based on participants' accounts. These days, Furbush Road typically gets the brunt of the storm surges in addition to water flowing down from Nahant Road.

Figures 14 & 15: Kelley Greens Golf Course (Conservation area)

Areas prone to flooding

Flood hazard areas identified in the HMP and per key stakeholder interviews include:

- Lynn/Nahant rotary
- The Causeway
- Lowlands: Lower Castle Road, Ward Road and Lower Fox Hill Road, softball field / Lowland's parking lot; Castle Road through Harbor View Road (= parts of "Lowlands"); Flash Road (extension of Golf Course area)
- Little Nahant Road to Antigo Way
- Bass Point Road from Gardner to Trimountain
- Willow Road from Oceanview to Winter Street
- Furbush Rd: Willow Road at Furbush Road
- Willow Road 90 – 172 including the Wharf (wharf seawall has been damaged and the wharf parking lot has been inundated; based on Clarendon Hill Interview with Police Department.)

Specific areas of concern – Current Concerns and Challenges Presented by Hazards

As noted, inland and coastal flooding along with storms and sea level rise (shoreline change) are major concerns in Nahant. Three areas have been identified as vulnerable to inland flooding; the Lowlands, Furbush Road area and the golf course. The Lowlands are particularly vulnerable to flooding as the storm water sewer system is malfunctioning and receives a huge influx of storm water from residential sump pumps during high precipitation events. In addition, major utility infrastructure (gas and electric substations) is located in this flood-prone area.

As noted in the prior section, the longstanding drainage and flooding issues in the Lowlands have been identified as a top priority by the MVP committee and stakeholders. The associated impacts need to be addressed most urgently to improve Nahant's resilience to flooding.

Infrastructural Concerns

<u>Overloaded storm water sewer system, pump system and drainage</u>

- Storm drainage systems including existing natural ditch systems are considered inadequate and were determined to be malfunctioning, especially during heavy precipitation and coastal storm surge events.
- Aging and malfunctioning storm water sewer system is overloaded during flooding and reaches capacity easily[8].
    - Sump pumps add additional loads into the sewer system which reach high loads during storm events.[9]
    - A failure of the sewer pumps would cause the Lowlands area to flood. All utility infrastructure is located in the Lowlands and at risk to flooding.
    - Sanitation is a concern since toilets do not flush if sewer pumps have reached their capacity.

<u>Natural and armored coastal protection continue to experience serious damages during storms</u>

- Seawalls are eroding and/or suffer repetitive damages due to wave impact and storm surges and require intense maintenance and repair. Particularly, seawalls at Tudor Beach were heavily damaged during the 2018 storms.
    - Debris dislodged by storm surge-driven wave action blocks sewer and drainage outfall openings, roads, and damages homes.
- Various coastal locations have suffered from sinkholes.
- Natural coastal barriers (beaches and dunes) have been damaged.

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[8] The main sewer pump station is located below ground in a very low-lying area. It was noted that the sewer sump pumps are easily at capacity since the natural drainage to the conservation land (now the Golf Course) was changed.

[9] Sump pumps add additional loads into the sewer system. It was noted that over one million gallons of storm water was pumped daily during the March 2018 storm, double the normal amount. This almost caused a failure in the pumps due to the high increase in volume of flow.

- Sand areas have been stripped off and moved elsewhere.

Closed Causeway / Lynn Rotary may make Nahant temporarily isolated

- Nahanters are beholden to the access through the Causeway and rotary in Lynn. If these are impacted and/or closed due to floodwaters, access to Nahant is restricted. The rotary is considered more susceptible to inundation than the Causeway, which was recently reconstructed by the Massachusetts Department of Conservation and Recreation (DCR) to better withstand flood events. However, the Causeway had to be closed temporarily during the March 2018 storm due to debris being pushed on the road (combination of storm surge and high tide impacts).
    - Harmful medical situations may arise.

Utility infrastructure in Causeway and Lowlands is vulnerable

- Co-located potable water, electricity and gas lines in Causeway are vulnerable as they may be damaged during a storm event.
- Electric and gas substations located in the Lowlands are prone to flooding.
- Overhead electrical lines are vulnerable to high wind events with the potential for falling poles to create an additional life safety and property damage hazard.

Vulnerable Roadways:

- Roadways are at risk to flooding from high precipitation events.
- Nahant is at risk of becoming isolated during flood events. Little Nahant is at risk of being cut off from "Big Nahant" while "Big Nahant" is at risk of being cut off from the mainland.

Compost area: Outflow from compost area may be detrimental to adjacent wetlands, especially during heavy precipitation or coastal storm events.

Societal Concerns

- Lack of communication / awareness[10]
- Lack of individual preparedness among residents
- Evacuation needs: response time and limited staffing / need for volunteers
- Lack of shelters and adequate equipment
- Access to/from Nahant / danger of isolation:
    - Access to/from Little Nahant (can be cut off during a storm)
    - Middle and high school children or their parents who are on the mainland during the daytime may not be able to come home when Causeway / Lynn rotary is closed.
    - Very limited medical support on Nahant itself
    - Only one evacuation route

[10] Evacuation information is posted on the Town website. To residents it is obvious that "there is only one way on/off island: The Causeway". However, visitors or people not familiar with the website may be at risk due to limited awareness during an emergency event.

    - No food supply on Nahant – solution: (Nahant Emergency Management Organization (NEMO) to coordinate
- Elderly/ vulnerable population.

Environmental concerns

- Dunes and beaches have suffered heavy erosion due to past storms
- Sand movement / accumulation
- Impacts of salt water (storm water) intrusion on natural habitats
    - Furbush thicket (owned by Mass Audubon; bird habitat, compare overview map Figure 1) has become vulnerable because it was transformed from an area open to the sea into a partly sealed and closed off area; it is overgrown and would need to undergo a large overhaul to restore its full ecological capacity (including water infiltration capabilities)[11]
    - Heritage Trail has become susceptible to inundation
    - Freshwater wetlands and other natural habitats are vulnerable to salt water intrusion
- Invasive species are replacing natural trees
- Health concerns: bad water quality at beaches after storm due to combined storm water overflow
- Health concerns: indoor air quality (due to mold development in flooded basements)
- Impacts on shellfish due to the warming/acidification of the oceans
- Natural erosion occurs on Willow Road, Spouting Horn, Pleasant Street
- Concern about the use of pesticides
- Tombolo – All of Nahant is considered a tombolo (coastal deposition landform), making it the town's most unique natural feature. However, this also makes it more vulnerable to the adverse effects of natural hazards and climate change due to its relative isolation and proximity to areas of greatest susceptibility and impact.

Recommendations

Participants at the MVP workshop identified a number of recommendations to address vulnerabilities and increase resiliency in three main topic areas in accordance with the CRB workshop approach: infrastructure, society, and environment. Increased management needs were noted for the combined storm and sewer system due to more frequent high intensity rainfall events and from coastal storm surges. Moreover, the malfunctioning pump system and drainage system were a key theme that emerged in discussions; necessary upgrades of the storm drainage system seem to be a priority. In addition, coastal protection in the form of seawall repair and dune restoration / management was

[11] Based on the Mass Audubon restoration plan, the thicket "was historically a red maple swamp and salt marsh, open to the sea, with a bridge carrying Willow Road over this opening. Conversion of Willow Road to a causeway across this opening, sometime early in the 20th century, has blocked tidal flow into the Thicket and hampers drainage out." (Mass Audubon. 2017).

discussed. The need to incorporate nature-based solutions and increase natural water retention areas, e.g. through green infrastructure solutions or improved pervious surfaces, along with the planting of additional trees and the protection of wetlands and natural habitats arose during discussions as well. Communication/education of residents as to emergency situations/preparedness and storm drainage evolved as another priority item during discussions with a focus on increasing training and volunteer activities. Participants advocated for education on action measures such as on-site drainage or water storage, e.g. in the form of green infrastructure (such as water retention basins, or simple rain barrels that alleviate drainage and lessen the pressure on the stormwater system).
Securing access to and from Nahant in case of storms and medical emergencies passing through the Lynn/Nahant rotary and the Causeway were another priority area which added a regional focus to the discussion. The master risk matrix (Appendix B) provides further details on these findings. Appendix D contains additional comments on priorities received on the Draft MVP report. The final MVP report has been updated with these findings.

Top Recommendations to Improve Resilience

Top Priority - Infrastructure

The Lowlands have been identified as most vulnerable location for inland flooding as this area houses the Town's vital infrastructure (including gas and electric substations and sewage pump station. [12] Additional priority areas for inland flooding are the Furbush Road area and the golf course. Coastal flooding particularly at Tudor Beach Rd has been identified as another high priority. The recommendations below reflect the detailed findings from the entire workshop discussions.

1. <u>Establish a long-term strategy to upgrade and maintain the storm water and natural drainage systems including green infrastructure solutions to reduce inland flooding*:*</u>

- Conduct an updated drainage study and remedial action plan, focusing on the Lowlands area along with the golf course and Furbush area:
    - Evaluate drainage solutions for water removal through a combination of green infrastructure solutions (e.g. natural ditches) and installation of storm water pumping stations
        - Develop an actionable, prioritized plan to replace and enlarge the drainage pipes and add pump systems in the Lowlands area in combination with green infrastructure solutions (e.g. natural ditches or retention basins, see below) to store and remove rain water from the system.
        - Install a storm water pumping station in the Lowlands
        - Assess the need for adding a storm water pumping station in the Furbush Rd area

[12] The MVP Community Survey, along with the MVP workshop findings stress that improvements to the stormwater system in the Lowlands are priority number one. MVP Committee meeting discussions concur (compare Appendix D, MVP comment 3).

- Dredge natural ditches and upgrade water storage capacity in the Lowlands and Furbush Road area.
    - Repair / Replace and open up the storm water drainage system on Castle Road in order to improve drainage and reduce flooding in the lowlands (compare Appendix D, public comments 3, 4).[13]
    - Establish plan to repair/improve and clean/maintain the natural drainage system.
- Educate property owners on ways to mitigate storm water, e.g. through a financial incentive or rebate program that minimizes stormwater inflow from properties including sump pumps and rewards on-site rain water infiltration and storage (e.g. through rain barrels).

2. <u>Establish a holistic long-term plan to reduce flood risk by incorporating natural solutions (such as living shorelines) with grey infrastructure (seawall) upgrades to reduce the impacts from coastal flooding</u>.
    - Beaches / Dunes (maintenance and improve):
        - Coordinate beach / dune management with SWIM and conduct removal of invasive species in addition to trash removal.
        - Develop town policies for dune management, including restoration, mowing plans, and access plans (for DPW).
            - Organize a community beach cleanup team and/or cleanup days (e.g. trash and invasive species removal)
        - Coordinate with the Massachusetts Office for Coastal Zone Management (CZM) and incorporate more living shoreline at selected beaches. During the March 2018 storm sand was washed out and moved at several beaches. Dune restoration will help to stabilize the sand and control further erosion. Recommendations for priority dune restoration include the Castle Road Beach, between the Dill and Quinn homes, Doggie Beach (also known as Black Rock Beach) and Short Beach.

    - Repair or upgrade seawalls previously impacted (including those listed in Table 3).

3. <u>Upgrade sewer system infrastructure including pump stations:</u>

    - Develop a program / incentive plan to identify and correct infiltration issues associated with sewer system.
    - Incorporate changes into town bylaws in coordination with DEP requirements and ensure sanitation standards are maintained (e.g. toilets are working properly at all times).

4. <u>The Causeway / Lynn Rotary</u>

- Collaborate with DCR to identify next steps and responsibilities to upgrade the rotary and Causeway.

[13] During the April 2018 Town Meeting, the Town voted to appropriate funds towards drainage improvements to the Ward Road and Bear Pond areas; specifically resolving the gravity outfall at Bear Pond, assessing/fixing the pipes that drain Ward/Fox Hill/Castle Roads, dredging the drainage ditch and providing a permanent/portable pump to the Ward Road area. The Castle Road storm drain has been evaluated. The following items still need to be completed: opening of the Castle Road storm drain, dredging of ditches, installation of pump to Ward Road area (MVP Committee).

- Collaborate with neighboring communities including Lynn to petition congressional and state legislators to address flooding of the Lynn rotary.

    - Integrate flooding concerns into existing traffic study for Lynn rotary for redesign (long-term).
    - Improve support for emergency communications associated with causeway access.

Top Priority - Societal

1. Communication and Awareness:

- Develop a comprehensive communications plan together with a group of volunteers and possibly other committees that would include steps for increasing risk awareness and improving emergency preparedness for all residents.
- Increase awareness and educate as to hazards and risks and as to how to prepare for it. This includes information on individual mitigation or adaptation actions that residents can take on their own and/or in coordination with their neighbors.

    - This may include developing an education plan, e.g. with the Library or School, to bring climate risk education to town residents and businesses or setting up small scale community engagement programs such as "adopt a storm drain" or “adopt a catch basin” to encourage residents to actively engage in reducing vulnerability from flooding.
    - Town may develop content on cable TV station for emergency management on a rolling basis; this may include public actions for weather preparation, and education on ecological issues / green infrastructure to alleviate the risk of flooding due to natural infiltration options.
    - Furthermore, a new resident "welcome packet" with critical town information, and post-card process for getting "on the list" for town communications may be developed.

- Volunteer Activities to increase awareness/communication:
  Encourage interested citizens to volunteer for activities which increase hazard awareness including communication on hazard preparedness.
    - Possibly have the MVP Committee engage neighbors and friends and inform about activities that reduce vulnerabilities and increase climate resilience and what actions citizens can take on themselves.

2. Emergency Management / Operations and Staffing/Capacity: (Medium / High Priority):
   Selectmen and Town Administrator shall evaluate staffing/capacity and make recommendations for added staffing / volunteer opportunities.

    - Explore opportunities to add additional staffing or volunteers. Extend the Community Emergency Response Team (CERT) with additional trained residents.[14]

[14] MVP Committee may organize those CERT trainings in coordination with the Public Safety Department.

- Information on medical at-risk populations may be integrated into the development of a priority response plan that addresses most critical locations/facilities/residents (pending resident's agreement).[15]
- Increase use of communication means/tools such as Reverse 911 and Cable TV to reach all members of the community.

Top priority - Environmental

1. <u>Implement natural green infrastructure solutions for storing / removing access water:</u>

    - Restore natural drainage systems to become fully functional and increase maintenance efforts
        - Restore the Castle Road drainage system to become fully functional to increase natural drainage options for the Lowlands.
    - Evaluate existing maintenance plans. Identify opportunities for low-to-no-cost natural green infrastructure solutions.
        - Consider installing a program to install natural rain gardens, rain barrels, and other natural storage areas for water, especially in the Lowlands.
        - Create large water storage / detention areas and bioswales, and study and implement means for fast water removal.
        - Evaluate drainage solutions including water removal through pumps and nature-based solutions at the Lowlands and Furbush Road areas of concern.
    - Review local regulations and bylaws to encourage green infrastructure installations such as rain gardens, bioswales and/or use of permeable surfaces such as porous pavers or permeable pavements (e.g. porous asphalt) etc. that reduce storm water runoff.
    - Evaluate opportunities for collaboration and increased participation of residents:
        - Identify areas for citizen volunteer involvement to install green infrastructure solutions; look into establishing programs such as "adopt a rain barrel" etc.
        - Identify instances for key private property owner involvement; explore incentives such as matching state, municipal, private and other grants.
        - Consider the restoration and maintenance plan for the Mass Audubon Furbush thicket.

2. <u>Reduce flood pathway impacts (e.g. at beach parking locations) by installing permeable surfaces.</u>

    - Replace selected impervious surfaces with permeable solutions, e.g. parking lots at Short Beach / Spring Road, Nahant Road, and Castle Road entrances (which create flood pathways in case of storms with storm surges).
    - Consider the use of pervious materials such as wooden slats and evaluate the use of fabric synthetic material as alternatives to concrete or paved walkways at selected locations.

[15] The police maintain a database with this information.

3. Develop a long-term coastal defense plan for the entire coastline to enhance natural ecosystems in order to reduce the vulnerability to storm damage including a living shoreline & dune management plan.

    - Develop a living shoreline plan that identifies natural coastal barriers / protection
    - Develop a dune management / nourishment plan that goes beyond the existing trash removal program to foster dune stabilization to limit sand movement.
    - Develop town policies for dune management which may include dune planting program, removal of invasive species, bird protection, and replacing paved walkways with sand or boardwalks (to stabilize dunes).

    - Identify areas for citizen volunteer involvement.

Medium Priority Recommendations

Infrastructure

1. Increase utility infrastructure resilience and use of renewable energies:

    - Work with National Grid to upgrade the resilience of the gas pipeline and infrastructure in co-located pipes in Causeway.
    - Advocate for DCR and MWRA to develop a safe replacement plan for the utility pipe lines within the co-located pipes in the Causeway.
    - Floodproof electric and gas utilities located in the Lowlands, e.g. elevate generator, raise building, and replace current pipes with non-corrosive gas pipes.
    - Advocate for burying of overhead electrical lines.
    - Advertise for the Solarize program and advocate for adding energy storage to it to encourage energy independence.

2. Compost Area (Medium-High Priority):

Conduct a feasibility study to assess options including a more economic and environmentally safe operation in line with regulations. Options may include regrading or closure of compost area and hauling of materials to remove potential influx of harmful substances to wetlands

Societal

1. Shelters: Review and improve the Emergency Management Plan as necessary (with regard to the shelter needs).

    - If necessary, add additional shelters, needed equipment, and update the plan to respond to vulnerable populations (e.g. medical needs in cases of emergencies).[16]

[16] A public comment received on the Draft MVP report calls for adding the library as a shelter option. During the March 2018 storm, about twenty people were using the library for various purposes including computer access and family entertainment.

- Nahant Emergency Management Organization (NEMO) to provide recommendations to increase shelter capacity.
- Identify areas for citizen volunteer involvement.

2. Improve access restraints in case of emergencies

Work with Lynn and Swampscott and their schools to arrange for "across the Causeway" shelter situations in case of emergency (Note: some arrangement is already in place).

- Little Nahant, access issues:
  Continue to pursue federal program for military surplus vehicles to supply medical supplies, food, staffing during emergencies with access limitations (compare roadways access feature in infrastructure section).

Environmental

1. Develop education program on benefits of nature-based solutions, invasive species management, and regenerative practices, along with the use of pesticides.

2. Maintain and increase native tree species around town:

   - Consider planting of native, durable trees.
   - Explore adoption of Tree City USA program or similar initiatives.
   - Explore volunteer planting programs.
   - Review town tree policy, e.g. as to maintenance, removal of invasive species as necessary.

3. Enhance natural ecosystems including eelgrass habitats and living shorelines in order to reduce the vulnerability to storm damage.
   - Review materials on nature based coastal solutions to create living shorelines
   - Explore option to recycle Christmas trees into a reef system to protect seagrass and dunes in line with best practices and existing regulations.

Lower priority recommendations

Infrastructure

1. Increase resilience of roadways:

- Conduct a town-wide study of roads vulnerable to flooding. Regrade vulnerable roads or install bioswales at selected locations to encourage water runoff if necessary.

Furthermore, an emergency call was placed to the library from someone that was looking to be rescued from her flooded home (Public Comment #4. Sharon Hawkes).

Societal

1. Improve Medical/Food Access:
   Nahant Emergency Management Organization (NEMO) to arrange agreements for provisions from local restaurants to emergency shelters.

2. Ensure well-being of Elderly/Vulnerable Populations:
   Continue wellness check-ins with elderly as needed.[17]

3. Reduce costs from storm induced property damage and educate home owners on flood mitigation measures:

- Provide education material on floodproofing and other individual flood mitigation measures, flood insurance, and other useful materials for homeowners.
    - Ensure the library has all nine FEMA publications on flood protection topics as creditable under CRS Activity 350, in addition to other locally pertinent documents on Nahant's flood hazards and how homeowners can reduce their risk of flood damages and loss. The availability of these publications should be routinely promoted by the Town using various outreach methods.
    - Establish a "flood protection" page on the Town's website that provides the public with information needed to increase flood hazard awareness and to motivate actions to reduce flood damage and encourage flood insurance coverage. Hyperlinks to other helpful resources and publications should also be provided for people who want to learn more (e.g., FEMA's *Protect Your Home from Flooding: Low-Cost Projects You Can Do Yourself*).
- Once in the program, promote Nahant's participation in FEMA's Community Rating System (CRS) and advocate for measures that will continue to increase the Town's CRS Class, reduce flood insurance costs, and increase resilience. Special emphasis should be placed on activities that are creditable under Series 300 (Public Information).
    - Collect storm damage assessments and costs for both public and private property, to help with meeting town's obligations for FEMA reporting
    - Possibly work with FEMA to identify strategic solutions for individual property locations.

[17] It is recommended that a plan is developed which includes information on medical needs to better assist in cases of emergency. Volunteers or MVP Committee may assist with this task.

Environmental

1. In a regional approach with neighboring communities develop a long-term plan to reduce combined sewer overflow in order to maintain beach water quality.

2. Educate on solutions for flood proofing to mitigate mold issues in homes to improve air quality

    - Establish a website on "flood protection" on the Town's website and have flood protection publications available that address flood proofing and mold protection measures.
    - Identify resources such as qualified contractors and best practices to address mold mitigation problems due to flooding.

Other recommendations

Ensure Hazard Mitigation Plan is updated by 2020.

Outlook

As noted, several distinct areas for improvements were discussed during the MVP workshop.

<u>Identified action measures evolved around the following main topic areas:</u>

1. Education, engagement & awareness (including preparedness)
2. Natural system protection measures
3. Structural and infrastructural improvements
4. Review of local plans and bylaws (e.g. to encourage on-site infiltration or temporary water storage measures to reduce pressure on the storm water system)

Several of the action measures shall be connected to volunteer activities due to limited staffing. Nahant has already achieved considerable buy-in from key stakeholders throughout the MVP program. The community survey yielded an impressive participation and raised residents' awareness for natural hazards and climate change. The Town and MVP Committee plan to build on this movement and are looking to increase outreach activities with the help of volunteers e.g. to better prepare for emergency situations, mitigate coastal and inland flooding, and increase resilience. Volunteer activities discussed include the development of a comprehensive communications plan (e.g. for emergency situations), beach cleanup / tree planting activities, outreach and education e.g. on residential rain water collection measures among others. Partners for education measures are currently being identified.
All of these areas tie into potential grant areas offered by FEMA, Coastal Zone Management (CZM) or the EEA.

It is recommended that the Town evaluates submitting applications for the following grant categories.

1) MVP Action Plan categories:

    - Additional Studies e.g. feasibility studies or vulnerability studies for specific areas
    - Design studies to redesign storm water infrastructure to function properly over the life of the infrastructure given projected increased coastal and inland flooding
    - Regulatory review to ensure identified action measures, e.g. for green infrastructure measures such as bioswales are in-line with local by-laws and regulations
    - Education, community outreach and engagement, e.g. on storm water pump drainage, green infrastructure solutions, dune protection, or flood proofing of homes
    - Construction and Implementation of natural solutions to store/remove excess water, e.g. rain gardens, bioswales etc.

2) Coastal Zone Management grant categories:
    - Detailed Vulnerability and Risk Assessment e.g. to establish comprehensive coastal defense plan
    - Public Education and Communication
    - Local Bylaws, Adaptation Plans, Other Management Measures
    - Redesigns and Retrofits
    - Natural (coastal green infrastructure) storm-damage protection measures such as living shorelines or development of comprehensive dune management plan

3) FEMA grants – the following categories may be tapped into once the community is part of the NFIP program:
    - Flood Mitigation Assistance (FMA) Grant
    - Pre-Disaster Mitigation (PDM) Grant
    - Repetitive Flood Claims (FLC)
    - Severe Repetitive Loss (SLR) Grant.

In addition to this, **partnerships with state-wide agencies such as DCR and utility companies** shall be strengthened and fostered to maintain / improve access to Nahant through the Lynn rotary and Carney Causeway and achieve a more resilient utility infrastructure on Nahant.

Lastly, **regional collaboration** was brought up during the workshop. It is encouraged to drive specific issue areas such as the Lynn rotary or on collaborations for vulnerable population including school kids, elderly, or medical sick with neighboring communities to strengthen the region overall.

Figure 16: Workshop participants

The Town of Nahant is planning to hold their public listening session in early April.

CRB Workshop Participants

All workshop invitees are listed below; attendance is indicated with an x.

Name	Department/Group	Attendence
Vi Patek	SWiM	x
Tony Barletta	Town Administrator	x
Tim Lowe	DPW	
T Taylor	Selectman	
Steven Scyphers	Northeastern	x
Steve Thiboult	Bass Point Appartment Maintenance	
Sean Pierce	DCR	
Robert Dwye	Police Chief	
Rob Tibbo	Harbormaster	x
Rob Barreda	Fireman	
Richie Lombard	Selectman	
Richard Snyder	Planning Board	
Priscilla Geigis	DCR	
Niamh Callahan	Nahant Real Estate	
Mike Halley	Nahant Emergency Management / Police	x
Mickey Long	Senior Housing	x
Michael Feinberg	Fire Chief	x
Marcia Divoll	MVP / Council of Aging	x
Linda Pivacek	Resident	x
Linda Perterson	Director of Senior Housing	x
Laurie Giardella	MVP/ Finance Committee	x
Kristen Kent	Conservation Committee	x
Kevin Andrews	Johnson School	x
Keith Obash	DPW	x
Katie Lotterhos	MVP	x
Jon Grabowski	Northeastern	x
Gino Spelta	MVP / Police	
Enzo Barile	Selectman	x
Ellen Steves	Conservation Committee	x
Diana Brandi	Resident	X
Dennis Ball	Nahant Emergency Management	x
Deborah Murphy	Public Health Nurse	x
Danny Fiore	Golf Course	
Christine Johnson-Liscio	MVP	x
Carl Maccario	Resident/Emergency Management	x
Brendan Ward	Financial Committee	
Brendan Baranch-Olmstead	MVP	x
Abby Roberts	MVP / Green Committee	x
Peggy Curran	Green Committee, note taker	x
Ellen Goldberg	note taker	x

CRB Workshop Project Team:

Name	Organization	Role
Dennis Ball	Emergency Management	Key Stakeholder
Brendan Baranch-Olmstead	MVP Committee	Core Team Member
Enzo Barile	Selectmen	Key Stakeholder
Tony Barletta	Town Administrator	Key Stakeholder
Peggy Curran		Note taker
Marcia Divoll	MVP Committee	Core Team Member
Rob Dwye	Chief of Police	Key Stakeholder
Michael Feinberg	Fire Chief	Key Stakeholder
Laura Gmini	MVP Committee	Core Team Member
Ellen Goldberg	Green Committee	Note taker
Dave Hampton	Clarendon Hill Consulting Team	MVP Table Top Facilitator
Ellie Hoyt	Clarendon Hill Consulting Team	MVP Table Top Facilitator
Isabel Kaubisch	Clarendon Hill Consulting	MVP Lead Facilitator
Christine Liscio	MVP Committee	Core Team Member
Katie Lotterhos	MVP Committee	Core Team Member
Tim Lowe	DPW Superintendent	Key Stakeholder
Jim Newman	Clarendon Hill Consulting Team	MVP Table Top Facilitator
Darrin Punchard	Clarendon Hill Consulting Team	MVP Table Top Facilitator
Abby Roberts	MVP Committee	Core Team Member
Gino Spelta	MVP Committee	Core Team Member

Suggested Citation

Clarendon Hill Consulting (2019). Municipal Vulnerability Workshop Summary of Findings. Town of Nahant, Massachusetts.

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Appendix A:

Workshop Agenda & maps

Workshop Agenda

Town of Nahant

Municipal Vulnerabilty Preparedness Workshop

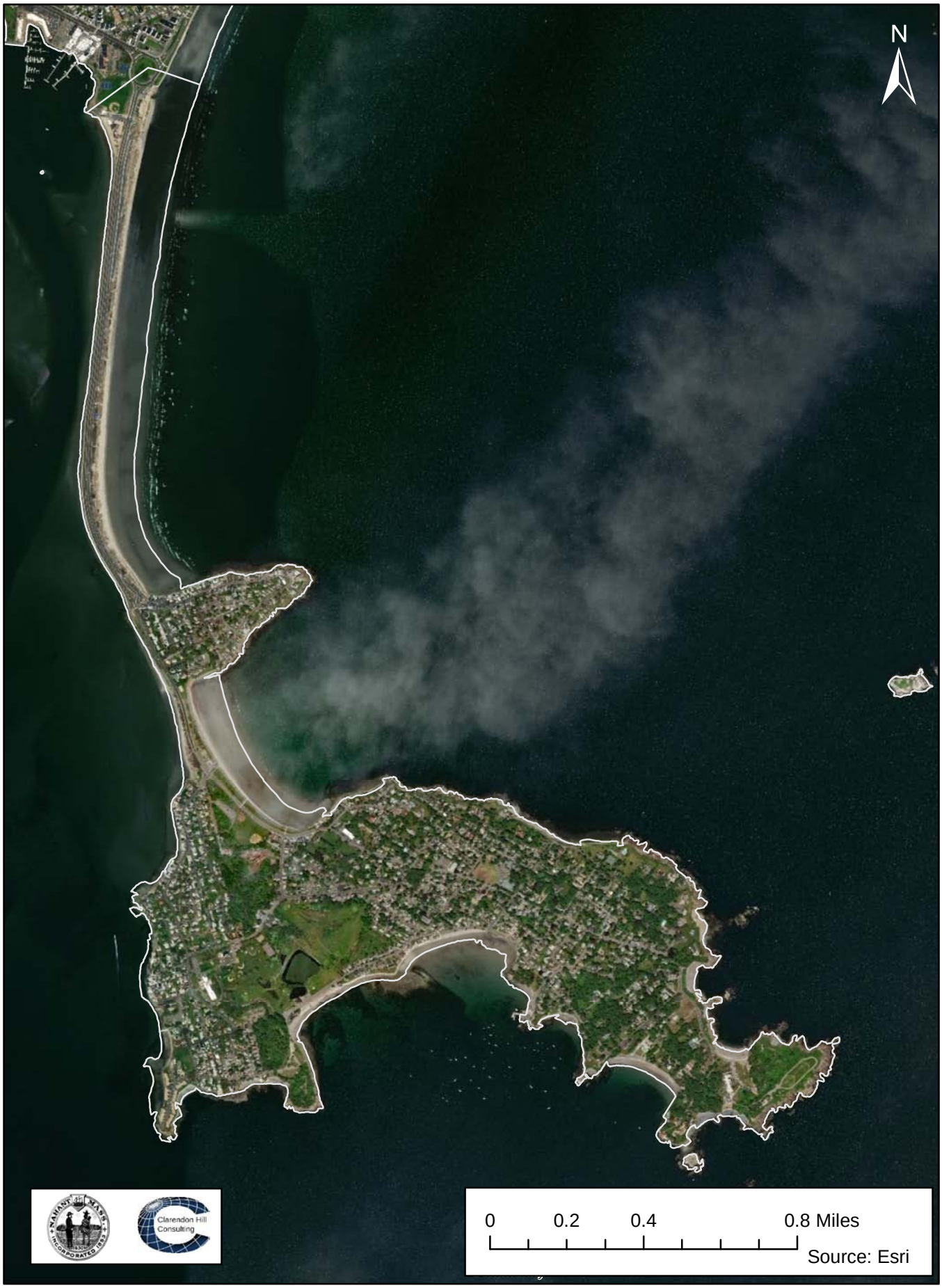
Date 2/9/2019

Time 8:30:00 AM - 4:30 PM

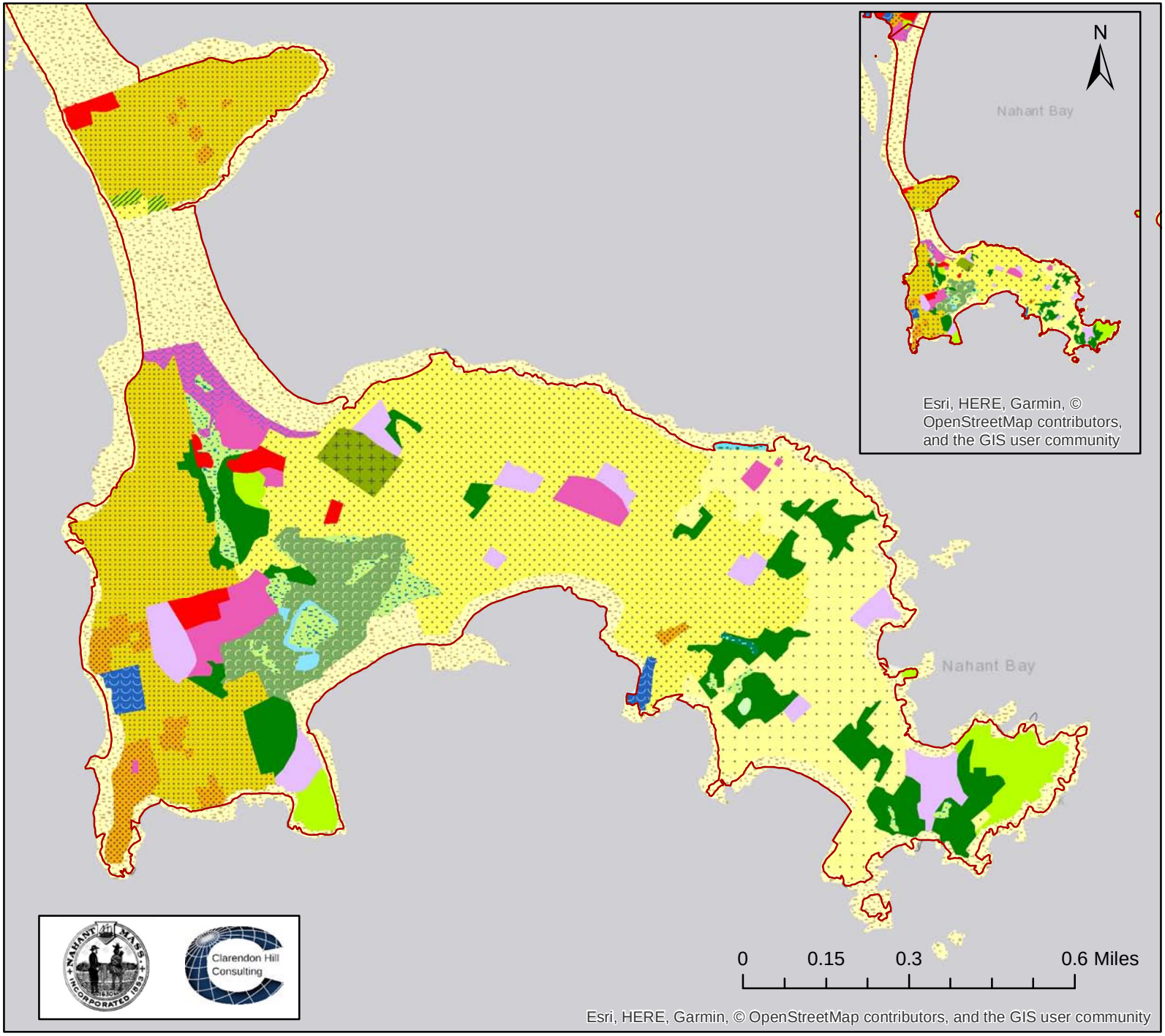
Nahant Town Hall

Time	Activities	Who
8:30 AM	Sign-In, name-tags & refreshments	CHC team / MVP Committee
9:00	Welcome	Town Administrator
9:10	Resident shares experience from Jan/March 2018 storm	MVP Committee member
9:15	Introductions & Overview of Workshop	CHC Lead Facilitator
9:20	Overview Presentation (Science, data resources, past efforts) Large Group Discussion: Top Hazards	
10:00	Instructions & Small Groups Work	
10:10 AM 10 min *(50 min total; 5 min intro; 15min/feature)*	*Small Group Exercise 1* a) Determine top priority hazards b) Review municipal vulnerabilities (V) and strengths (S) for Infrastructure, Societal and Environmental Features	Small Groups & CHC Table Top Facilitators
11:10 AM	5-minute break	
11:15 *(75 min total; 25 min/feature)*	*Small Group Exercise 2* Identify Community Actions to address vulnerabilities (V) or protect strengths (S) of infrastructure, societal and environmental features Determine Top 3 (5) Priority Actions for each feature	Small Groups & CHC Table Top Facilitators
12:40 PM (30 - 40 min)	LUNCH	
1:20 PM *(45 min)*	Large Group Discussion *Small Group Spokesperson Reports Top Priority Actions (and reasoning)*	Large group discussion IK/ facilitators / small group spokes persons
14:05 *(60 mins)*	Large Group Activity & Discussion Determine Overall Priority Actions by incorp. urgency and timing (sticky dot activity)	IK, facilitators All
03:25 PM	Closing Remarks & Next Steps: How will Nahant use the outcomes from todays workshop/ recommendations?	IK, All
4:30 PM	Adjourn	

Town of Nahant - Aerial Photo



Town of Nahant - Land Use Map



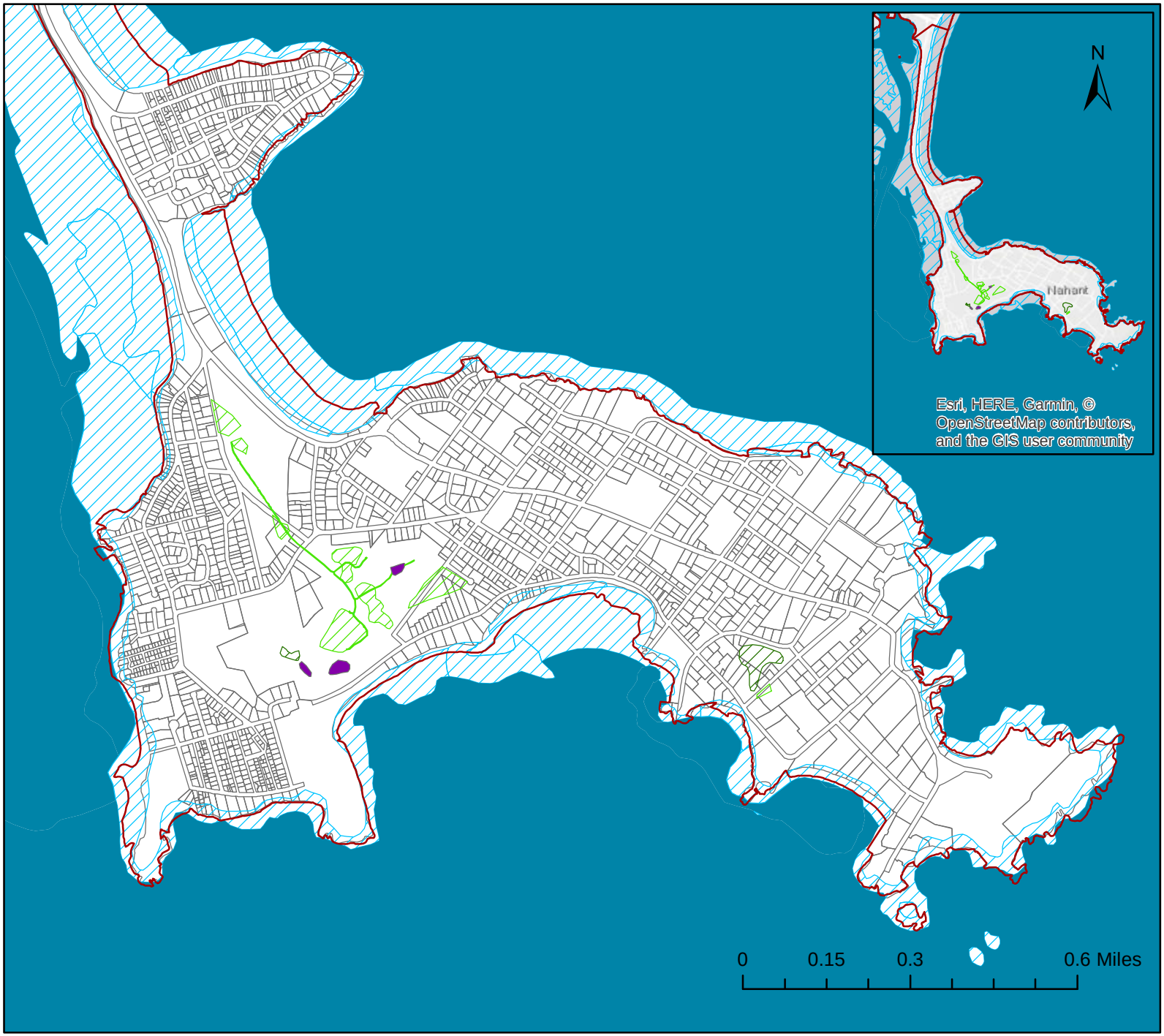
Legend

- Town boundary
- Parcels

Land use (2005)

- Forest
- Open Land
- Water
- Forested Wetland
- Non-Forested Wetland
- Salt Water Wetland
- Saltwater Sandy Beach
- Cemetery
- Golf Course
- Participation Recreation
- Spectator Recreation
- Water-Based Recreation
- Marina
- Multi-Family Residential
- High Density Residential
- Medium Density Residential
- Low Density Residential
- Very Low Density Residential
- Transitional
- Urban Public/Institutional
- Commercial

Town of Nahant - National Wetland Inventory Map



Legend

Town boundary

Parcels

National Wetland Inventory (2007, USFWS)

Estuarine and Marine Deepwater

Estuarine and Marine Wetland

Freshwater Emergent Wetland

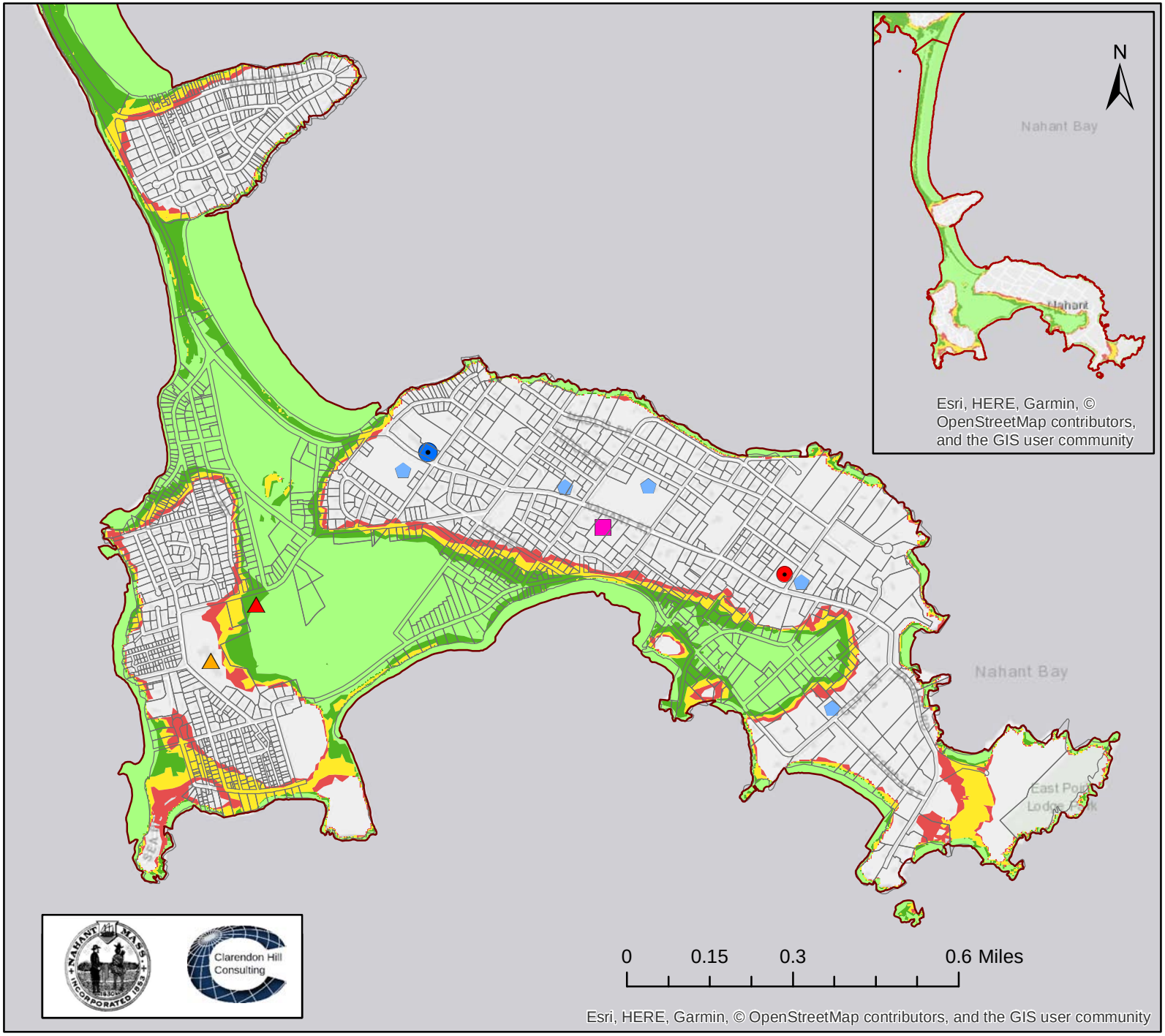
Freshwater Forested/ Shrub Wetland

Freshwater Pond

Riverine

Clarendon Hill Consulting

Town of Nahant - Hurricane Storm Surge Map



Legend

Parcels

Town boundary

Critical Facilities

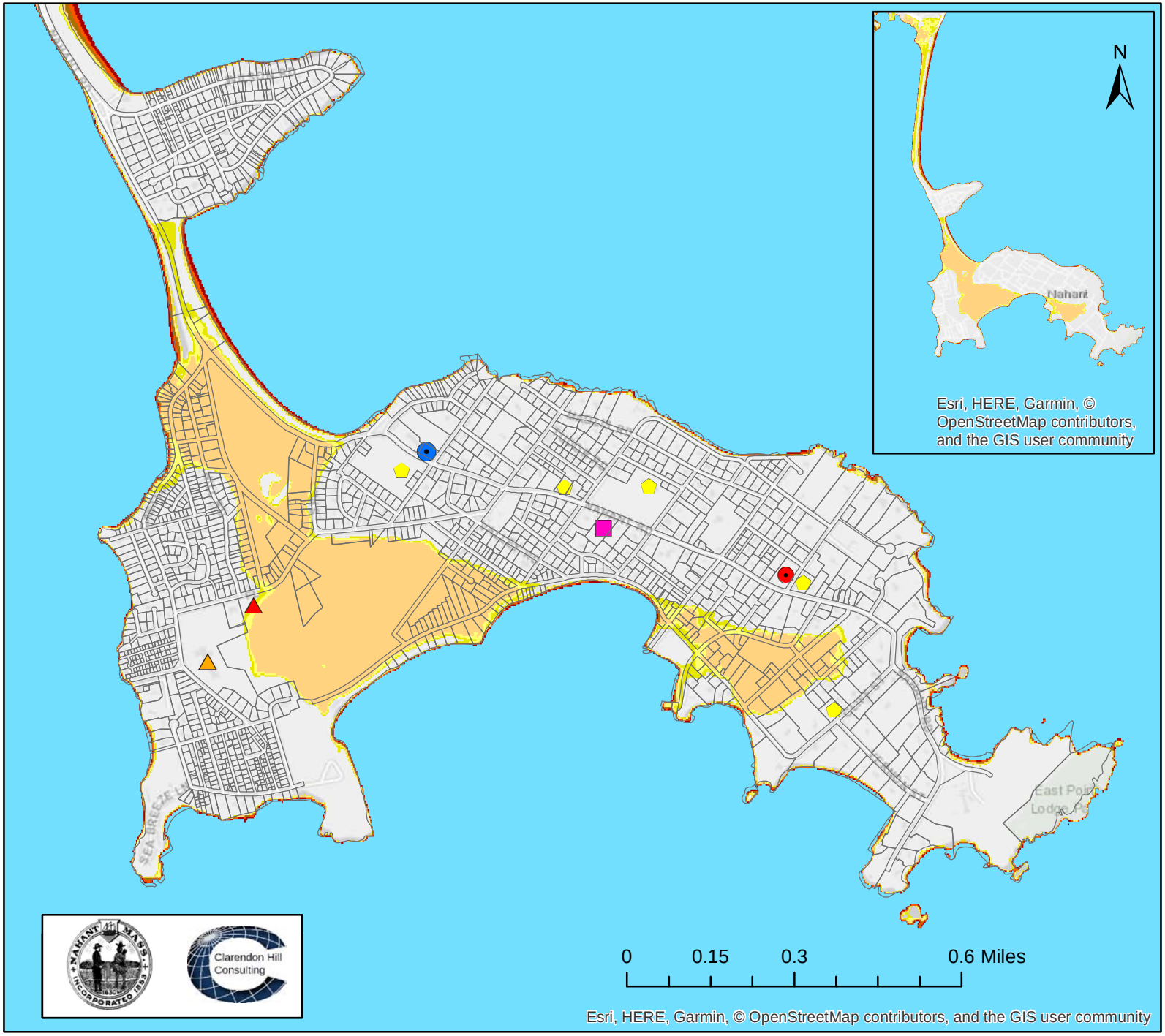
- Town Hall
- Fire Station
- Police Department
- Public School
- Long term care facility
- Shelter option (Church, Library, Country Club)

Worst-case Hurricane Storm Surge Categories

- Category 1
- Category 2
- Category 3
- Category 4

Source: NOAA

Town of Nahant - Projected Sea Level Rise



Legend

Parcels

Projected Sea Level Rise

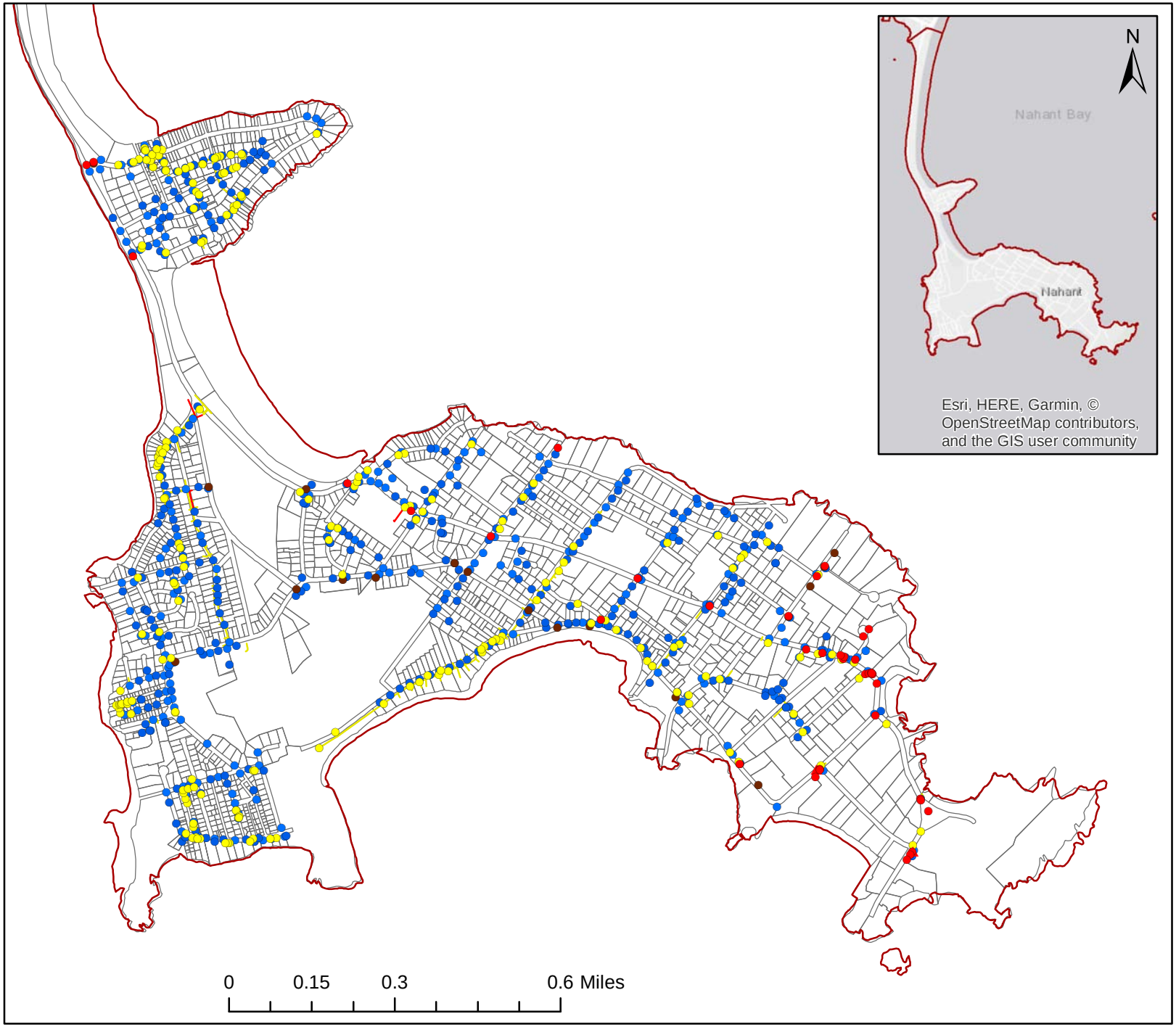
- Current Mean High Water
- 1ft Sea level rise
- 2 ft sea level rise
- 3 ft sea level rise
- 4 ft sea level rise
- 5 ft sea level rise
- 6 ft sea level rise

Source: NOAA

Critical Facilities

- Town Hall
- Fire Station
- Police Department
- Public School
- Long term care facility
- Shelter option (Church, Library, Country Club)

Town of Nahant - Gas & Electric Network



Legend

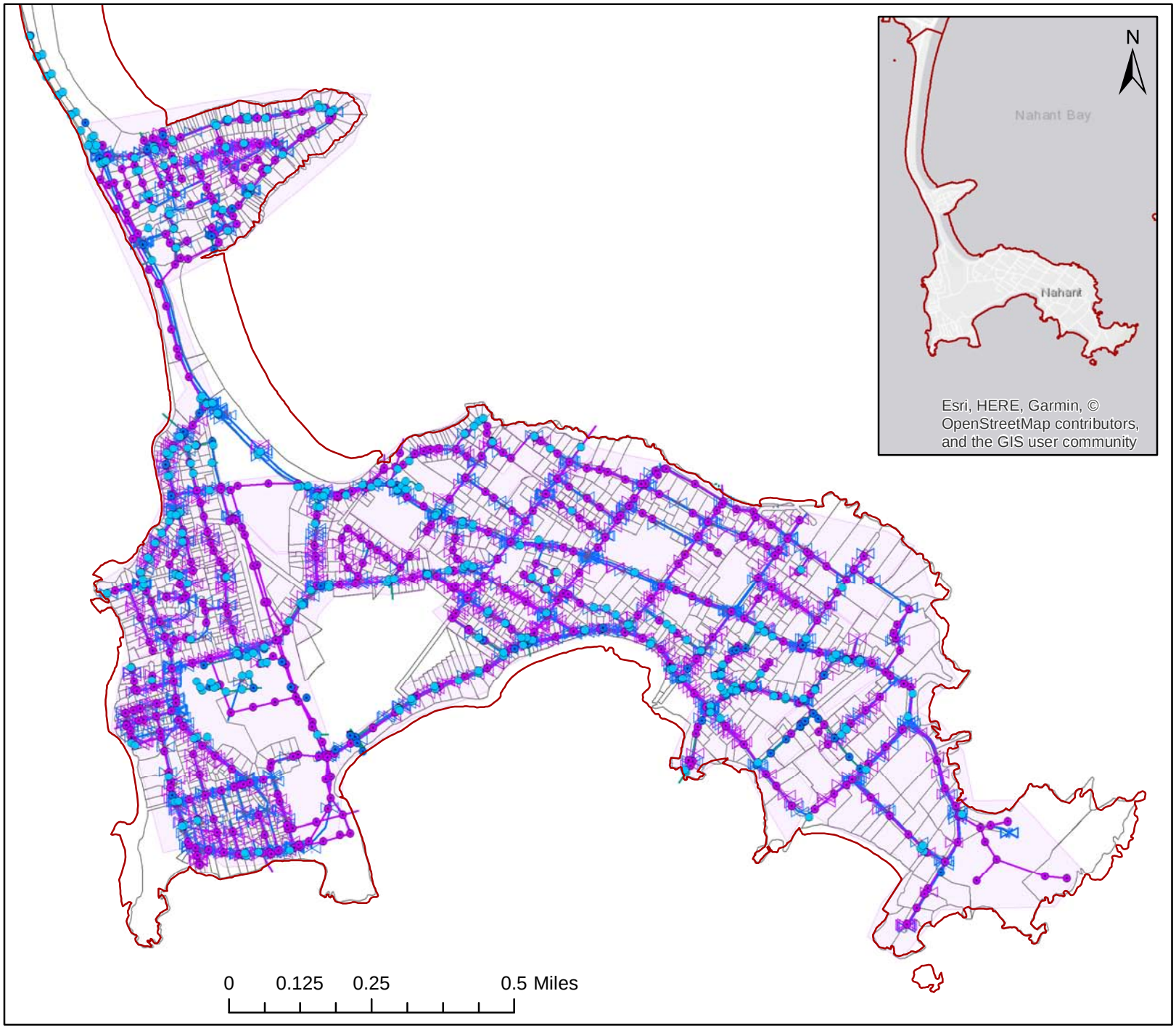
- Town boundary
- Parcels

Utility network

- Electric man hole
- Fire alarm box
- Gas valves
- Telephone man hole
- Utility pole
- Electric lines
- Gas lines

Clarendon Hill Consulting

Town of Nahant - Water Network



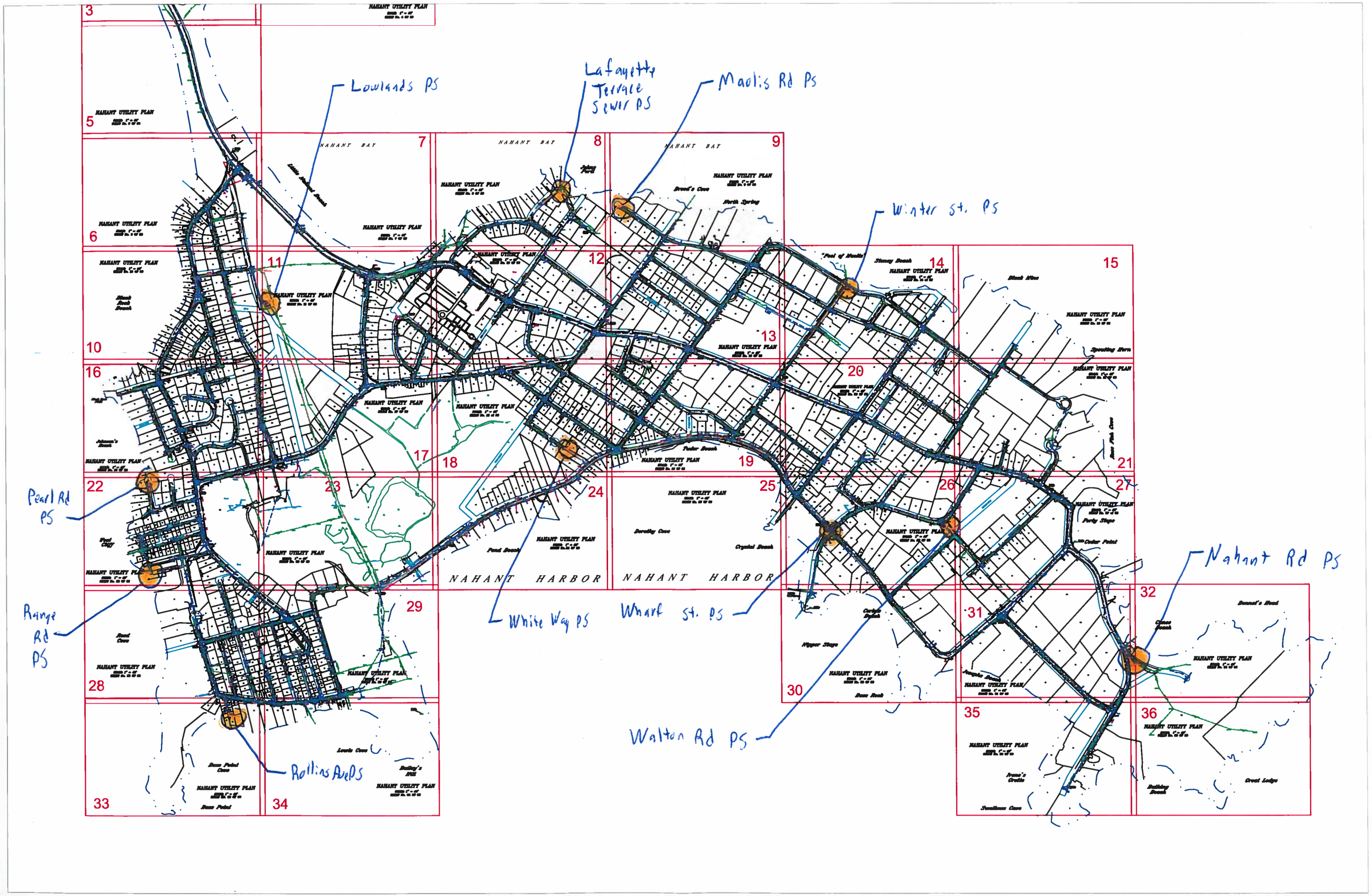
Legend

- Town boundary
- Parcels

Utility network

- Drain catch basins
- Drain man hole
- Sewer man hole
- Water hydrants
- Water valve
- WSO valve
- Drain line mains
- Drain structure
- Sewer lines
- Water lines
- Sewer tributary zones

Clarendon Hill Consulting


Lowlands PS
Lafayette Terrace Sewer PS
Maolis Rd PS
Winter St. PS
Pearl Rd PS
Range Rd PS
White Way PS
Wharf St. PS
Walton Rd PS
Nahant Rd PS
Rollins Ave PS
NAHANT BAY
NAHANT HARBOR
NAHANT UTILITY PLAN
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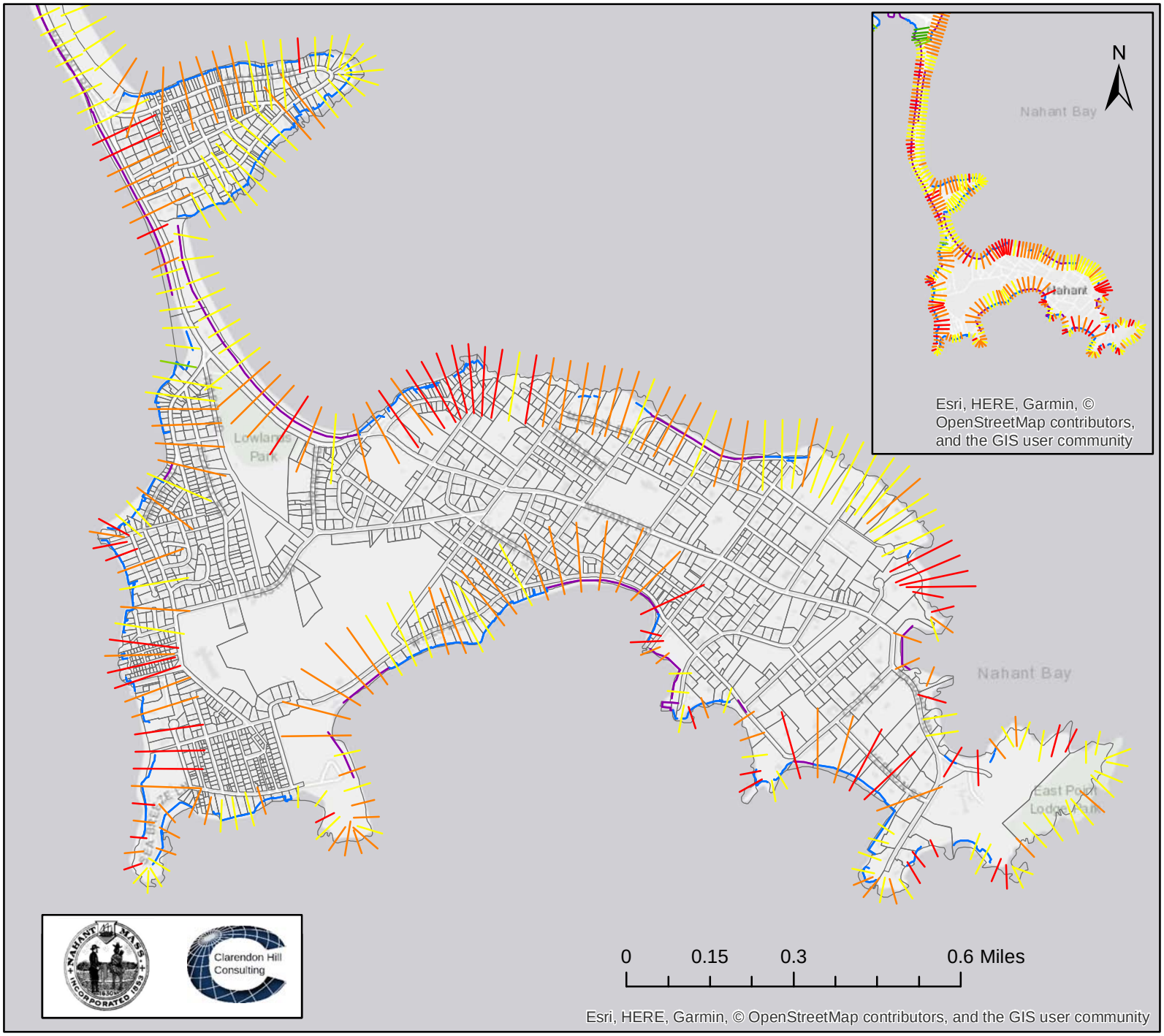
Town of Nahant - Long Term Shoreline Changes



Legend

Parcels

Private shoreline structure

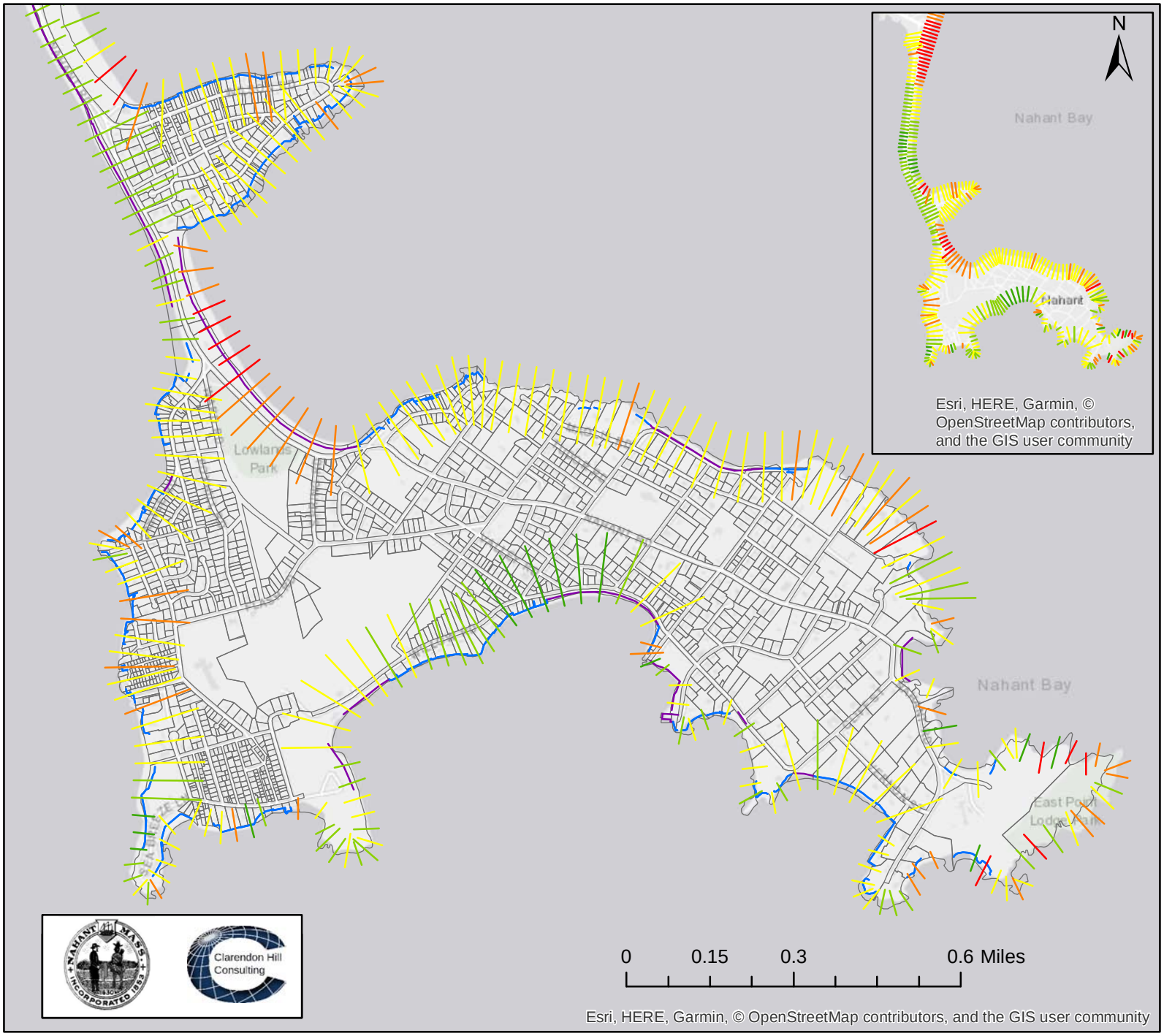
Public shoreline structure

Longterm Shoreline Change Rate of Erosion (feet/year)

- -2.46 - -0.449
- -0.45 - -0
- -0.01 - 1.0
- 1.01 - 2.50
- 2.51 - 5.150000

Source: USGS, MORIS, CZM

Town of Nahant - Short Term Shoreline Changes (Coastal Erosion)



Legend

Parcels

Private shoreline structure

Public shoreline structure

Shortterm Shoreline Change Rate of Erosion (feet/year)

- -13.39 - -3.41
- -3.40 - -1.0
- -1.01 - 0.49
- 0.50 - 1.725
- 1.726 - 4.27

Source: USGS, MORIS, CZM

Appendix B:
Master Risk Matrix

Community Resilience Building Risk Matrix

www.CommunityResilienceBuilding.org

All 4 Tables
H-M-L priority for action over the Short or Long term (and Ongoing)
V = Vulnerability S = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Features	Location	Ownership	V or S	1 Coastal Flooding (includes storm surge, high tides, etc.)	2 Inland Flooding (due to High Precipitation)	3 Extreme Weather/Storm events (includes winter/ ice storms, nor'easters, hurricanes and other high wind events)	4 Shoreline Change (includes sea level rise and coastal erosion)	Priority H - M - L	Time Short Long Ongoing
Infrastructural									
Sewer system (pump capacity and infiltration)	Lowlands, Town wide	Town	V	Develop a program or incentive plan to identify and correct infiltration issues associated with sewer system, incorporate into town bylaws in coordination with DEP requirements, and include property owner education with a financial incentive or rebate towards other ways to mitigate stormwater. Explore grant funding options for continued sewer system maintenance and upgrades. Continue to/enhance support for ongoing CCTV project, produce video tour of pumping station to share with residents (CCTV program identified as a strength). Develop long-term strategy based on Coughlin Engineering report				H	S/O
Storm drainage, including existing ditch system	Lowlands, Golf Course, Furbush, Town wide	Town	V	Conduct updated drainage study, focusing on three primary areas, then repair/improve and clean/maintain: a. Golf course: dredging of ditches, upgrade pumping and outfall pipe near Bear Pond, integrate principles of green infrastructure, sustainability, regeneration b. Lowlands: ditch upgrades near the dump, install stormwater pumping station, upgrade pipe network including an evaluation of condition and size c. Furbush area: improve storage capacity (ex. a pond), install pumping station				H	S
Main Sewer Pump Station (is below ground in a very low lying area)				Provide backup power for dewatering pumps in the pumphouse to keep the big pumps dry. Develop a plan to replace and enlarge the drainage pipes and systems in the golf course and Lowlands area. Think beyond the pumps to develop a long term plan to reduce flooding risk in the Lowlands area.				H	L/O
Seawalls are damaged and require more intense maintenance	Tudor Beach, Willow Rd., 40 Steps, Marjoram Beach, Marginal, Wharf	Town and Private	V	Plan for better and more consistent maintenance of Town seawalls. Apply for an Action Grant to raise the seawall at Tudor Beach. Establish living shorelines, e.g. at Castle Rd, Short Beach, Tudor Beach.				H	S/O
Beaches / Dunes, storm damage; sand accumulation / movement	Short Beach, Doggy Beach	Town/State/Nahant Conservation Committee/some private	V	Develop town policies for dune management, including how to properly restore, mowing plans, access plans for DPW (see also dune feature in environmental section). Develop living shorelines. Town Administrator to identify grants and establish and maintenance and improvement program.				H	S

Causeway / Lynn Rotary	Lynn Rotary, Causeway	State	V	Integrate flooding concerns with existing traffic study for Lynn rotary for redesign (long-term). Issue combined appeal with Lynn to petition congressional and state legislators to address flooding that affects rotary (esp. pathway north of Ward Bath House). Improve support for emergency communications associated with causeway access (see communication actions under societal section).	H/L	L
The causeway and the other co-located utility infrastructure in the causeway: Gas, water, electricity, communications	Causeway	Town, DCR, MWRA, Utilities	V	Strengthen the Solarize program and add energy storage to it to encourage energy independence. Advocate for DCR and MWRA to develop a replacement plan for the pipes. Work with National Grid to upgrade the resilience of the gas pipeline and infrastructure.	M	O/L
Roadways, access	Bass Pt., Castle Rd, Summer St, Fox Hill	Town	V	Continue to pursue federal program for military surplus vehicles to supply medical supplies, food, staffing during emergencies with access limitations (on-going, see Little Nahant feature in societal section). Consider using FEMA mitigation money to raise roadways (long-term).	M	O/L
Overhead electrical lines blow down in storms	Town wide	National Grid	V	Work with National Grid to improve maintenance program and develop a long term plan to bury electrical lines.	M	O
Compost Area	Dump Rd	Town	V	Regrade and remove existing material. Sell - charge for use.	M-H	S
Distributed Sewage pump stations are vulnerable	Town wide	Town	V	Perform a vulnerability analysis of distributed pump stations to develop a long term plan.	M/L	O
Electric and natural gas utilities	Lowlands, Vet Park, Town wide	National Grid	V	Floodproof - move generator from ground level. Protect sewer well. Raise buildings. Gas - replace current pipes to non-corrosive. Continue to pursue "solarize" program and include educational efforts to educate residents on solar rebates (regional program).	M/L	O
Town Roadways vulnerable to flooding (esp. Fox Hill, Spring, Nahant, Castle, Willow, and Bass Point Roads)	Town wide	Town	V	Conduct a study of town roads to identify roads vulnerable to flooding. Regrade vulnerable roads to encourage water runoff.	L	M
Bear Pond	Golf course	DPW	V	Review existing engineering reports and pursue action items, esp. to address overburdened / diminshed capacity due to silting.		
Generators	Various Locations	Town	S/V			
Nursing Home	Nahant Rd	Private	V			
Bunkers / Towers	Various Locations	Bunkers - Town, Towers - Private	S			

Fire Station / Police	Spring Rd / Nahant Rd	Town	S			
Societal						
Public Education/Communication: Lack of awareness / information and communication about hazards and risks *(need community involvement for emergencies)*	Town wide	Town and residents	V	Develop an education plan, perhaps with the Library, to bring climate risk education to town residents and businesses. Engage the MVP Committee to speak to neighbors and friends about the work of this group. Set up small scale community engagement programs such as "adopt a storm drain" to encourage residents to actively engage in reducing vulnerability. Develop comprehensive communications plan, including systems for emergency communications beyond Town Hall (integration of various groups), develop new resident "welcome packet" with critical town information, and post-card process for getting "on the list" for town communications. Check recent emergency management study re: shelter needs. Address Medically vulnerable population.	H/L	S
Emergency services; Emergency operations center (EOC), Community Emergency Response Team (CERT)	Public Safety			Request Town Administrator / Board of Selectmen to review staffing and encourage community involvement. Explore opportunities for additional staffing or volunteers. Engage MVP committee to organize CERT trainings at Town Hall. Formalize a plan, perhaps housed in the Emergency Management Committee, to build stronger communication across the many town committees.	H	
Limited staffing / capacity issue (safety and personnel)	All	Fire, Police, DPW		Town Admin and Selectmen to evaluate staffing, make plans, and engage community /volunteers to work on communication / emergency response plan. Identify specific issues to obtain input from residents to improve emergency response and reduce vulnerabilities.	H	O
Lack of emergency shelters	Johnson School	Nahant Emergency Management Organization (NEMO)/Town	V	Explore opportunities for additional shelter capacity at a new location (ex. Town Hall, STA Church); NEMO to provide recommendations to increase shelter capacity. Create resident action group for animal safety during emergencies, include provision for bringing pets to shelters	M	O
Lack of Medical Facilities	Townwide	N/A	V	Identify medical issues for vulnerable residents.		
Food access	Town-wide	NEMO	V	NEMO to arrange agreements for provisions from local restaurants.		
Little Nahant, access issues	Little Nahant	Town, Residents	V	Continue to pursue federal program for military surplus vehicles to supply medical supplies, food, staffing during emergencies with access limitations (on-going, see roadways access feature in infrastructure section).	M	O/S

School age children can get stranded apart from parents in and emergency	Town wide	Schools	V	Coordinate with Swampscott schools to work with parents and kids from Nahant to shelter in case of an emergency (Note: this is already in place). Work with Lynn and Swampscott to arrange for "across the causeway" shelter in case of an emergency.	M	S
Only one evacuation route	Town wide	Town, Public Safety	V	Strive to keep the evacuation route open as best as possible.	M	O
Small-town community - Isolated	Town wide	Town	S/V	Recognition and communication of chain of command and action for Town residents.	L	L
Special needs population (including school kids and senior residents); Nursing Home	Town wide; Nahant Rd (high ground)	Town, and residents	V	Actions are already in place through the Police Department and the Council on Aging. Possibly improve communication. Continue to use Reverse 911. Continue Wellness check-ins with elderly.	L	S/O
Costs of property damage from storms and flooding can be a serious financial burden for residents and the town	Town and coastal residents	Town, residents, FEMA	V	Put a system in place to gather and aggregate storm damage assessments and costs for both public and private property, to help with meeting town's obligations with reporting and to keep track of what areas are most vulnerable.	L	O/M
Active Community & Strong Community Support - Neighbors Helping Neighbors	Townwide	N/A	S			
Environmental						
Dune (management/nourishment); sand movement	Short Beach, Doggy Beach	Town	S/V	Identify grant money to hire a consultant team to develop an overall coastal defense plan that includes a dune management plan that looks ahead many years. As a separate planning activity, find grant funding to develop a living shoreline plan. Develop town policies for dune management, including dune planting program, bench relocation, bird protection, and replacing paved walkways with sand or boardwalks (see also dune feature in infrastructural section). Improve Short Beach / Spring Rd + Nahant Rd, Castle Rd. entrances; improve ramp layout and make permeable. Also look to use wooden slats, fabric synthetic material as alternatives.	H	M/S
Natural drainage system in the Lowlands area	Lowlands	Town	S/V	Increase maintenance efforts on the existing drainage system in the Lowlands. Restore the functioning of the Castle Road drainage storm drain to increase drainage options for the Lowlands.	H	M
Implement natural green infrastructure solutions for storing / removing access water	Lowlands / Wetlands	Town / Mass Audubon	S/V	Create natural storage areas for water. Install more rain gardens / rain barrels and large storage / retention solutions for water capture and removal \. Incorporate solutions in current management plans (e.g. rain gardens, bioswales).	H	O/L
Enhance natural ecosystems like living shorelines and eelgrass habitat	The beaches	Town and state	S/V	Identify grant funding to look at the whole coastline of the town to find opportunities to enhance natural systems in order reduce the vulnerability to storm damage. Explore opportunities to possibly recycle Christmas trees into a reef system to protect seagrass and dunes (review protection measures and best practice examples).	M	S

Reduce creation of flood pathways (e.g. at beach parking locations)	Town-wide/Lowlands			Replace impervious surfaces with permeable solutions, e.g. at Short Beach parking lot or at life saving station to prevent the creation of flood pathways.		
Trees & native planting enrichment	Town wide	Town	V	Explore options for volunteer tree planting to increase on-site water infiltration. Explore adoption of Tree City USA program, or similar, for Nahant. Develop and explore funding opportunities for town tree policy including maintenance, removal of dangerous trees, and planting programs.	H/M	**S**
Water quality at beaches is bad after big rains	Regional	Town, Neighboring towns, state	V	Work with Lynn and other coastal communities to support a long term plan to reduce Combined Sewer Overflows in order to maintain regional beach water quality.	L	L
Air quality	Town-wide	Individuals, DPW	V	Identify resources such as qualified contractors and best practices to address mold mitigation problems due to flooding.		
Hazard Mitigation Plan		Town Admin, Board of Selectmen	V	Update plan before 2020.		S
Sanitation	Lowlands			When flooded, can't flush toilets in lowlands area. Ties into sewer system upgrade/improvements.		
Stormwater affecting natural habitats	Nahant Audubon Thicket, Heritage Trail, natural habitats	?	V	Identify areas affected by stagnant and salt water from flooding which impact natural habitat. Review natural green infrastructure solutions for storing / removing excess water and look into solutions such as emergency pumps to remove water in selected areas.		
Invasive species are replacing natural trees	Town wide	Town	V	Develop education program around invasive species management and regenerative practices.	M	S
Furbush thicket	Furbush	Mass Audobon	V	Collaborate with Mass Audobon to identify funding opportunities for thicket restoration in coordination with existing master plan (see storm drainage feature in infrastructural section). Tap into existing interest from residents and explore volunteer opportunities for eco-restoration.	H	S
Natural Springs	Golf Course	Town	S			
Open Spaces / Recreation Areas	Mostly in Lowlands	Mostly Town; some Private	V/S		M	O
Warming and ocean acidification on shellfish	Town wide	Town	V	No specific actions identified other than a focus on greenhouse gas mitigation and general education around climate change impacts.	L	L

NEMO: Nahant Emergency Management Organization

Appendix C:
MVP Workshop Sign In Sheet

TOWN OF NAHANT MVP CRB WORKSHOP

Project:	Municipal Vulnerability Preparedness Program	**Meeting Date:**	02/09/2019
Facilitator:	MVP Committee / Clarendon Hill Consulting LLC	**Place/Room:**	Nahant Town Hall

Name	Title/Function	E-Mail
Christine Johnson-Liscio	MVP Committee	christineliscio@comcast.net
Keith Olbash	DPW	KOlbash@nahant.org
Michael Feinberg	Fire Dept	mfeinberg@nahantfire.org
Abby Roberts	SPM	awsuzann@yahoo.com
LINDA PETERSON	COA DIRECTOR	LPETERSON@Nahant.org
Laurie Giardella		lgiardella@comcast.net
Deb Murphy	PH Nurse	dmfmmurphy@comcast.net
Steven Seyphers	Assistant Professor NU Marine Science Ctr.	s.seyphers@northeastern.edu
Robert Tibbo	Harbormaster	Harbormaster@Nahant.org
Peg Curran	Notetaker	pcurran612@gmail.com
Katie Lotterhos	MVP	klotterhos@gmail.com
Brendan Barnett-Olmstead	MVP	mau_zo_01908@yahoo.com
Drena Brandi	MVP	d_brandi@verizon.net
Linda Pivacek	MVP	lpivacek@comcast.net
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Vi Patch	S.W.I.M.	vipatch@gmail.com
Ellen M Steeves	Conservation Commission	esteeves@partners.org
DENNIS A. BALL	EMERGENCY MGT. DIR	DBALL@NAHANTFIRE.ORG

Name	Title/Function	E-Mail
Kristin Kent	Conservation Chair	conservation@nahant.org
Maria Divoll	MVP comm.	mkdivoll@yahoo.com
Mike Halley	AST Emergency Manager	MHALLEY@NAHANT.org
Glenn Goldberg	Volunteer	RUSTYBLACKBIRD
Mickey Long	mickeylong@cuttlok.com	eyeedu.com
Ken Andrews	PRINCIPAL - SCHOOL	KANDREWS@JOHNSONSCHOOL.ORG
TONY BARLETTA	TOWN ADMINISTRATIVE	ABARLETTA@NAHANT.ORG
Jon Grabowski	Professor	j.grabowski@neit.edu

Appendix D:
Public Comments on
Draft MVP Report

Draft MVP Report Public Comments

Public Comment #1:

To whom it may concern,

I read with great interest your draft of the summary of findings for the Town of Nahant's Community Resilience Building Workshop. The public was invited to comment on this draft; see attached for my comments.

Please feel free to contact me if you wish.

Regards,
Suzanne Hamill

"When I click on nahant.org, I get something titled "Welcome to the Municipal Vulnerability Preparedness Webpage"

It includes the Municipal Vulnerability Preparedness Draft. The title should read, "Municipal Vulnerability..." rather than "Municipal Vulnerabiliy..."

Following instructions on the page, I downloaded the March 21, 2019 Draft Plan and read it all. Here are my comments starting with page one:

The "Overview" section, line one, should read, "The Town of Nahant, incorporated in 1803," (Add a comma after "1803")
The fifth line should read, "$71,776." rather than, "$71,776 dollars."
In the last paragraph of that section, reference is made to "EEA." What is EEA?

On page two, in the paragraph beginning, "The MVP process has helped...", line five should read, "Public Works" rather than "Public Work"

On page three, the paragraph titled, "Community Resilience Building Workshop", line one should read, "February 9, 2019," rather than "February, 9 2019"
The last sentence of that paragraph should begin with, "Twenty-seven" rather than "27"

Under the photo section on page 3, the end of the caption reads, "...report out". What does that mean?

In the "Summary of Findings" paragraph, line seven, the text should have a semicolon after, "were shared" and a comma after, "for example"

On page four, line five should read, "three consecutive..." rather than, "3 consecutive..."

The map on page four could be titled, "...Critical Facilities and Wetland Areas" and should have the same designation in the caption below the map. Also, should the DPW be included as a critical facility?

The last paragraph on that page should have a colon after “four categories” rather than a comma.

On page five, line four, change, “1 additional degree C, the air can hold 7%...” to something like, “one degree C, the air can hold seven percent...”

In the text below the photo caption, change, ...“and high wind events as another”... to, ...”and high wind events, as another”...

On page six, line five of the last paragraph should read something like, “...an estimated $182 million”

On page seven, Table 2, in the section listing “Blizzards and Snowstorms”, why aren’t these in chronological order? (The March Blizzard of 2013 should be listed after the January Blizzard of 2005.)

In that same table, last line, “Nor’easter” should be written instead of, “Nor’ester.”

On page eight, line one of the paragraph should read, “23” rather than, “twenty-three” and line three of that paragraph should read, “Town’s” rather than, “Towns”

The caption under the photos should read, “Nor’easter” rather than, “Nor’Easter”

I think you meant that “preliminary cost estimate” was “$3,745,000” rather than “$3,745.” on line four of the paragraph.

In Table 3 on page eight, capitalization of words is inconsistent in the description of “Emergency Protective Measures”

Page nine, continuation of Table 3, “Revetment Damage” should have both words capitalized for consistency, as should “Infrastructure Damage” Also, “Parrott” Road is the correct spelling, not “Parrot”

Under “Environmental” in the Table, “Short Beach” should have both words capitalized

In the “Property damage” section on that page, the dollar amount should read, “$7.015 million” or “7.015 million dollars” (Don’t use both the dollar sign and the word, “dollars”)

In the “Repetitive Loss Structures” paragraph, why does “RLP” stand for “Repetitive Loss Structures”?

In line four of that paragraph, change, “thirty” to “30” and in line five, change, “2-4” to “two to four”

Page 10, top line of the text says there are “four hazards” based on stakeholder interviews, however five hazards are listed. The next sentence should read, “...the following five...”

The “Storms” hazard line could read something like, “Storms (winter storms [ice, snow, high wind events])

In the “*Extreme temperatures” section, line two, change, “Climate Change” to “climate change”

In the last paragraph of page 10, line five has too much space between “extreme events” and “sufficient” and the entire sentence is unwieldy. Perhaps it could end after, “low-lying areas” and another sentence could begin with, “Drainage...”

Page 11, line 13, do you mean to say, “received” rather than, “retrieved”? On the same line, change, “storm” to, “storms”

Last line of page 11, change, “public work” to “public works”

Page 12, line four of first paragraph, change, “Extreme” to, “extreme”

Under the “Current Strengths” paragraph, line nine, change, “public work” to “public works”

Page 13, line three, change, “one of nicest” to, “one of the nicest...”

Page 14, first paragraph, line three, change, “cut-off” to, “cut off” and in the same paragraph, line nine, change, “3-4” to, “three to four”. On the last line, change, “4 feet” to, “four feet”

Page 15, line 10, change, “participants’ accounts” and in the “Lowlands Area” section on that page, line four, change, “Lynn harbor” to, “Lynn Harbor” ; on line six of the same paragraph, change, “Kelly” to “Kelley”
Use same spelling of “Kelley” in photo caption

Page 16, “Areas probe to flooding” in the “Lowlands” section, change, “softball field/lowland’s” to, “Lowlands” and on the next line change, “Harbor” to, “Harbor View”. In the same section change, “Basspoint” to, “Bass Point”

On the same page, change, “Specific areas of concern -Current concerns and Challenges Presented by Hazards” to, “Specific Areas of Concern - Current Concerns and Challenges Presented by Hazards”

In that paragraph, line two, change the comma after, “flooding” to a colon.

In the “Infrastructural Concerns” paragraph, line one, change, “Storm drainage system” to, “Storm drainage systems” and, “natural ditch system” to, “natural ditch systems”

Page 17, under “Utility Infrastructure...” perhaps “electric and gas substations...” should read, “are prone to flooding” and under, “Vulnerable Roadways”, change “Big Nahant is at risk” to, “Big Nahant”...

Page 18, under “Environmental concerns”, in the section about Furbush Thicket, there’s an open parenthesis before, “owned by Mass Audubon”. Perhaps it could be removed.

Page 21, line 19, change, “This may include...” to, “this may include...”

Page 38, “CRB Workshop Participants”, the top of the box, at right, should read, “Attendance” rather than, “Attendendence”

Also check the spelling of names and that their titles are correct.
For example, “Tony Barletto” should say, “Tony Barletta” (I’m not familiar with some of these names, but I can see several are not spelled correctly. This is important!)

In the Appendix section, “Community Resilience Building Risk Matrix”, “Top Priority Hazards” (at top, center, change, “hight tides” to, “high tides”

Under that Appendix’s chart, “Seawalls damaged” area, “Location” box, change , “Willow St.” to “Willow Rd.” and in the large box at right, change, “cosistent” maintenance to, “consistent”...

Under that Appendix’s “Roadways, access” section, change, “Castle St.” to, “Castle Rd.”

In the same Appendix, under “Bear Pond” info, big box at right, change, “ ..../diminshed” to, “...overburdened/diminished”

Same Appendix, “Societal” section, big box at right of “Public Education”, change, “Adress...” to, “Address...”
Under the “Emergency services” section, big box at right, last line, change, “Formaize”... to, “Formalize”...
Under the “Limited staffing” section, big box on right, change, “input from residens”... to, “input from residents”...
Under the “Little Nahant” section, big box on right, change, ...”infrastructre” to, “infrastructure”
Under the “School age children” box, change, “and” emergency... to, “an”...
Under the “Only one evacuation route” section, change, “Publis” Safety to, “Public” Safety

In the “Environmental” part of that Appendix, “Implement natural green...” part, big box on right, change, “detention” solutions to, “retention” solutions
In the “Enhance natural ecosystems” section, big box on right, second line, change, “in order reduce”... to, “in order to reduce”... and in the third line, change, “christmas” to, “Christmas”

In the “Reduce creation of flood pathways” section, change, “Highlands” to “Lowlands”, which I think is what you meant to say, and in the big box at right, change, “orat” to, “or at”

In the “Trees & native planting” section, big box at right, change, “Explore adoption of Tree City USA program for Nahant or similar” to, “Explore adoption of Tree City USA program, or similar, for Nahant”

In the “Air quality” section, big box at right, sentence is unfinished. Complete it.

In the “Stormwater” section, big box, do you mean to say, “...removing excess water”?

In the “Warming and ocean acidification” section, big box, sentence is unfinished. Complete it. This section also repeats, four sections below. So, omit one of these, most likely the one with an incomplete sentence.

In the “Furbush” section, small box to right, change, “Mass Audubon” to “Mass Audubon” and also in big box on right

Public Comment #2:

MVP Draft Plan - Comments, questions or requests

So, there has been a lot of back and forth about what in this town is important. The residents need to step back and look at who and what is truly vulnerable. As you recall , the storm of 2018 left this town divided in more ways than one. Lowlands area sat in floodwaters for almost 7 days and the Tudor beach area was damaged by storm surges. These are the only two areas we should be concerned about, the lowland neighborhood houses the most vital infrastructure for the town. The National grid substation is there as well as our sewage pump house, that pumps our sewage to Lynn. If either of those gets compromised, the WHOLE town is affected by their failure due to extreme flooding. We came very close to losing both last year as a result of that storm and we do not have the ability to eradicate the drainage situation due to the fact that a discharge pipe on Castle Rd. Was cut, capped, and encased without the towns kmowledge. Fortunately, or unfortunately, the 2018 storm was the perfect storm to expose such a weakness in our infrastructure. That outflow pipe was designed to allow water to recede from the neighborhoods of lowlands as well as the drainage ditches on Ward Rd. Since this storm dumped water in the neighborhood tide after tide for 3 days, the water stayed and increased in volume, unable to retreat to the ocean at low tide, as was designed.

This neighborhood went to town Hal, town meetings, special meetings, neighborhood meetings, We made our case for the town to take action, The town was behind us and appropriated money for a dedicated pump in lowlands area. However, a year later, and some extensive drain inspection, and clearing out, still no pump and still, not a solution in site. The town had to fight to get on the property to inspect the outflow pipe on Castle Rd. An unfathomable thought by me because there is clearly an easement on the property. Once they finally get on said property, they determine that the wall is not permitted properly, the pipe was broken, or cut off, and cannot be repaired at this time due to the huge cost to repair. So, it goes on the back burner once again. This is not acceptable! Nor, is this the way the Town should be handling the situation, or the money the town allocated for the repair or to have a pump in place, for future events! I'm so tired of seeing that after every meeting , Lowlands gets moved back to the bottom of the priority list! Lowlands iIS the priority, for all the townspeople! Time for action, not meetings! The surveys were done, inspections were done, recommendations were made and not followed!

Let's do what's right for this town and the lowlands are, Let's get a dedicated pump as was voted on by the Town at town meeting, and let's fix the outflow pipe on Castle Rd., and hold whoever was responsible for the action that damaged said pipe accountable. Enough is enough! The lowlands residents have been lobbying for a dedicated pump for over a year and nothing has happened. Please make this your priority,

Your Name | Personal Information Is Optional	Michael Szczawinski
Your Email Address | Required For A Response	spike464@yahoo.com

Public Comment #3:

MVP Draft Plan - Comments, questions or requests

I hope that the Final MVP Plan reflects that the Lowlands flooding and Drainage issues are a number one priority for the Town of Nahant, due to the location of, gas, sewer, and electric substation infrastructure and the impact that these issues have on public safety.

In reviewing the MVP Survey results, numerous MVP committee meetings, and 1-day workshop information, grant money to improve the flooding and drainage issues in the Lowlands has emerged as a TOP priority for the Town of Nahant.

The Town of Nahant approved Article 32 at April 2018 Town Meeting. This article approved funds to evaluate and repair the Castle Road Storm drain and other drains in the Lowlands. To date the Storm Drain has been evaluated but not repaired/replaced as a way to mitigate flooding and improve drainage. In addition, Article 32 approved a, "permanent/temporary" pump in the Lowlands. To date, this has not be procured. Finally, improving other drainage issues in the Lowlands and Bear Pond, was also included in Article 32, however to date there has been no improvement.

The longstanding drainage and flooding issues in the Lowlands need to be addressed as a way to improve our preparedness as a community. Our research and history have shown this is our number one vulnerability. Please revise the MVP draft to reflect the following:

Under Infrastructure:
Repair/replace the Storm Drain on Castle Road, in order to improve Drainage and reduce flooding in the lowlands which impact our infrastructure, safety, and community.

Installation of a pumping station in the Lowlands, to improve drainage and reduce flooding risk to our infrastructure and community.

Thank you.

Your Name | Personal Information Is Optional	Christine Johnson-Liscio
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Public Comment #4:

VP Draft Plan – Comments, questions or requests	As you consider additional shelter possibilities, I hope you will consider the library. Last March, 18 people walked to the library to use it during the storm for computer access and family entertainment. And we received a call from someone looking to be rescued from her flooded home.
Your Name | Personal Information Is Optional	Sharon Hawkes
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