



City of Revere, Massachusetts

Municipal Vulnerability Preparedness Summary of Findings Report

June 2019

City of Revere, Massachusetts

Prepared for:

City of Revere, Massachusetts

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1. Overview

Introduction

The Commonwealth of Massachusetts' Municipal Vulnerability Preparedness (MVP) Program is designed to increase resiliency to natural hazards that are exacerbated by climate change at the municipal level. The MVP Program provides cities and towns with monetary and technical support to begin the process of planning for climate change resiliency and implementing priority projects. It is designed to help communities:

- Define extreme weather and natural and climate related hazards
- Understand how their community may be impacted by climate change using state-specific data
- Identify existing and future vulnerabilities and strengths
- Identify opportunities to take action to reduce risk and build resilience
- Implement key actions identified through the planning process

The City of Revere received a MVP planning grant from the Executive Office of Energy and Environmental Affairs to participate in the MVP Program to increase its resiliency planning efforts. This program builds off and enhances other planning processes in Revere, including the City's 2014 Hazard Mitigation Plan and actions identified in the Environmental Bond Bill (Bill H. 4835, signed into law in August 2018) for Revere.

Community Resilience Building Workshop Framework

The MVP Program utilizes The Nature Conservancy's Community Resilience Building (CRB) workshop framework. The CRB framework was created in response to the need for municipalities, among other entities, to build community resilience, adapt to extreme weather and hazards, and proactively plan and act to reduce risk. This framework fosters collaboration with and among community stakeholders through a facilitated approach that aims to advance the education, planning, and ultimately the implementation of priority actions.

The CRB framework was implemented as part of the MVP Program in Revere. Workshops were held on January 10, 2019 and January 31, 2019.

Objectives

The central objectives of the MVP workshops were to:

- Define top local natural and climate-related hazards of concern
- Identify existing and future strengths and vulnerabilities
- Develop prioritized actions for the community
- Identify immediate opportunities to collaboratively advance actions to increase resilience

Core Project Team

The City's Core Project Team for the MVP Planning Grant included the following individuals:

- Frank Stringi, City Planner, Department of Community Development (MVP Project Manager)
- Elle Baker, Project Planner, Department of Community Development
- Paul Argenzio, Superintendent, Department of Public Works
- Joe Maglione, Revere Water Facilities Director

- Donald Ciaramella, Project Manager, Department of Engineering
- Nick Rystrom, City Engineer, Department of Engineering

The Core Project Team, with assistance from Aaron Weieneth (State certified MVP provider), Amanda Shanahan, and Liz Durfee of AECOM, planned and implemented the workshops.

AECOM was responsible for preparing workshop materials, leading presentations, facilitating large group discussions, and overseeing the small group discussions. The Core Project Team members and additional City staff were responsible for facilitating and note taking during the small group discussion.

Workshop Participants

Sixty-nine stakeholders representing departments and decisions-makers from the City of Revere, neighborhoods, business associations, and regional and state entities were invited to the workshops. A total of 38 stakeholders attended Workshop 1 on January 10, 2019 (Figure 1). Twenty-eight stakeholders attended Workshop 2 on January 31, 2019. Both workshops were held at the Point of Pines Yacht Club, located at 28 Rice Avenue in Revere. A complete list of invitees and attendees is included in Appendix A. The stakeholders who attended represented several departments of the City of Revere; Revere neighborhood associations, including individuals from Beachmont, West Revere, and Riverside Association; Point of Pines Yacht Club; Point of Pines Beach Association; Massachusetts Department of Conservation and Recreation; and other entities.



Figure 1: Participants of Workshop 1 at the Point of Pines Yacht Club

Process

Workshop 1

Workshop 1 began with welcome and introductions led by Elle Baker, City of Revere, and a presentation by Aaron Weieneth, AECOM. The presentation included an overview of the MVP program and an introduction to climate change projections and natural hazards. After the presentation, AECOM led a group discussion to identify the top hazards in Revere and recorded these hazards on large flip charts.

The remainder of the workshop was dedicated to small group activities and a report out to the larger group. AECOM provided instructions for the breakout group activity. Participants were organized in five groups representing five

geographic areas of the city that had been predetermined by the Core Project Team (Figure 2). These geographic areas included:

- Beachmont
- Point of Pines / Riverside
- Oak Island / Revere Beach
- West / North Revere
- Sales Creek

During Workshop 1, participants identified the need to expand the Sales Creek area to include Youngs Hill. The geographic area approach was used to help facilitate focused discussions on areas of the City that have historically been affected by natural hazards are particularly vulnerable to the effects of climate change. The breakout groups were also instructed to consider portions of the City located beyond their assigned area.

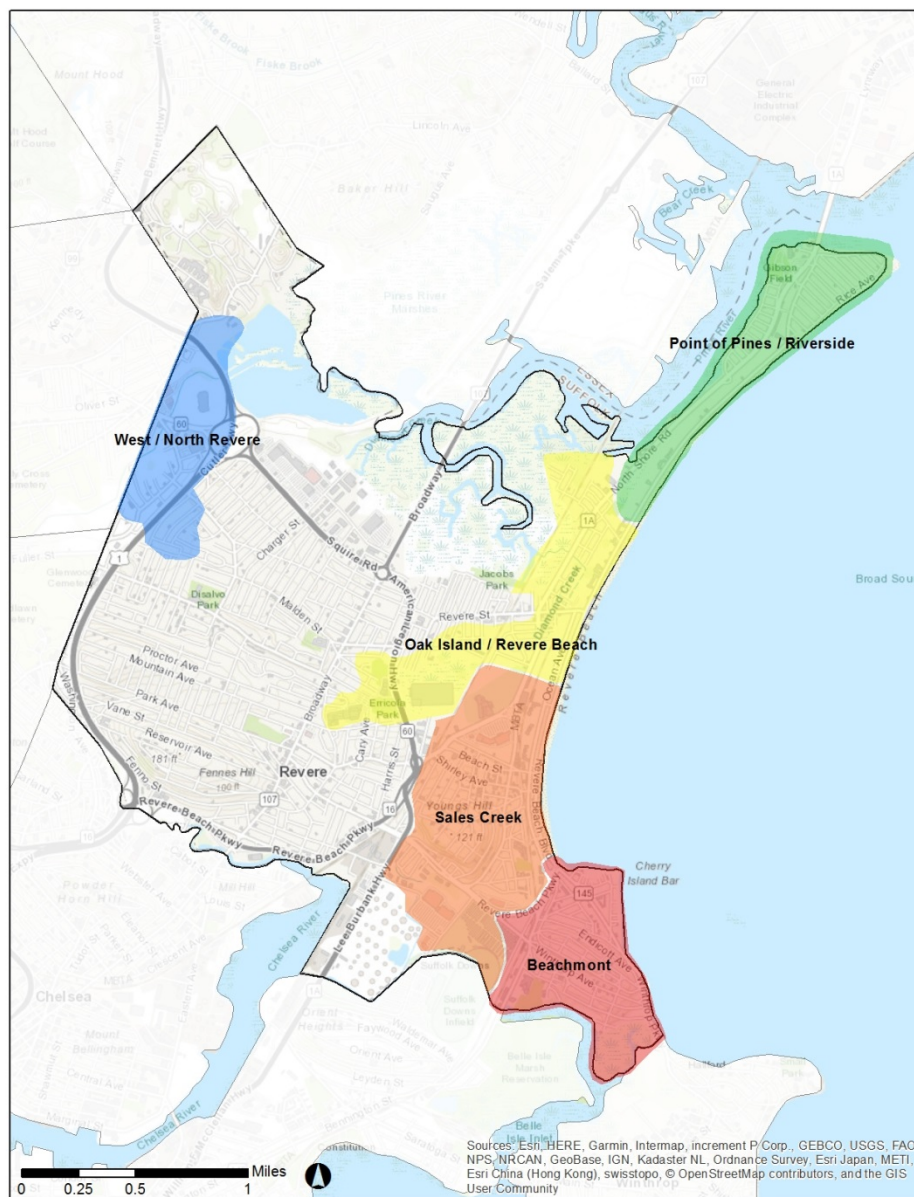


Figure 2: Five geographic areas identified in Revere for MVP Workshops

Each breakout group consisted of four to ten individuals and a facilitator. Several workshop participants were identified as 'City-wide' experts and instructed to participate in the small group discussions in all five geographic areas.

The first assignment for each group was to identify the top four hazards the city faces. After discussing and evaluating natural hazards, each group recorded their top four hazards in the "Top Priority Hazards" section of the CRB Risk Matrix, a tool developed as part of the CRB framework.

All groups were then tasked with identifying infrastructural, societal, and environmental features that would be impacted by the top four hazards. Participants recorded the ownership and identified the location of each feature on base maps (Figure 3) and in the CRB Risk Matrix (Figure 4). Each feature was categorized as a *strength (S)* or a *vulnerability (V)*. The breakout group facilitator guided the process of identifying and characterizing features. AECOM staff oversaw the small group discussions and provided assistance as needed. After each group had selected four top priority hazards and populated the *Features, Location, Ownership, and V or S* columns of the CRB Risk Matrix, AECOM staff led a report out session. A spokesperson from each group reviewed the top four hazards and select infrastructure, society, and environmental features for their geographic area. A summary of these features was captured on a large flip chart.

Copies of the base maps used in the workshop are included in Appendix B. Completed CRB Risk Matrices for each geographic area/breakout group are included in Appendix C. Refer to Appendix D for the agenda and meeting materials for Workshop 1.



Figure 3: Participants map (left) and discuss (right) features in Workshop 1

Workshop 2

Workshop 2 included a brief presentation by Aaron Weieneth, AECOM, to review:

- The City's objectives for the MVP program
- Local natural and climate-related hazards of concern identified in Workshop 1
- Existing and future infrastructural, societal, and environmental strengths and vulnerabilities

Following this overview, five geographic area breakout groups were reconvened to develop prioritized actions for the City. With the assistance of a designated facilitator, each group reviewed the CRB Risk Matrix that was initiated in Workshop 1. The next step was to brainstorm actions to reduce vulnerability and reinforce strengths for each of the infrastructural, societal, and environmental features identified in Workshop 1. Participants were given examples of potential actions as well as a list of hazard mitigation measures identified during the preparation of Revere's Hazard Mitigation Plan in 2014.

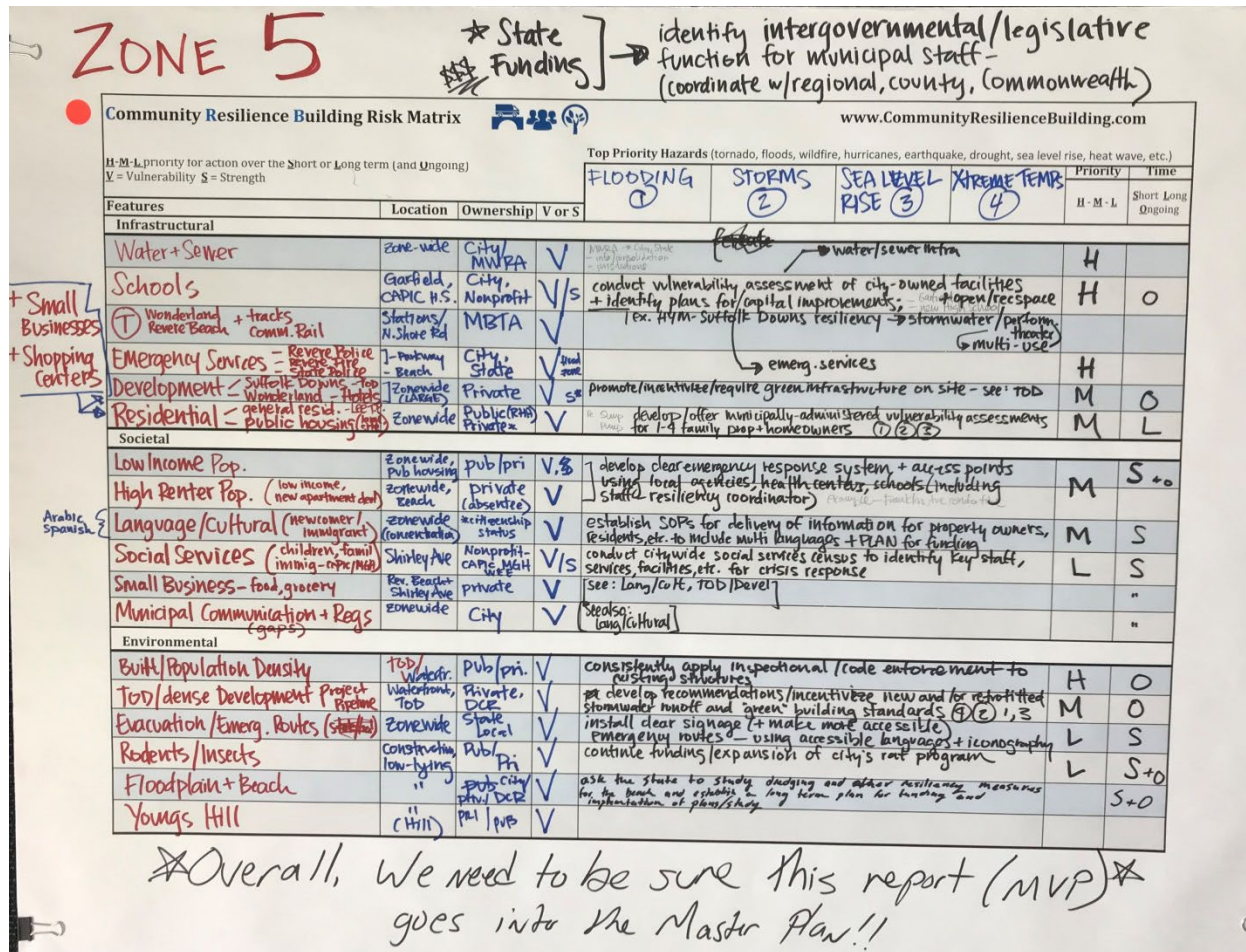


Figure 4: Example of a completed CRB Risk Matrix from Sales Creek area participants

Several human-caused hazards in Revere were identified during Workshop 1 and documented in the CRB Risk Matrices. While the Core Project Team and other workshop participants recognize that it is important to address these hazards, it was determined that human-caused hazards were out of the scope of this project. The breakout groups were instructed to focus on developing actions for natural and climate-related hazards in Workshop 2.

A combined total of 79 actions were developed for Revere. Where appropriate, groups identified which priority hazard(s) each action addressed. The majority of actions addressed flood hazards or multiple hazards. Refer to the CRB Risk Matrices in Appendix D for a complete list of actions.

Each breakout group then ranked the priority and identified the timeframe for all proposed actions. Actions were assigned a high (H), medium (M), or low (L) priority based on factors including funding availability, impacts from recent hazards, necessity for advancing longer-term outcomes, contribution towards meeting existing planning objectives, and geographic scope. Participants considered the timeframe to implement actions with respect to factors including need or urgency, feasibility, and cost. Actions were assigned an ongoing (O), short (S), or long (L) timeframe (Figure 4).

Each breakout group determined three to five highest priority actions to report out to the large group. The AECOM staff captured these highest priority actions on a flip chart during the report out session, and action commonalities across the breakout groups were identified. For the final step in prioritizing actions, participants were asked to vote on their top five priorities by placing sticky dots next to the actions they considered the highest priorities for the City regardless of the geographic areas (Figure 5). Appendix D includes meeting materials from Workshop 2, and a photograph of Workshop 2 participants is provided as Figure 6.

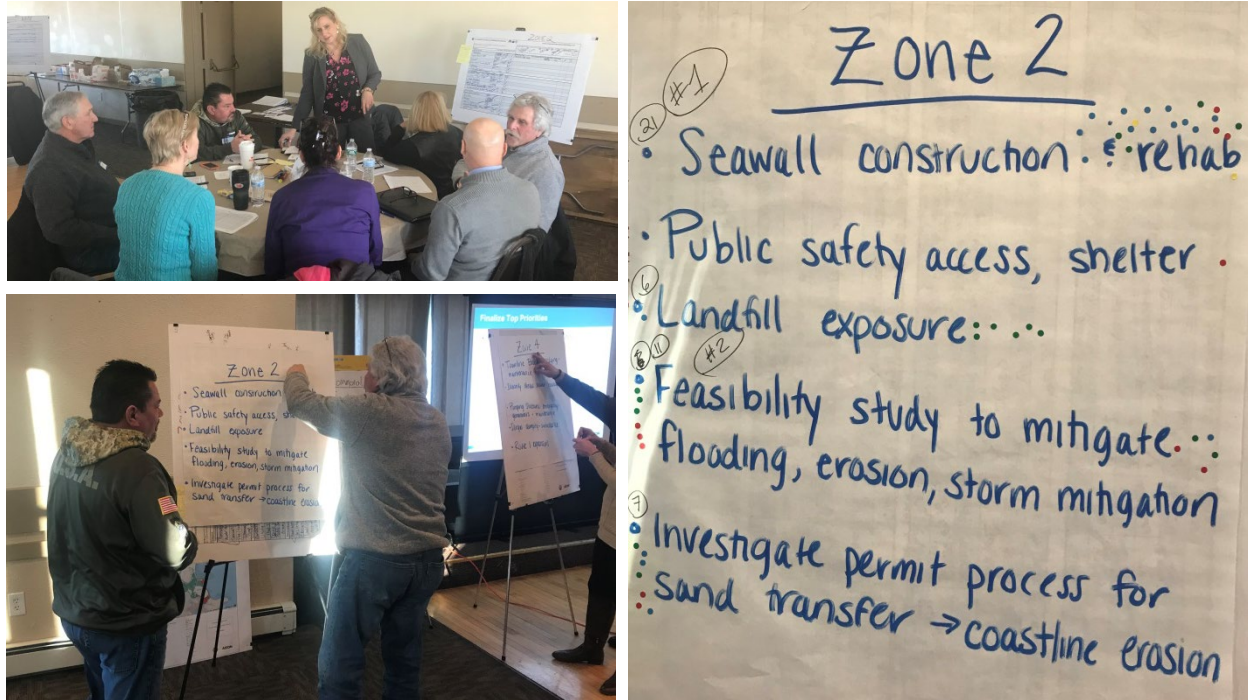


Figure 5: Clockwise from top left: Participants discuss actions in Workshop 2, Voting results for actions in the Point of Pines / Riverside area, Participants rank actions



Figure 6: Group photo of Workshop 2 participants at the Point of Pines Yacht Club

2. Top Hazards & Vulnerable Areas

Top Hazards

The MVP workshop participants identified the following hazards of concern for Revere as part of the large group discussion (Figure 7):

- Coastal Flooding
- Erosion
- Extreme Temperatures/ High Temperatures
- High Winds
- High(er) Water Table
- Hurricanes and Nor'easters
- Inland Flooding
- Invasive Species
- Sea Level Rise
- Severe Storms and Winter Storms

Each of the five breakout groups identified a different set of top priority hazards (Figure 8). The four hazards that emerged as the top overall priority hazards for Revere were:

- Coastal Flooding
- Inland Flooding
- Severe Winter Storms / Nor'easters
- High Temperatures

Coastal and Inland Flooding

Coastal and inland flooding has damaged property, infrastructure, and natural systems throughout the city. As ranked in the City's 2014 Hazard Mitigation Plan, coastal hazards and flooding have a high frequency of occurrence and a 'serious' severity. The convergence of freshwater and tidal systems in the vicinity of Belle Isle Marsh and Rumney Marsh has led to significant flooding during high tide rain events. MVP workshop participants noted that flooding has led to pollution in marshes, wetlands, and other surface water bodies due to associated sediment and nutrient loading. It has also increased the amount of trash and debris, impacting the performance of tide gates. Storm surge has damaged seawalls and other coastal infrastructure, as well as contributed to erosion. More intense precipitation events and larger, more frequent storms coupled with increased development have exacerbated flood hazards in Revere and expanded flood zones. In the future, sea level rise is projected to result in coastal flooding that will extend further inland than in the past or present.

Severe Winter Storms / Nor'easters

One of the most significant impacts of storms, including nor'easters and winter storms with high winds, is loss of power. In addition to being an inconvenience, loss of electricity can result in the inability to heat homes and businesses and operate home medical devices. This is a serious threat to public health, particularly the city's elderly population. Power outages also impact business continuity and school closures. MVP workshop participants noted that winter storms have impacted the availability of parking in Revere when parking bans are in effect and snow piles block parking spaces. According to the 2014 Hazard Mitigation Plan, winter storms have a high frequency of occurrence and are a serious hazard in Revere. It is likely that winter storms will continue to impact the City in the future.

High Temperatures

High temperatures present a hazard to Revere's population. Participants identified that the elderly, children, and low income individuals without access to air conditioning are at risk to extreme heat. The 2014 Hazard Mitigation Plan ranks temperature extremes as having a medium frequency of occurrence and minor severity. In Revere, the annual number of days over 90 degrees Fahrenheit is projected to increase from a baseline of 9 days to a possible range 23-108 days by the end of the century based on available climate change projections from the State. Revere is an urban area, and the city's high level of impervious surfaces will contribute to this trend of increasing temperature.

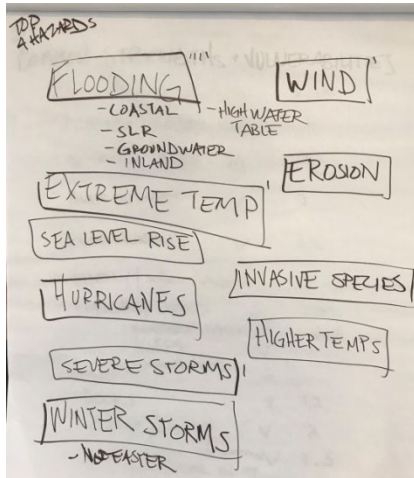


Figure 7: Notes recorded during a large group brainstorm of hazards affecting Revere



Figure 8: City staff and stakeholders discuss priority hazards and vulnerable features in Revere

During both the large group and small group discussions of hazards, participants also highlighted several human-caused hazards and general threats to wellbeing that were determined to be outside the scope of this project.

Areas of Concern

The Core Project Team and AECOM prepared a base map for workshop participants to use during the identification of vulnerable locations and features across the city. Critical facilities, areas of critical environmental concern, vulnerable areas identified in the City's 2014 Hazard Mitigation Plan, and areas that have previously flooded were included on the base maps. The maps also displayed information and assets associated with vulnerable populations, such as hospitals, assisted living facilities, and schools. AECOM also prepared a Hurricane Inundation Zone Map, Sea Level Rise Map, and an Environmental Justice Map to assist participants with the identification of vulnerable areas (see Appendix B).

The five geographic areas identified by the Core Project Team prior to Workshop 1 are considered to be areas of concern in the City (Figure 2). The geographic areas were established to help focus discussions at the workshops around areas with known historic problems. These areas encompass a majority of the areas of Revere that fall within the FEMA 100-year floodplain and all areas along the coast of Revere. They include inland areas around Rumney Marsh and Belle Isle Marsh, which are vulnerable to flooding. Portions of the Point of Pines / Riverside and Oak Island / Revere Beach areas are areas of concern because they are vulnerable to a 2-foot sea-level rise scenario. All five geographic areas are projected to be impacted by a 4-foot sea-level rise scenario by 2100.

The extent of hurricane inundation zones in Revere is widespread, encompassing both coastal and inland areas of the City and thus was well represented in the five breakout group discussion areas.

Additional areas of concern include sections of the City with vulnerable populations. According to the State's

Critical and Other Facilities and Assets Included on Base Maps

- Local and State Police Stations
- County Sheriff
- Fire Stations
- City Hall
- Library
- Schools
- Hospitals and Health Centers
- Long Term Care Residences
- Water Infrastructure, including wastewater and stormwater pump stations and tide gates
- Mass Historical Commission Inventory Areas
- Areas of Critical Environmental Concern
- FEMA flood zones

Environmental Justice data, most Census block groups in Revere have Environmental Justice populations, including minority, low income, and/or English isolation populations. The block group to the north of Youngs Hill in the Sales Creek area is characterized by all three of these factors and, therefore, likely more vulnerable than other areas of the City due to language and communication barriers and lack of access to resources.

3. Current Concerns and Challenges Presented by Hazards and Climate Change

During Workshop 1, participants reviewed vulnerable areas and assets on the base maps and identified additional areas of concern. A summary of areas of concern for each geographic area follows.

Beachmont

Several areas are susceptible to flooding in the southeast corner of Revere (Figure 9). Areas along Winthrop Parkway from the Elliot Circle to the Revere-Winthrop border and within the Winthrop Parkway Neighborhood are vulnerable to flooding. Portions of this area lie within the FEMA 100-year and 500-year floodplains. The beaches and shoreline of coastal areas and streets — such as Broad Sound Avenue — within the Beachmont area are vulnerable to sea level rise and storm surge. Streets to the north and northwest of Belle Isle Marsh Reservation, including Pearl Avenue, Belle Isle Avenue, Winthrop Avenue, and Bennington Street have experienced flooding. This region is home to schools, pump stations, a tide gate, and areas designated as Areas of Critical Environmental Concern by the State.

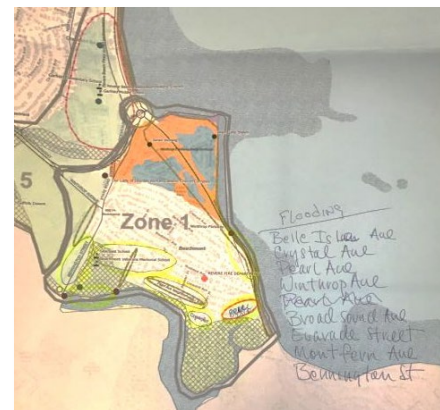


Figure 9: Image of vulnerable locations identified in southeast Revere

Point of Pines / Riverside

With the exception of elevated areas around the Route 1A on-ramp, all of the Point of Pines / Riverside area is located within the FEMA 100-year floodplain. This region of the City has widespread vulnerability to flooding. Route 1A, Mills Avenue, Rice Avenue, and Revere Beach Boulevard have experienced localized flooding and drainage issues. Residences in the neighborhoods of this area have experienced flooding and increased flood insurance rates. There are several vulnerable tide gates located along Route 1A. The Point of Pines Yacht Club, Point of Pines Beach, and associated piers, docks, and water access points are exposed to wind and storm surge (Figure 10). The Point of Pines Yacht Club is identified as an emergency gathering space.



Figure 10: View east towards Lynn Harbor from the Point of Pines Yacht Club

Oak Island / Revere Beach

Similar to the Beachmont and Point of Pines / Riverside areas, the Oak Island / Revere Beach area is characterized by low-lying areas within the FEMA 100-year floodplain, coastal frontage, and marshes. Non-functional flood gates and an antiquated drainage system contribute to flood vulnerability in this part of the City. Within this area, the high density of traffic along Roosevelt Avenue, Revere Street, and Broadway combined with flood vulnerability impact emergency access. Additional hazards in this area include risk of fire due to the prevalence of Phragmites in the marsh near the Wonderland Greyhound Park and coastal erosion. Populations in low-income and senior housing and schools in the Oak Island / Revere Beach area are among the vulnerable social features in this area.

West / North Revere

The West / North Revere area has frontage on both the east and west sides of the Pine River and lies to the southwest of Rumney Marsh. The west side of this region of the city along the Malden border is within the FEMA 100-year floodplain. The drainage system is of particular concern in this area. Storm drainage systems on Washington Avenue and Amelia Place and catch basins on Asti Avenue and Tuscano Avenue are insufficient to manage stormwater. This results in pooling of water in these areas. Along Route 1, tide gates that are not adequately maintained exacerbate flooding within the Town Line Brook watershed. Area-wide challenges include illegal sewer hookups, downed trees, groundwater infiltration, and expansion of flood zones. Additionally, backfill on properties has reduced the area available for collecting and storing water during precipitation events.

Sales Creek

The Sales Creek area lies almost entirely within the FEMA 100-year floodplain and is flanked by the Chelsea River, Belle Isle Marsh, and Broad Sound. This is a densely developed portion of Revere's waterfront with multiple schools, subway stations, local and State police, a transit oriented development economic development area, and ongoing construction. Factors that increase vulnerability in this region of the city include the poor condition of water and sewer infrastructure, evacuation and emergency routes that are susceptible to flooding, and characteristics of the population that resides here — including low-income populations, non-native English speakers, renters, and newcomers — which can be more challenging to reach through the City's conventional communication methods. Topography in this area makes low-lying areas vulnerable to flooding. The fire and police departments off Revere Beach Parkway and the police department on Ocean Avenue are identified as vulnerable locations.

4. Specific Categories of Concerns and Challenges

The following major categories of concerns and challenges for the City were identified by the Core Project Team and MVP workshop participants.

Critical Infrastructure Limitations

The City's stormwater infrastructure and drainage system is outdated and in need of repair. MVP workshop participants expressed concern about the capacity of the existing pump stations and noted the need for additional pump stations. The lack of regular tide gate maintenance was also cited as a problem. The existing drainage infrastructure is often overwhelmed by coastal and inland flooding due to these factors. In addition, the condition of the seawall and rock revetments emerged as a major concern of workshop participants.

Emergency Preparedness

MVP workshop participants identified emergency preparedness as an area of concern. Breakout groups commented on the lack of awareness of an evacuation plan and procedures. The lack of signage along emergency evacuation routes was recognized as a problem. Participants also expressed concern with the fact that many of the roads that residents would take to evacuate are often flooded.

Inadequate City-Wide Communications

Revere has a high population of non-native English speakers and individuals who do not speak or read English. Workshop participants were aware that city-wide communication policies and procedures need improvement to make information about hazards, evacuation, and other events requiring public notice available in multiple languages.

Degraded Natural Systems

Participants expressed concern about natural systems, including marshes impacted by sedimentation and invasive species and eroded stream banks and beaches. Trash, landfill pollution, and stormwater were also cited as factors that have degraded natural systems in Revere. In addition to concern for the quality of natural resources and the

health of habitats, participants connected these impacts to the function of natural systems with increased flood hazards.

5. Strengths and Assets

The following current City strengths and assets were identified by the Core Project Team and MVP workshop participants.

Infrastructural Features

Although participants noted the shortcomings of the drainage system, they also recognized that the City's water infrastructure, including tide gates and stormwater pump stations that manage water, are critical assets. This infrastructure, along with seawalls and rock revetments that provide a physical barrier between the community and storm surge, high tides, and rising seas protect people and property.

There is a substantial amount of ongoing and proposed development in Revere. This is considered a strength because it supports a strong local tax base.

Societal Features

Revere has emergency services, including police, fire, and other personnel, as well as shelters and gathering space for residents to go during an emergency. The City also has strong communication systems and policies.

The following social services are considered assets: community action groups; senior housing; programs that support children, families, and immigrants; Community Action Programs Inter-City, Inc (CAPIC); and Mass General Hospital (MGH) Revere Health Care. In addition, the level of public awareness and education about flooding and other natural hazards was recognized as a strength in Revere.

City services, such as trash collection, are also an asset.

Environmental Features

Natural marshes, including Belle Isle Marsh and Rumney Marsh, are critical assets that reduce vulnerability to flooding because they provide flood storage capacity.

6. Top Recommendations to Improve Resilience

Priority Actions by Geographic Area

The top priority actions identified for each of the five geographic areas used for the MVP workshops are presented below.

Beachmont

- Reconstruct seawall and revetments.
- Install levee and/or natural berm to prevent flooding of properties that abut the marsh.
- Dredge Belle Isle Creek.
- Improve emergency access and reduce hazards to vehicles by changing one-way traffic patterns and encouraging use of public parking garages during high tide and storm events.

- Increase awareness and planning for schools, elderly, and underserved community members.
- Elevation of Repetitive Loss and Severe Repetitive Loss residential structures.

Point of Pines / Riverside

- Construct and rehabilitate seawall. Install snow fencing and restore dunes.
- Increase public safety and access to shelters for evacuation and construct a new fire station.
- Reduce exposure to pollution by prohibiting an increase to volume of fill/waste at the Wheelabrator landfill.
- Conduct feasibility study to determine the best mitigation plan to address flooding, erosion, and storm impacts.
- Investigate and streamline the permit process for sand transfer between the vicinity of the Point of Pines Yacht Club, where it is accreting, and Point of Pines Beach Association, where there is coastal erosion.

Oak Island / Revere Beach

- Upgrade drainage system to help control flooding.
- Beach nourishment and erosion control.
- Repair, replace, and install flood gates.
- Promote thoughtful future development with respect to flooding and drainage. Implement best management practices and include natural flood storage in new developments.
- Build a new high school.
- Create and establish multilingual communication.
- Repurpose Route 1A oil tanks for stormwater storage.

West / North Revere

- Seek funding for and develop a program to dredge and maintain Town Line Brook.
- Identify illegal sewer hookups.
- Develop a program or policy to install emergency generators at and maintain pumping stations.
- Reduce illegal dumping through surveillance.
- Expand Route 1 travel lanes.

Sales Creek

- Develop municipally-administered vulnerability assessments for homeowners.
- Distribute multilingual information.
- Develop, promote, and incentivize green infrastructure, and new and/or retrofitted stormwater and green building standards.
- Liaison between City and State to position for funding sources and increase communication.
- Incorporate MVP findings into the City's Master Plan and Hazard Mitigation Plan updates.

Commonalities, or actions identified in multiple regions of Revere, include:

- Flood mitigation projects and studies
- Improve public education, awareness, and communication
- Drainage system improvements
- Repair and install pump stations and flood gates
- New development / building requirements to increase resilience and not adversely impact neighboring properties

MVP workshop participants were asked to vote on their top five priorities by placing sticky dots next to the actions they considered the highest priorities for the City regardless of the geographic area (Table 1). The action that received the most votes was construction and rehabilitation of the seawall in Point of Pines / Riverside. Seawall reconstruction in Beachmont was also a top strategy. Participants indicated that conducting a feasibility study to determine the best strategies to mitigate problems including flooding, erosion, and storm impacts was an important action to take to better understand the scope of the problem and potential solutions.

Table 1: Top priority actions based on voting

Number of Votes	Action
21	Seawall construction and rehabilitation in the Point of Pines / Riverside area
11	Conduct a feasibility study to determine the best strategies to mitigate flooding, erosion, and storm impacts in the Point of Pines / Riverside area.
8	Reconstruct seawall to mitigate flooding in the Beachmont area
8	Dredge and maintain Town Line Brook in the northwest side of Revere
7	Liaison between City and State to position for funding sources and increase communication city-wide, especially in regions with dense and/or diverse populations, such as Sales Creek,
7	Encourage thoughtful future development in relation to flooding and drainage in the Oak Island / Revere Beach area and throughout the city.
7	Investigate permit process for sand transfer to mitigate coastline erosion in the Point of Pines / Riverside area.

Categorized Priority Actions and Resiliency Strategies

Following the voting activity, the Core Project Team grouped the top priority actions identified through the MVP workshop process for Revere into four categories to aid in the City's future resilience planning and implementation efforts: planning; policies, regulations, and procedures; flood mitigation and coastal hazard projects; and public education, awareness, and communication. These actions are included in Table 2, along with outstanding high priority actions identified for Revere in the City's 2014 Hazard Mitigation Plan (HMP) and relevant entries included in the Environmental Bond Bill for Revere.

Table 2: Categorized priority actions for Revere

Category	MVP Program Priority Actions	2014 HMP Outstanding High Priority Actions	Environmental Bond Bill Entries for Revere
Planning	<ul style="list-style-type: none"> • Conduct a feasibility study(ies) to determine the best strategies to mitigate coastal flooding, erosion, and storm impacts. • Update the City’s 2014 Hazard Mitigation Plan, incorporating findings from the MVP planning process. • Conduct a city-wide drainage study. 	<ul style="list-style-type: none"> • Research feasibility of dredging sections of Trifone and Town Line Brooks to increase storm water and coastal surge storage. • Develop a City-based wetlands mapping capacity that would include an all local wetlands delineations database. 	<ul style="list-style-type: none"> • \$300,000 shall be expended to for a study to determine solutions to flooding issues in the Riverside, Point of Pines, and Beachmont sections of the City of Revere (<i>Lines 327-328</i>)
Policies, regulations, and procedures	<ul style="list-style-type: none"> • Liaison between City and State to identify and secure funding and increase communication. • Investigate permitting and regulatory process for sand transfer to mitigate coastline erosion. • Mitigate impact of development and redevelopment by requiring best management practices for stormwater management and incentivizing green infrastructure and green building technologies. 		
Flood mitigation and coastal hazards projects	<ul style="list-style-type: none"> • Reconstruct and repair seawalls and revetments (Beachmont and Point of Pines / Riverside areas). • Dredge and maintain Town Line Brook. • Improve the drainage system city-wide based on findings of the feasibility study identified under the Planning action category and resulting recommendations. 	<ul style="list-style-type: none"> • Pearl Avenue: replace headwall and install new 24 inch drain line along lower Pearl Avenue. • Install fixed-location, backup, diesel generating capacity at 17 sewer pump stations. • Install new diesel, fixed location generator at the Reservoir Pumping Station. • Re-establish sand dunes from Cary Circle to Eliot Circle along Revere Beach by re-planting beach grass. • Install levees along Belle Isle Avenue/Belle Isle Inlet to prevent tidal surge/over wash into adjacent residential neighborhood. 	<ul style="list-style-type: none"> • \$4,000,000 shall be expended to repair and replace the failing seawall along Winthrop Parkway (<i>Lines 270-271</i>) • \$2,500,000 shall be expended for repairs to the Sales Creek culvert and related improvements (<i>Lines 803-804</i>) • \$10,000,000 shall be expended for repairs and improvements to the Revere Beach Reservation (<i>Lines 873-876</i>) • \$800,000 shall be expended for planning and infrastructure improvements to mitigate flooding issues in the Riverside, Point of Pines, and Beachmont neighborhoods (<i>Lines 876-878</i>)
Public education, awareness, and communication	<ul style="list-style-type: none"> • Improve communication with public and educate public about evacuation plans and hazards. • Develop multilingual resources. 	<ul style="list-style-type: none"> • Purchase mobile Incident Command Unit. 	

7. Community Listening Session

Revere hosted a public information and listening session titled “Climate Change & Revere: A Community Listening Session” on April 4, 2019 from 6:30-7:30PM at the Rumney Marsh Academy Auditorium (140 American Legion Highway, Revere, MA). The listening session was advertised on the City’s website, social media, distribution lists, and in the Revere Journal. It was also recorded by RevereTV and posted online. The listening session was kicked off by Mayor Brian Arrigo and provided the public with the opportunity to learn about the MVP workshops and to ask questions and provide feedback about the key findings and top priorities identified during the workshops (Figure 11). Participants also had an opportunity to identify additional issues they are aware of that were not identified in this MVP Summary of Findings Report. Information collected during the listening session is included in Appendix E.



Figure 11: Photo of listening session participants

8. Conclusion and Next Steps

The priorities identified during the MVP workshops, outlined in this report, and identified during the listening session will be integrated into existing and future municipal planning efforts, including the City’s Master Plan Update, Capital Improvement Plan, and Hazard Mitigation Plan Update. The City will seek funding from the MVP Action Grant Program and other sources to implement the priority actions identified in this report to improve Revere’s resilience to natural hazards and climate change. The City will also submit annual progress reports to the Commonwealth that outline steps taken toward implementing its priority actions to maintain designation as an MVP community.

9. Acknowledgements

The MVP Program in Revere was made possible through the leadership and support of the City’s Core Project Team:

- Frank Stringi, City Planner, Department of Community Development (MVP Project Manager)
- Elle Baker, Project Planner, Department of Community Development
- Paul Argenzio, Superintendent, Department of Public Works
- Joe Maglione, Revere Water Facilities Director

- Donald Ciaramella, Project Manager, Department of Engineering
- Nick Rystrom, City Engineer, Department of Engineering

Workshop meeting space was generously provided by the Point of Pines Yacht Club.

Funding utilized to advance the program was provided through the Executive Office of Energy and Environmental Affairs' Municipal Vulnerability Preparedness Climate Resiliency Planning Grants program.



Figure 12: View of the Western Channel from the Point of Pines Yacht Club

Appendix A MVP Workshop Invitees and Participants

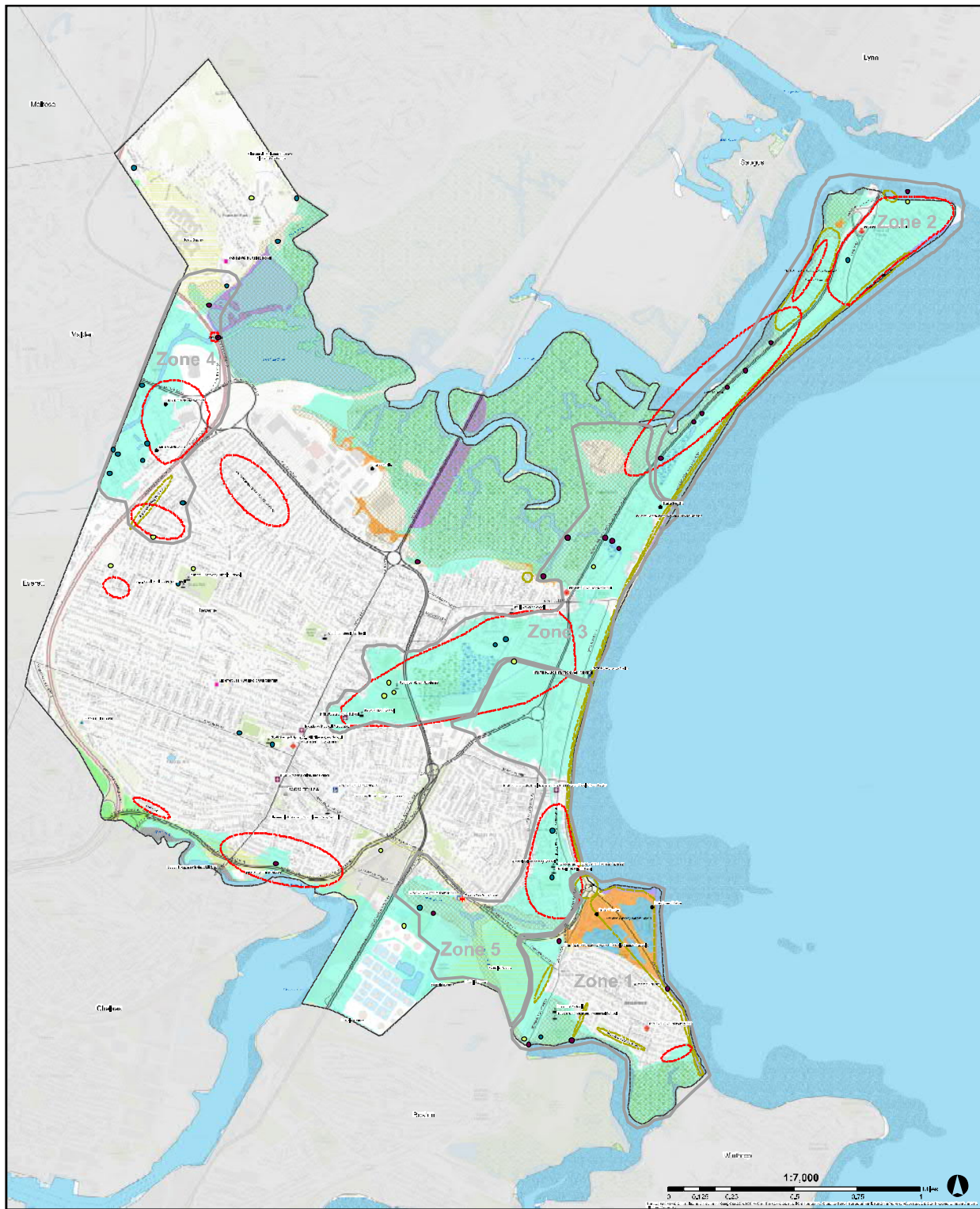
City of Revere Municipal Vulnerability Preparedness Planning Grant - Workshop Sign-in

Name	Occupation	Affiliation	Workshop 1	Workshop 2
Argenzio, Paul	Superintendent DPW	City	X	X
Arrigo, Brian	Mayor	City		
Ash, Tyler	Project Assistant, Community Development		X	X
Avallone, Elaine	Oak Island Neighborhood Group	Beverly Ave.		
Baker, Elle	Project Planner	City	X	X
Bolton, Jay	Vice Commodore	Point of Pines Yacht Club	X	X
Boncore, Joseph	State Senator	Regional	X	X
Bright, Chris (Chief)	Fire	Public Safety	X	
Canter, Reuben	311 Department	City		
Cullen, Jim	Fire Department	City	X	X
DeLeo, Robert	Speaker of the House	Regional		
DeMauro, Julie	Active Living Coordinator	West Revere Resident	X	X
Deveau, Ed	Beachmont Resident	Beachmont	X	X
Doctoroff, Christina	DCR	State	X	
Ferragamo, Gary	President Point of Pines Business Association	Point of Pines Business Association	X	
Festa, John	Business Liaison	Economic Development	X	X
Gianinno, Jessica	Councilor at Large	City		
Giffee, Philip		NOAH, East Boston		X
Glancy, Jack	Commodore	Point of Pines Yacht Club	X	X
Guido, James (Chief)	Police	Public Safety	X	
Guinasso, Arthur	Ward 3 Councilor	City		
Harrington, Paul	Calumet Resident	Calumet		
Heiser, Kathleen	President BIC	Beachmont	X	X
Holmes, Lor	Resident	Campbell Ave.	X	X
Hurley, Elaine	Riverside Association	Riverside		
JanJar, Kristen	RCC	Shirley Ave.	X	X
Jenkinson, Kathy	Riverside Association	Riverside	X	
Johnson, Margo	Oak Island Neighborhood Group	Arcadia Ave.		
Keefe, Patrick	Ward 4 Councilor	City		
Kelly, Diane (DR)	School Department	City		
Kessman, Mike	City Engineer	City	X	X
LeCentra, Loretta	Riverside Association	Riverside	X	X
Leng, Tech	City Planner	Shirley Ave.	X	X
Lock, Marc	Plumbing Inspector/Resident	Point of Pines	X	X
Lund, Ellen	Ford St. Resident	Ford St.		
Maglione, Joe	Water Department	City	X	X
Mares, Rafael	TND	Beachmont		
Marra, Bob	Mayor's Chief of Staff/Resident	Mayor's Office/Point of Pines	X	X
McCush, Gerry	Point of Pines Business Association/ Resident	Point of Pines		
McKenna, Joanne	Ward 1 Councilor	City	X	X
Millar-Page, Wendy L.	Revere Chamber of Commerce	Executive Director		
Moribito, Steve	Councilor at Large	City		
Mullen, Ginny	North Revere Neighborhood Group	Resident		
Nalesnick, Laurie	VP Point of Pines Business Association	Point of Pines Business Association	X	X
Nickerson, Priscilla	City Liaison	West Revere Resident		X
Novoselski, Ira	Ward 2 Councilor	City	X	
O'Brien, Robert	Economic Development	City/Resident	X	
O'Hara, Amy	Community Police	Public Safety	X	
Patch, Charlie	Ward 6 Councilor	City	X	

City of Revere Municipal Vulnerability Preparedness Planning Grant - Workshop Sign-in

Name	Occupation	Affiliation	Workshop 1	Workshop 2
Peznola, Joe		West Revere Resident		
Pfetsch, Robin	DCR	State		
Post, Steven	Revere Beach Boulevard	Jack Satter House		
Powers, John	Ward 5 Councilor	City	X	X
Riccio, Gina	Resident	Point of Pines		X
Rizzo, Dan	Councilor at Large	City		
Rotondo, George	Councilor at Large	City		
Rupp, Paul	Consultant/Former City Planner	Revere Beach Partnership		
Rystrom, Nick	City Engineer	City		
Salvo, Richard	Resident			
Serino, Richard	Aide to Rep. Vincent/Resident	West Revere Resident	X	X
Simmons, Jill		Resident		X
Squibb, John	Community Development	City		
Strelitz, Bob	Riverside Association	Riverside	X	
Stringi, Frank	City Planner	City	X	
Tucker, Michael	Oak Island Neighborhood Group	Ellerton Ave.		
Vadala, Josh	School Department	City	X	X
Vincent, RoseLee	State Representative	Regional	X	
Zacheria, Mike	Action Emergency	Business Owner		
Zambuto, Anthony	Councilor at Large	City	X	

Appendix B Base Maps



Legend

Critical & Other Facilities & Assets

- Local Home
- State Police
- County Sheriff
- Fire Station
- City Hall
- Library
- School
- Other
- Acute Care Hospitals & Health Centers**
- Hospital w/ICU/ER
- Hospital w/out ER
- Community Health Center
- Long Term Care Residences**
- Nursing Home
- Residential

Water Infrastructure

- Wastewater Pump Station
- Flood Gate
- Stormwater Pump Station
- Mass Historical Commission Inventory Areas
- Areas of Critical Environmental Concern

Approximate Location of Previously Flooded Areas

- Localize Flooding
- Flood Areas Identified in 2014 Hazards Mitigation Plan

FEMA National Flood Hazard Layer

- A-1% Annual Chance of Flooding, no BFE
- A-2% Annual Chance of Flooding, with BFE
- AE-1% Regional Floodway
- AH-1% Annual Chance of Inlet Flooding, with BFE
- V-2% High Tides Coastal Area
- X-1% Annual Chance of Flooding

Base Map Features

- Zoning
- Municipal Boundary
- City or Town
- Township
- MassDOT Major Roads**
- U.S. Highways
- State Route
- Non-Numbered Road
- Water Bodies**
- Pond, Lake, Ocean
- Wetland
- Salt Wetland
- Tidal Flat
- Linear Water Features**
- Perennial Stream
- Intermittent Stream
- Shoreline
- Unstable Shoreline
- Unincorporated
- Channel in Water

City of Revere, Massachusetts

Municipal Vulnerability Preparedness Planning Grant

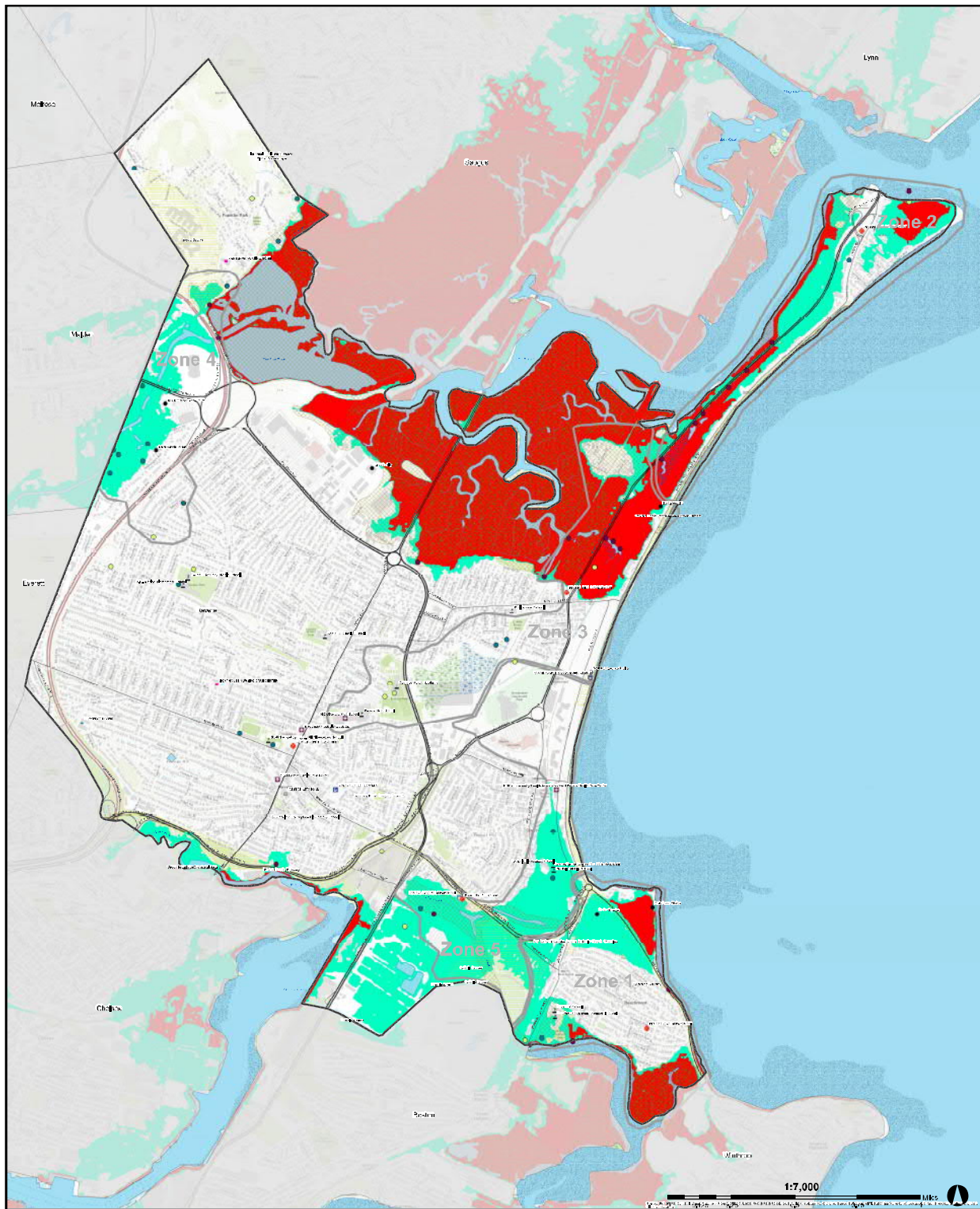
BASE MAP 1

With Localized Flooding & Water Infrastructure

Page | November 2014



City of Revere, Massachusetts | Municipal Vulnerability Preparedness Planning Grant | Base Map 1 | November 2014



Legend

Critical & Other Facilities & Assets

- Local Police
- State Police
- County Sheriff
- Fire Station
- City Hall
- Library
- St. Leo's
- Other
- Acute Care Hospitals & Health Centers**
 - Hospital - EHR
 - Hospital - MRI
 - Community Health Center
- Long Term Care Residences**
 - Assisted Living Facility
 - Nursing Home
 - NestCare
- Water Infrastructure**
 - Wastewater Pump Station
 - Tide Gate
 - Stormwater Pump Station
 - Mass Historical Commission Inventory Areas
 - Areas of Critical Environmental Concern

Sea Level Rise (SLR) Scenarios

- 2 foot SLR
- 4 foot SLR

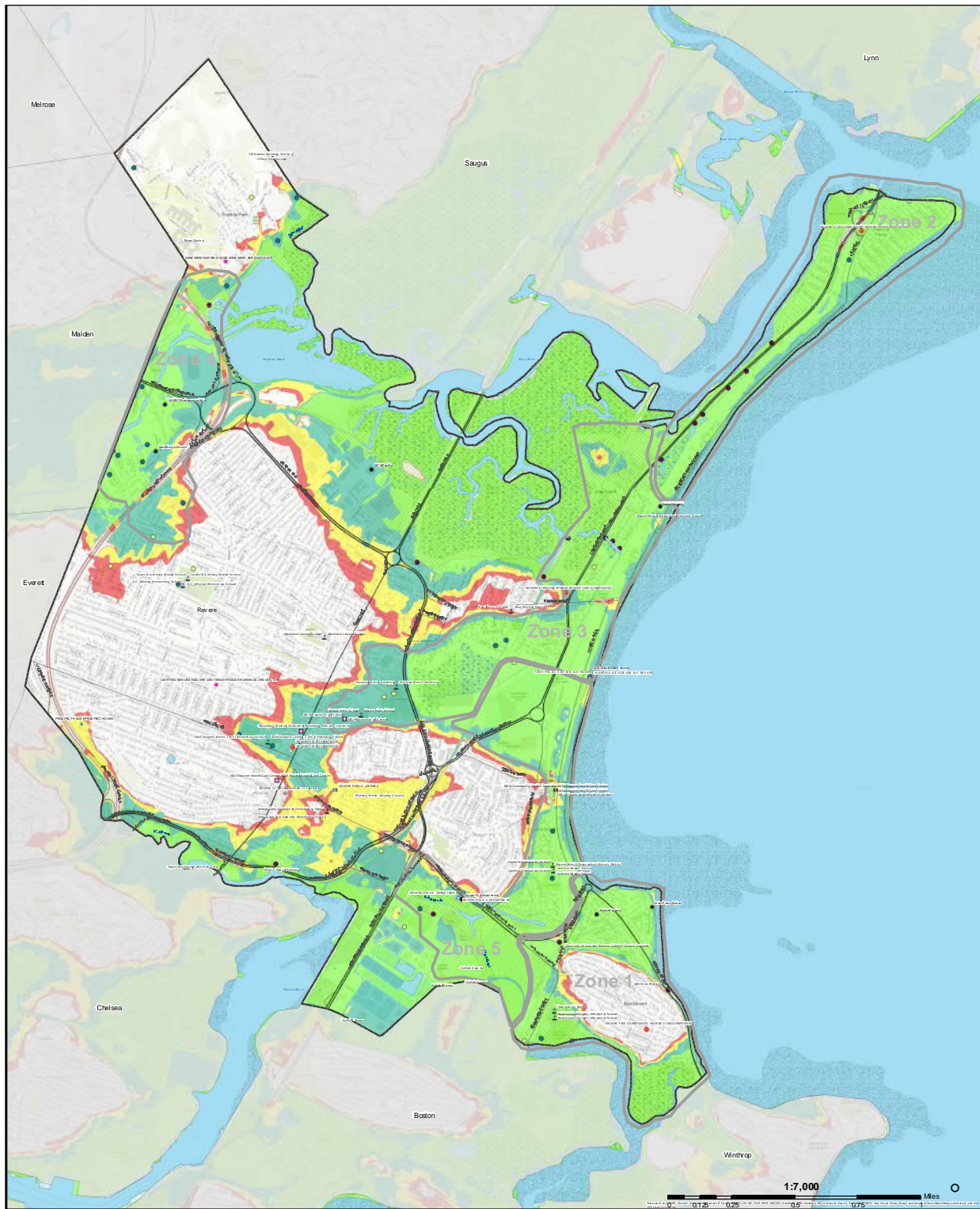
Base Map Features

- Zones
- Municipal Boundary
 - City/Town
 - Town/City
- MassDOT Major Route
- US Highway
- State Route
- Non-motorized Road
- Water Bodies**
 - Pond, Lake, Ocean
 - Wetland
 - Soft Wetland
 - Hard Wetland
- Linear Water Features**
 - Potential Stream
 - Perennial Stream
 - Shoaling
 - Historic Shoreline
 - Ditch/Canal
 - Channel in Water

City of Revere, Massachusetts
 Municipal Vulnerability Preparedness Planning Grant
Sea Level Rise
 August 2016



Drawn by: Bascos, NOAA



Data Source: MassGIS, NOAA

Legend

Critical & Other Facilities & Assets

- Local Police
- State Police
- County Sheriff
- Fire Station
- City Hall
- Library
- Schools
- Other
- Acute Care Hospitals & Health Centers**
 - Hospital with ER
 - Hospital without ER
 - Community Health Center
- Long Term Care Residences**
 - Assisted Living Facility
 - Nursing Home
 - Rest Home
- Water Infrastructure**
 - Wastewater Pump Station
 - Tide Gate
 - Stormwater Pump Station
 - Mass Historical Commission Inventory Areas
 - Areas of Critical Environmental Concern

Hurricane Inundation Zones

- Hurricane Category**
- 1
 - 2
 - 3
 - 4

Base Map Features

- Zones
- Municipal Boundary
- City of Revere
- Town/City
- MassDOT Major Roads**
 - U.S. Highway
 - State Route
 - Non-numbered Road
- Water Bodies**
 - Pond, Lake, Ocean
 - Wetland
 - Salt Wetland
 - Tidal Flat
- Linear Water Features**
 - Perennial Stream
 - Intermittent Stream
 - Shoreline
 - Manmade Shoreline
 - Ditch/Canal
 - Channel in Water

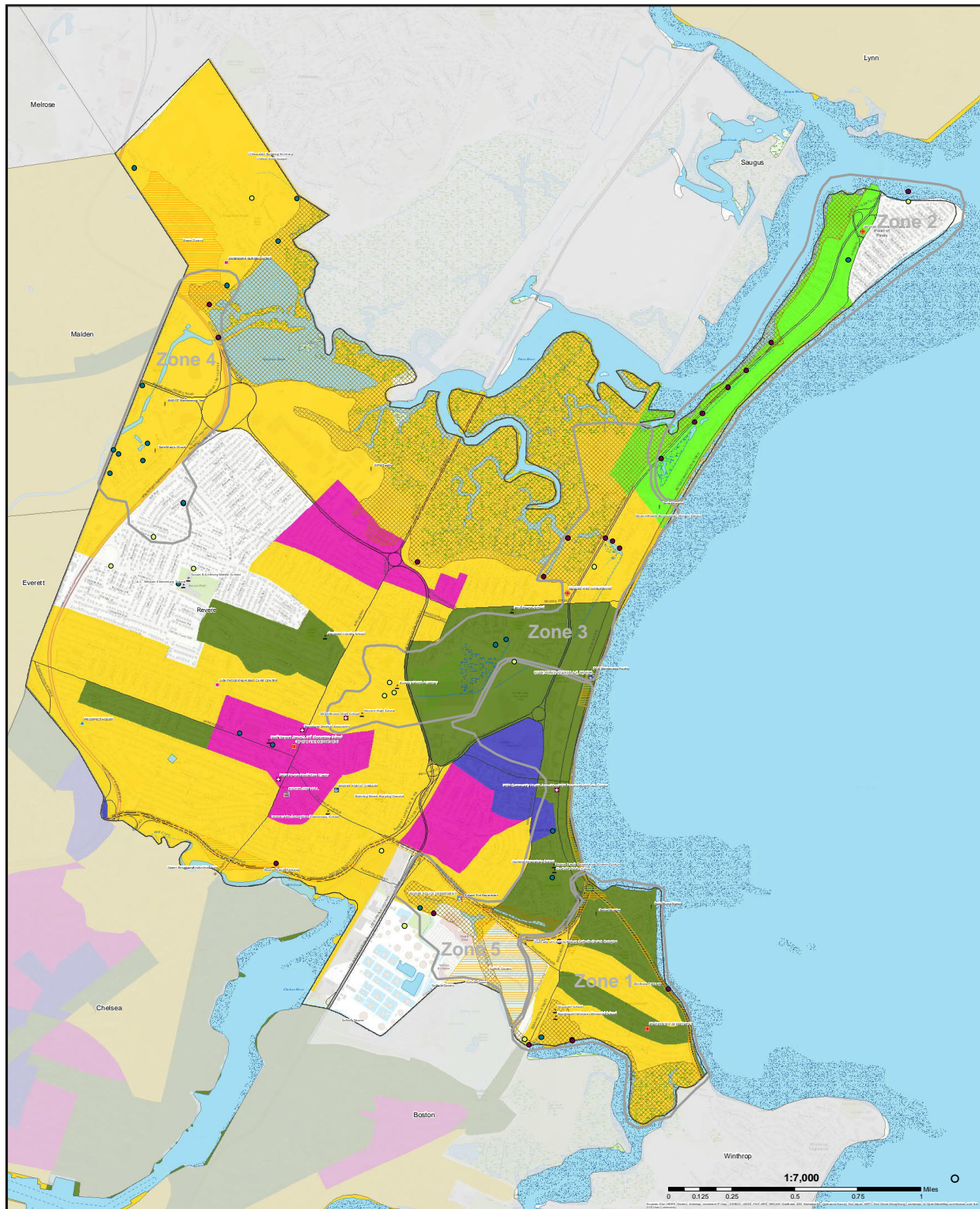
City of Revere, Massachusetts

Municipal Vulnerability Preparedness Planning Grant

Hurricane Surge Inundation Zones

Project January 2015





Data Source: MassGIS

Legend

Critical & Other Facilities & Assets

- Local Police
- State Police
- County Sheriff
- Fire Station
- City Hall
- Library
- Schools
- Other
- Acute Care Hospitals & Health Centers**
 - Hospital with ER
 - Hospital without ER
 - Community Health Center
- Long Term Care Residences**
 - Assisted Living Facility
 - Nursing Home
 - Rest Home

Water Infrastructure

- Wastewater Pump Station
- TideGate
- Stormwater Pump Station

- Mass Historical Commission Inventory Areas
- Areas of Critical Environmental Concern

Environmental Justice (EJ) 2010 Populations

- EJ Criteria, by Block Group**
- Minority
 - Income
 - English isolation
 - Minority and Income
 - Minority and English isolation
 - Income and English isolation
 - Minority, Income and English isolation

Base Map Features

- Zones
- Municipal Boundary**
 - City of Revere
 - Town/City
- MassDOT Major Roads**
 - U.S. Highway
 - State Route
 - Non-numbered Road
- Water Bodies**
 - Pond, Lake, Ocean
 - Wetland
 - Salt Wetland
 - Tidal Flat
- Linear Water Features**
 - Perennial Stream
 - Intermittent Stream
 - Shoreline
 - Marmade Shoreline
 - Ditch/Canal
 - Channel in Water

City of Revere, Massachusetts

Municipal Vulnerability Preparedness Planning Grant

Environmental Justice Populations Map

Prepared January 2014



Appendix C Completed CRB Risk Matrices from Five Geographic Area Breakout Groups



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	Flooding (Coastal/Back Shore) (1)	Extreme Temps (2)	Hurricanes, Nor'easters (3)	Winter Storms (4)	Priority	Time
								H - M - L	Short Long Ongoing
Infrastructural									
Seawalls/ rock revetments/ parks/ levees	Beach	DCR	V/S	Reconstruction of wall and revetments along Winthrop Pkwy (1)(3) Short Beach breakers need to be set higher: Dredge Belle Isle Creek; Install levees/natural berms to prevent flooding in abutting properties				H	O
Roadways	All	City/State	V						
Drainage system/ sewer system	All	City/State	V	Improve sewer/drainage systems in vulnerable areas (Belle Isle Ave, Crystal Ave, Pearl Ave, Winthrop Ave, Broadsound Ave, Evarde Street, Montfern Ave, Bennington St)				H	S
Pumping Stations	Broadsound Ave, Bennington St	DCR	V/S	Develop more pumping stations in Beachmont, Pearl Ave.				H	S
Beachmont School	Bennington St	City/State	V	Berms and drainage to protect school				H	S
Flood Gates	Winthrop Pkwy	DCR/City	S	Regular maintenance of gates				M	O
Trash racks - Tide gates	Bennington St	DCR	V	Regular maintenance of gates				M	O
Power Grid/ Communications	All	Nat Grid	V	Awareness program to increase awareness about preparedness during outages				L	O
				Increase communications with utility, identify most vulnerable poles and infrastructure				L	S
Public transit system	Beachmont Sq	MBTA	V	Raise rail bed				L	L
Dolphin Ave Elderly Housing	Dolphin Ave	RHA	V	Review and/or augment plan for evacuation				M	S
Societal									
Elderly	Dolphin Ave	City	V	Provide air conditioning and heating assistance (Boston has a heat pump initiative); identify and increase				M	L
School Children	Beachmont School	City	V	Plan for evacuation of schools				M	O
Low income households	All	Personal/ City	V						
Community Action Groups	All	Personal/ City	S						
Emergency Services	All	City	S	Change traffic patterns (one-way streets) to improve emergency access (4)				M	L
Parking Density (on street)	All	City	V	Increase awareness of using public transit and public parking to avoid having cars in vulnerable locations				L	L
Local Businesses	Beachmont Sq	Bus	V	Opportunity to do more to increase residents' and businesses' awareness/preparedness				L	L
Public Awareness	All	City	S						
Evacuation/ Displacements	High School, Beachmont School	City	V	Review/expand city evacuation centers				L	O
				Use mobile electronic evacuation signage				H	O
Pets	Beachmont	Personal/ City	V	Identify locations for pet to go in emergencies				M	S
Emergency Shelters	Schools	City	V/S						
Language barrier/multi-cultures			V						
Environmental									
Hunting	Marsh	?	V						
Snow dumping on beach	Revere Beach	DCR	V						
Pollution - sanitary sewage	All	City	V	**See flood strategies listed above					
Fuel Tanks - cars + homes	All	Personal	V						
Logan Airport - noise/air pollution	All	Massport	V						
Saltwater marsh	Marsh	DCR/State	S	Reduce flooding by dredging Belle Isle Creek; elevating the marsh; implementing a combination of green and gray infrastructure				H	S
Phragmites	Belle Isle	DCR/State	V	Maintenance/ remove Phragmites				M	O
Illegal dumping/drainage	Marsh	City	V						
Trash pick up	All	City	V/S	Develop plan to educate about trash impacts (pollution) during flood events when trash is not picked up				L	L



Zone 2: Point of Pines / Riverside

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

H-M-L priority for action over the Short or Long term (and Ongoing)

V = Vulnerability S = Strength

Features	Location	Ownership	V or S	Flooding - Sea level rise, groundwater (1)	Wind (2)	Erosion (3)	Storms, Nor'easters (4)	Priority	Time
								H - M - L	Short Long Ongoing
Infrastructural									
Roadways	Revere Beach Parkway / 1A / Mills Ave/ Rice Ave	City, State, DCR	V	Roadway and seawall, feasibility study, include education about; Mills Ave (wall), Rice Ave (add wall hardened/fix wall /build dune/remove sand); Point of Pines Yacht Club (remove sand)				H	S
Private property - homes	Pines, Riverside Blvd	Private	V	Install back flow prevent on homeowner service - must be maintained and accessible				H	S
Seawall - Natural Barrier	Riverside, Pines, Mills Ave	City, POP Beach Association	V/S	Snow fencing and dunes and dune grass - zig zag walkways				H	S
Pier/ docks/ access points	POP Yacht Club, POP Beach	Multiple	S/V	Conduct feasibility study					
Drainage	Mills Ave	City	V	Check valves are installed - maintenance is ongoing spring and summer 2019				H	O
Pump stations	Multiple	City	S/V	New sewer pump station, new catch basin pump station - work to line the pipes to the pump station				H	O
Gibson Park	Hayes Ave	City	S/V						
Fire Station	Lynnway	City	S/V						
Jack Satter House (Retirement Community)	Revere Beach Blvd	Private	S/V						
Societal									
Emergency gathering space - Point of Pines Yacht Club, evacuation plan	POP Yacht Club/ City	POP Yacht Club/ City	S/V	Early notification of potential evacuation requirements; utilize the POP Yacht Club as an EMT staging area				H	S
Utility - outage/ med device/ down powerlines	All users	NatGrid, private businesses	V	Prep with National Grid for dedicated crews and updated (poles) infrastructure; remove excess wires (2)(4)				M	S/L
Flood insurance	Private	Private	V	Explore payment options and support land survey of elevation					O
Duck hunting	Shore	DCR/Federal	V	Deferred for other planning process					
Public safety access, fire, police, EMT	Pines, Riverside	City	S/V	New fire station/ shelter for evacuation				H	O
Communication system/ policy	All residents + businesses	City	S	Reverse 311				H	O
Environmental									
Boat access at low tide	POP Yacht Club	Private	V	Emergency rescue launch ramp of Riverside with inflatable boats/ dredge				H	O
Accretion	POP Yacht Club, POP Beach	All	V	Conduct feasibility study to evaluate streamlining permit process; remove Point of Pines Yacht Club sand, move to Point of Pines Beach Association; no increase to volume of landfill				H	O
Erosion	Mills Ave, POP Beach, dunes, N.S. Road		V	Conduct feasibility study to evaluate streamlining permit process; remove Point of Pines Yacht Club sand, move to Point of Pines Beach Association; no increase to volume of landfill				H	S
Landfill exposure/contamination	Zone 2, 3, 4	Wheelabrator	V	No increase to volume of landfill. Conduct feasibility study to evaluate installation of flood gates to reduce exposure (Pines to Nahant), (Pines to Lynn), stop tide in Pines - low tide				H	S/L/O
Loss of Recreational Space	Revere Beach, Riverside	City + private	V			Protect beach and park, see feasibility study (3)		H	S
Wildlife risk, piping plovers		DCR, Point of Pines Beach Association	V	Maintain vegetation, vista pruning beach management				L	O



Zone 3: Oak Island / Revere Beach

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

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

Features	Location	Ownership	V or S	Coastal Flooding (1)	Inland Flooding (2)	Severe Weather/Storms (3)	Invasive Species (4)	Priority		Time	
								H - M - L	Short	Long	Ongoing
Infrastructural											
Antiquated drainage system		Public	V	Upgrade drainage system (2-4)				H		L	
Non-functional flood gates	Revere St.	Public	V	Install flood gates, repair existing flood gates (1-2)				H		O	
Multiple jurisdictions		Private	V	Streamline permitting				M		O	
Low-income housing	Zone-wide	Private	V	Identify emergency shelters, provide transportation				M		S	
Impact of Development	Zone-wide	Public	V/S	Implement best management practices				H		L	
Traffic and emergency access	Roosevelt Ave., Broadway, Revere St.	Public	V	Identify emergency access routes (1-3)				L		S	
Societal											
Educating Public/ lack of knowledge	Zone-wide	Public	V/S	Develop communication plan and Town Hall forums (1-4)				M		O	
Economic: civic and personal	Zone-wide	Public	V/S	Loan and grant programs (1-3)				L		O	
Language barriers	Zone-wide	Public	V	Create/establish multilingual communication (1-4)				H		O	
Population increase	Zone-wide	Public	V/S	Build new high school				H		S	
Senior housing	Jack Satter House	Public	S	Coordinate emergency planning (1-3)				M		O	
Environmental											
Reduction of natural storages		Public	V	Include natural storage in new developments				M		L	
Large natural marsh	Wonderland	Public	S	Continue invasive species management (4)				M		O	
Power of tides		Public	S	Utilize tide power for green solutions				M		L	
Erosion/ coastline	Coastal	Public	V	Coastal dune restoration (1)				M		O	
Fire hazard of marsh	Wonderland	Public	V	Increase regulations and protections to prevent impacts to resources/continue to maintain				L		O	

Community Resilience Building Risk Matrix



Zone 4: West / North Revere

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

H-M-L priority for action over the Short or Long term (and Ongoing)

V = Vulnerability S = Strength

Features	Location	Ownership	V or S	Flooding (1)	High Water Table, 100-Year Floodplain (2)	Higher Temperatures (3)	Higher Winds (4)	Priority	Time
								H - M - L	Short Long Ongoing
Infrastructural									
Drainage - pooling of water, catch basin	Asti, Tuscano	City of Revere	V	Expanding the infrastructure of current drainage systems (1-2)				M	L
Sewer systems	Wash Ave., Amelia Place	City of Revere	V	Develop conservation program - educating homeowners about the slow-flow shower heads, faucet, toilet, front load washers				M	S
Illegal sewer hook-ups	Area wide	Private property	V	Identify illegal hook-ups, increase testing and staff, need funding/(1-2)				H	O
Pumping stations		City of Revere	S/V	Develop program/policy to maintain pumping station - emergency generators				M	O
Tide gates	Rt 1	State of Mass	S/V	Develop program to maintain and clean tide gates and Town Line Brook; Collaborate efforts between MA DEP/DCR to develop program (1)					L
Societal									
Illegal dumping	Town Line Brook	DCR	V	Funding for security/surveillance to capture illegal dumpers, Caruso Court, Asti Ave, Lucia Ave, Rt 1; Dredge, maintain, patrol, increase water storage capacity of Town Line Brook (1-2)				H	L
Backfill areas on properties, meant to collect + hold water (swales)	Area wide	Private property owners	V						
Improper grading in dense areas	Area wide	Private property owners	V						
Environmental									
Downed trees	Area wide								
Excess silt - debris in Town Line Brook	Off Washington Ave	DCR	V	Develop a program/seek funding to develop program to clean and maintain Town Line Brook (1-2)				H	S
Groundwater infiltration	Area wide		V						
Expansion flood zones	Area wide	Public + private	S/V						
Rt 1 Traffic - increase emissions load, poor air quality		MassDOT	V	Add/expand travel lanes				H	L

Community Resilience Building Risk Matrix



Zone 5: Sales Creek

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

H-M-L priority for action over the Short or Long term (and Ongoing)

V = Vulnerability S = Strength

Features	Location	Ownership	V or S	Flooding (1)	Storms (2)	Sea level Rise (2)	Extreme Temps (2)	Priority	Time
								H - M - L	Short Long Ongoing
Infrastructural									
Water + sewer	Zone-wide	City/MWRA	V	MWRA- city, state - info/consolidation, jurisdictions				H	
Schools	Garfield, CAPIC H.S.	City, nonprofit	V/S	Conduct vulnerability assessment (water/sewer infrastructure; emergency services) of city-owned facilities and open/rec space and identify plans for capital improvements: Garfield, new High School. Ex. HYM-Suffolk Downs resiliency > stormwater/performance theater, multi-use				H	O
T - Wonderland, Revere Beach, + tracks, comm. Rail	Stations/ N. Shore Rd	MBTA	V						
Emergency services - Revere Police, Revere Fire, State Police	Parkway (local), Beach (state)	City, State	V (flood zone)	Conduct vulnerability assessment				H	
Development - Suffolk Downs, Wonderland, TOD, Hotels, small businesses + shopping centers	Zone-wide (large)	Private	V, S	Promote/incentivize/require green infrastructure on site - see TOD				M	O
Residential - general resid., Lee T.P., public housing	Zone-wide (large)	Public (RHA), Private*	V	Develop/offer municipally-administered vulnerability assessments for 1-4 family properties and homeowners; sump pumps (1-3)				M	L
Societal									
Low income pop.	Zone-wide, public housing	Public/ Private	V	Develop clear emergency response system + access points using local agencies, health centers, schools (including staff and resiliency coordinator) Ex. Franklin Ave condo fire				M	S+O
High renter pop. (low income, new apartment dev.)	Zone-wide, beach	Private (absentee)	V						
Language (Arabic, Spanish) / cultural (newcomer/immigrant)	Zone-wide (concentration)	*Citizenship status	V	Establish SOPs for delivery of information for property owners, residents, etc.. to include multi languages and PLAN for funding				M	S
Social services (children, family, immigrant (CAPIC/MGH))	Shirley Ave	Nonprofit-CAPIC MGH WEE	V/S	Conduct city wide social services census to identify key staff, services, facilities, etc. for crisis response				L	S
Small business - food, grocery	Rev. Beach + Shirley Ave	Private	V	See Language/cultural, TOD/Devel					S
Municipal communications + regs (gaps)	Zone-wide	City	V	See also: Language/cultural					S
Environmental									
Built/ population density	TOD/ Waterfront	Public/ Private	V	Consistently apply inspectional/code enforcement to existing structures				H	O
TOD/ dense development project pipeline	Waterfront, TOD	Private, DCR	V	Develop recommendations/incentivize new and/or retrofitted stormwater runoff and "green" building standards (1-4)				M	O
Evacuation/ emergency routes	Zonewide	State, local	V	Install clear signage (and make more accessible) emergency routes - using accessible languages and				L	S
Rodents/ insects	Construction, low-lying	Public/ Private	V	Continue funding/expansion of city's rat program				L	S+O
Floodplain + beach	Construction, low-lying	City/ Private/ DCR	V	Ask the state to study dredging and other resiliency measures for the beach and establish a long term plan for funding and implementation of plans/study					S+O
Youngs Hill	Construction, low-lying, hill	Private/ Public	V						

Notes: State funding -> identify intergovernmental / legislative function for municipal staff (coordinate with regional, county, Commonwealth); we need to be sure this report (MVP) goes into the Master Plan

Zone 1

Community Resilience Building Risk Matrix				www.CommunityResilienceBuilding.com					
H-M-L priority for action over the short or long term (and ongoing)				Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)					
V = Vulnerability S = Strength				FLOODING (Coastal/Inland Storm)	TEMP EX TRENDS	HURRICANES (N/A EASTERS)	WIND STORMS	Priority	Time
Features	Location	Ownership	V or S					H-M-L	Short Long Ongoing
Infrastructure									
SEA WALLS / ROCK REINFORCEMENTS	Beachfront	DCR	V/S	(Scale out)	• designing Belle Isle Creek			H	S (Building)
PARKS / LAWN	SPR		V		• Flood protection of wall along shoreline			H	S (Wall)
ROADWAYS	ALL	CITY/STATE	V		• Short beach breakers need to be set higher			H	S (Concrete)
SEWER SYSTEM / FLEET SYSTEM	Beachfront	DCR	V/S		• Improve sewer / drainage system in infrastructure			H	S
PUMPING STATIONS	Beachfront	DCR	V/S		• Develop major pumping stations in Beachfront			H	S
BEACHMENT SCOUR	Beachfront	CITY	V		• Beams - drainage to protect school			H	S
FLOOD GATES	W. Beach	DCR/CITY	V/S		• Monitor maintenance of gates			M	O
TRASH RACKS - TRASH GATES	Beachfront	CITY	V		• Awareness program to increase awareness about preparedness during stages			M	O
SEWER SYSTEM	Beachfront	CITY	V		• Identify most vulnerable pipes, infrastructure			M	O
COMMUNICATIONS	ALL	VARIOUS	V		• Remove communication w/ utility			M	O
PUBLIC TRANSIT SYSTEM	Beachfront	DCR	V		• Review equipment plan for evacuation			M	O
DOLAN AVE ELDERLY HOUSING	DOLAN AVE	RHA	V					M	O
Social									
ELDERLY	Beachfront	CITY	V		• air conditioning / heating (system has a heat pump tankless)			M	L
SCHOOL CHILDREN	Beachfront	CITY	V		• Cooling centers - identify / increase awareness of			M	L
FOR NATURE HOUSING	Beachfront	CITY	V		• Plan for evacuation of schools			M	L
COMMUNITY ACTION GROUPS	ALL	CITY	S					M	L
EMERGENCY SERVICES	ALL	CITY	S					M	L
PARKING DENSITY (ON STREET)	Beachfront	CITY	V		• Change traffic patterns (convey street) to improve emergency access			H	O
LOCAL BUSINESSES	Beachfront	CITY	V		• Increase awareness of vulnerability of + public building to avoid emergency			H	O
PUBLIC AWARENESS	Beachfront	CITY	V		• Awareness / preparedness opportunity to increase (residents / businesses)			H	O
EVALUATION / DISPLACEMENT	Beachfront	CITY	V		• Review urban city evc centers			H	O
PETS	Beachfront	CITY	V		• Mobile electronic evacuation			H	O
EMERGENCY SHELTERS	Beachfront	CITY	V		• identify locations for pets to go in emergency			H	O
Environmental									
PLANTING	Beachfront	CITY	V					M	L
SWAMP DRAINAGE ON BEACH	Beachfront	DCR	V		• see flood strategies			M	L
POLLUTION - CONTAINED SOLIDS	Beachfront	CITY	V					M	L
FUEL TANKS - CARS / HOMES	Beachfront	CITY	V					M	L
LOCAL AIRPORT - NOISE / AIR POLLUTION	Beachfront	CITY	V					M	L
SALTWATER MARSH	Beachfront	DCR	V		• design Belle Isle creek			H	S
WATERWAYS	Beachfront	DCR	V		• maintenance / remove piney trees			M	O
ILLEGAL DUMPING / DRAINAGE TRASH PICK UP	Beachfront	CITY	V		• develop plan to educate about trash impacts (pollution) during flood + what when trash isn't picked up			C	L

all Boat south + Boat camp EXT.

Zone 2

Community Resilience Building Risk Matrix				www.CommunityResilienceBuilding.com					
H-M-L priority for action over the short or long term (and ongoing)				Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)					
V = Vulnerability S = Strength				FLOODING	WIND	EROSION	STORMS	Priority	Time
Features	Location	Ownership	V or S					H-M-L	Short Long Ongoing
Infrastructure									
ROADWAYS	Beachfront	CITY/STATE	V		Feasibility study include			H	S
Private Property Homes	Beachfront	Private	V		install backflow preventer on home owner service - must be maintained			H	S
Seawall - National Airport	Beachfront	CITY/STATE	S/V		Storm fencing, DUNE S + DUNE GRASS - Zip Zip walkways			H	S
Pier / Docks / Access Points	Beachfront	Private	S/V					H	S
Drainage	Beachfront	CITY	V		Check valves are installed - maintenance is ongoing			H	O
Pump Stations	Beachfront	CITY	S/V		New Sewer Pump Station, New City Basin Pump Station			H	O
Social									
Gathering Space - POPC	Beachfront	OPEN	S/V		EARLY notification of potential evacuation requirements			H	S
Utility	Beachfront	Private	V		Prep all restore (grid for electric + gas + internet)			M	S/L
Flood Insurance	Beachfront	Private	V		Prep all restore (grid for electric + gas + internet)			M	S/L
DUCK HUNTING	Beachfront	DCR	V		Debarred			M	S/L
Public Safety Access	Beachfront	CITY	S/V		New Fire Station / Shelter for evacuation			H	O
COMMUNICATION SYSTEM	Beachfront	CITY	S		Reverse 311			H	O
Environmental									
Boat access / low tide	Beachfront	Private	V		Emergency Access			H	O
Accretion	Beachfront	Private	V		Launch Ramp of Processer all inflatable boats			H	O
Erosion	Beachfront	Private	V		Streamline Permit Process			H	O
Landfill Exposure / Contamination	Beachfront	Private	V		Prep POPC sand			H	S
Loss of Recreational Space	Beachfront	Private	V		Prep POPC sand			H	S
Wildlife Risk	Beachfront	Private	V		Maintain vegetation, visit Perry Beach, manage etc			L	O

#3 Feasibility Study
#1 Fire truck stalls

#2

#4

#5

Zone 3

Community Resilience Building Risk Matrix				www.CommunityResilienceBuilding.com					
H = H, priority for action over the short or long term (and ongoing)				Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)					
V = Vulnerability S = Strength				Coastal Flooding	Inland Flooding	Severe Weather/Storms	Invasive Species	Priority	Time
Features	Location	Ownership	V or S					H-M-L	Short Long Ongoing
Infrastructure									
Antiquated Drainage System		Public	V	Upgrade Drainage System (1-2-3-4)				H	L
Non-Functional Flood gates	Revere St	Public	V	Install Flood Gates, Repair Existing Floodgates (1-2)				H	O
Multiple jurisdictions		Private	V	Streamline Permitting				M	O
Low-income housing	Zone-wide	Private	V	Identify emergency shelters; Provide Transportation				M	S
Impact of Development	Zone-wide	Public	V/S	Implement Best Management Practices				H	S
Traffic and Emergency Access	Revere St	Public	V	Identify Emergency access routes (1-3)				L	S
Societal									
Educating Public/Lack of Knowledge	Zone-wide	Public	V/S	Develop Communication Plan; Town Hall Forums (1-4)				M	O
Economic: Civic and personal	Zone-wide	Public	V/S	Loan and Grant Programs (1-3)				L	O
Language Barriers	Zone-wide	Public	V	Create/Establish Multi-lingual Communication (1-4)				H	O
Population Increase	Zone-wide	Public	V/S	Build new high school				H	S
Senior Housing	Town Square House	Public	S	Coordinate Emergency Planning (1-3)				M	O
Environmental									
Reduction of Natural Storage		Public	V	Include natural storage in new developments				M	L
Large Natural Marsh	Wardwell	Public	V	Continue invasive species management (4)				M	O
Power of Tides		Public	V	Utilize tide power for green solutions				M	O
Erosion/Coastline	Coastal	Public	V	Coastal dune restoration (1)				M	O
Fire Hazard of Marsh	Wardwell	Public	V	Enforce regulations/protections to prevent impacts to resources / Continue to maintain				L	O

↓ Oak Island

West Revere - Zone 4

Community Resilience Building Risk Matrix				www.CommunityResilienceBuilding.com					
H = H, priority for action over the short or long term (and ongoing)				Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)					
V = Vulnerability S = Strength				Flooding	High Water Table	High Winds	High Winds	Priority	Time
Features	Location	Ownership	V or S					H-M-L	Short Long Ongoing
Infrastructure									
① Drainage	City of Brook	City of Brook	V	Expanding the infrastructure of current drainage systems (1-2)				M	L
② Sewer Systems	City of Brook	City of Brook	V	Develop Conservation Program - Educate Homeowners the value of slow flusher toilets, front load washers				M	S
Illegal Sewer hook-ups	City of Brook	Private Property	V	Identify illegal hook-ups; Increase testing - need for staff				H	O
Pumping Stations	City of Brook	City of Brook	V	Develop program policy to maintain pumping station - see annex table				M	O
Tide Gates	City of Brook	City of Brook	V	Maintain & Clean Tidegates; Townline Brook development program to Flood H				M	O
Societal									
Illegal Dumping	City of Brook	DCR	V	Coordinate efforts between Municipal DCR to develop program				H	O
① Budget cuts on sewer operating need to collect & treat water	City of Brook	Private Property	V	Improve financial program to ensure funding for security, surveillance, & response				H	O
② Improper standing in dense areas	City of Brook	Private Property	V	Coordinate with the City of Brook				H	O
Environmental									
① Downed trees - Excess silt - debris in town line brook	City of Brook	DCR	V	Develop a program and funding to develop program to clean & maintain townline brook (flooding)				H	S
Ground Water Infiltration	City of Brook		V						
Expansion Flood Zones	City of Brook	Private Property	V	Expand travel lanes				H	L
RTI Traffic	City of Brook	Private Property	V					H	L

Townline Brook

\$\$\$

High Water Table

High Winds

High Winds

High Winds

High Winds

High Winds

High Winds

High Winds

High Winds

High Winds

High Winds

High Winds

High Winds

High Winds

High Winds

High Winds

High Winds

High Winds

ZONE 5

State Funding } → identify intergovernmental/legislative function for municipal staff - (coordinate w/regional, county, Commonwealth)

Community Resilience Building Risk Matrix

www.CommunityResilienceBuilding.com

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.)

FLOODING (1)	STORMS (2)	SEA LEVEL RISE (3)	EXTREME TEMPS (4)	PROFICY	TIME
				H-M-L	Short Long Ongoing

Features	Location	Ownership	V or S	Notes	PROFICY	TIME
Infrastructural						
Water + Sewer	zone-wide	City/MWPA	V	conduct vulnerability assessment of city-owned facilities + identify plans for capital improvements; for stormwater/pavement, multi-use	H	
Schools	Garfield, CNPIC H.S.	City, Nonprofit	V/S	conduct vulnerability assessment of city-owned facilities + identify plans for capital improvements; for stormwater/pavement, multi-use	H	O
Emergency Services	Wendell + tracks, Revere Beach, Comm. Bx1	MBTA	V	emerge services	H	
Development	Wendell + tracks, Revere Beach, Comm. Bx1	City, State	V	emerge services	H	
Residential	Wendell + tracks, Revere Beach, Comm. Bx1	Private	V	promote/maintain/require green infrastructure on site - see: TOD	M	O
Societal	Wendell + tracks, Revere Beach, Comm. Bx1	Public (RM)	V	develop offer municipally-administered vulnerability assessments for 1-4 family resp + homeowners (1/2/3)	M	L
Low Income Pop.	zone-wide	pub/pri	V/S	develop clear emergency response system + access points	M	S+0
High Renters Pop.	zone-wide	private	V	develop clear emergency response system + access points	M	S+0
Language/Cultural	zone-wide	private	V	establish SOPs for delivery of information for property owners, residents, etc. to include multi languages + PRAN for funding services, facilities, etc. for crisis response	M	S
Social Services	zone-wide	private	V	establish SOPs for delivery of information for property owners, residents, etc. to include multi languages + PRAN for funding services, facilities, etc. for crisis response	L	S
Small Business - food, grocery	zone-wide	private	V	establish SOPs for delivery of information for property owners, residents, etc. to include multi languages + PRAN for funding services, facilities, etc. for crisis response		
Municipal Communication + Regs	zone-wide	City	V	establish SOPs for delivery of information for property owners, residents, etc. to include multi languages + PRAN for funding services, facilities, etc. for crisis response		
Environmental						
Built/Population Density	Tob, Wob, Wob, Tob	Pub/pri	V	consistently apply inspectional/code enforcement to existing structures	H	O
Tob/dense Development Project	Wob, Tob	private	V	develop recommendations/incentive new and for retrofitted stormwater runoff and green building standards (1/2/3)	M	O
Evacuation/Emerg. Awns. (stair)	zone-wide	State	V	install clear signage + make more accessible	L	S
Rodents/Insects	zone-wide	Pub/pri	V	emergency rules - using accessible language + iconography	L	S
Floodplain + Beach	zone-wide	Pub/pri	V	continue funding/expansion of city's rat program	L	S+0
Youngs Hill	zone-wide	Pub/pri	V	ask the state to study changing and make restrictions measures for the town and establish a long term plan for building and implementation of phase 2/3		S+0

+ Small Businesses + Shopping Centers

Arabic Spanish

Overall, we need to be sure this report (MVP) goes into the Master Plan!!

Appendix D MVP Workshop Agendas and Meeting Material

Revere Municipal Vulnerability Preparedness (MVP) Grant Project

MVP Workshop #1 January 10, 2019

Small Team Exercise Instructions

1. Team introductions (name, organization/department) 5 mins
2. Identify a spokesperson (not the facilitator or scribe) 1 min
3. Characterize the Top 4 hazards in Revere. Use climate change projections, maps, and your experience. 20 mins
4. Identify "features" in each of the three categories of the Risk Matrix (infrastructure, society, and environment). Where possible, identify location and ownership. *Identify community-wide features as well as features specific to your breakout group zone.* Classify each feature as a "Vulnerability" or a "Strength".
25 mins for infrastructure
25 mins for society
25 mins for environment

Definitions

Natural Hazard: Natural events that threaten lives, property, and other assets.

Climate Change: Change in the state of the climate that can be identified by statistical changes of its properties that persist for an extended period.

Risk: Potential for an unwanted outcome resulting from a hazard event, as determined by its likelihood and associated consequences.

Exposure: Extent to which something is in direct contact with natural hazards or their related climate change impacts.

Sensitivity: Sensitivity refers to the impact on a system, service, or asset when exposed to natural hazards.

Vulnerability: Degree to which a system is susceptible to, or unable to cope with, adverse effects of hazards and/or climate change.

A hazard is the sun. The risk is sunburn. The vulnerability considers the length of exposure to the sun, how sensitive the skin is to it, and what action can be taken to avoid sunburn.



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				Priority				Time		
Location	Ownership	V or S		H	M	L	Short	Long	Ongoing	
Infrastructural				Step 1: 20 minutes						
Step 2: 25 minutes per sector (75 minutes total)				To be completed at Workshop #2						
Societal										
Environmental										

Revere Municipal Vulnerability Preparedness (MVP) Grant Project Climate Change Projections for the North Coastal Basin¹

TEMPERATURE

- The North Coastal basin is expected to experience increased average, maximum, and minimum annual temperatures throughout the 21st century.
- Seasonal increases in temperature are expected, with the greatest increases in summer and fall.
- An increase in days with daily maximum temperatures over 90°F, 95°F, and 100°F is expected.
- The number of days with daily minimum temperatures below 32°F and 0°F is expected to decline by as much as 55% by the end of the 21st century.
- Increased temperature is expected to result in a decrease in heating degree-days and increases in both cooling degree-days and growing degree-days.

Table 1. Temperature Projections

North Coastal Basin Climate Parameter	Baseline (1971-2000)	Mid-Century (2050s)	End of Century (2090s)
Average Annual Temperature (°F)	49.7	52.4 – 55.9	53.2 – 60.5
Maximum Annual Temperature (°F)	59.2	61.7 – 65.2	62.4 – 69.9
Minimum Annual Temperature (°F)	40.2	43.1 – 46.6	44.0 – 51.1
Annual Days with Max Temp over 90°F	8	15 – 34	18 – 70
Annual Days with Max Temp over 95°F	1	3-12	5-38
Annual Days with Min Temp below 32°F	121	77 – 103	55 – 98
Annual Heating Degree-Days (Base 65°F)	6,194	4,677 – 5,502	3,793 – 5,265
Annual Cooling Degree-Days (Base 65°F)	590	866 – 1,321	961 – 2,099
Annual Growing Degree-Days (Base 50°F)	2,635	3,174 – 3,863	3,324 – 5,084

PRECIPITATION

- Projections for total precipitation and the number of days receiving precipitation over a specified threshold are variable.
- The highest increase in days receiving precipitation over one inch is expected to occur in winter.
- Total precipitation in winter is expected to increase by up to 20% by mid-century and up to 35% by the end of the century.
- Projections for total precipitation in summer and fall may drop or increase throughout the 21st century.
- Both annual and seasonal projections for consecutive dry days are variable throughout the 21st century, with fall and summer expected to experience the highest number of consecutive dry days.

Table 2. Precipitation Projections

North Coastal Basin Climate Parameter	Baseline (1971-2000)	Mid-Century (2050s)	End of Century (2090s)
Total Precipitation (inches)			
Annual	45.3	45.3 – 50.8	46.1 – 52.5
Winter	11.7	11.9 – 14.1	12.2 – 15.8
Spring	11.5	11.4 – 13.6	11.6 – 14.2
Summer	10.1	9.5 – 12.0	8.4 – 11.9
Fall	12.1	11.0 – 13.5	10.3 – 13.3
Annual Days with Precipitation over 1 inch	8	8 – 11	9 – 12
Annual Days with Precipitation Over 2 inches	1	1 – 2	1 – 2
Annual Days with Precipitation Over 4 inches	0	0 – 0	0 – 0
Annual Consecutive Dry Days	17	17 – 20	17 – 20

SEA LEVEL RISE

- Sea level rise is expected to increase by up to 1.4 feet under an intermediate scenario and 2.4 feet under a high scenario by 2050 relative to mean sea level rise in 2000.
- By 2100, sea level rise is expected to increase by up to 4.0 feet under an intermediate scenario and up to 7.6 feet under a high scenario in Boston.
- Under an extreme scenario, sea level may increase by 10.2 feet by 2100.

Table 3. Relative (or local) mean seal level projections for Boston, MA

Scenario	Probabilistic projections	2030	2050	2070	2100
Intermediate	Unlikely to exceed (83%) given a high emissions pathway (RCP 8.5)	0.7	1.4	2.3	4.0
Intermediate-High	Extremely unlikely to exceed (95% probability given a high emissions pathway (RCP 8.5)	0.8	1.7	2.9	5.0
High	Extremely unlikely to exceed (99.5% probability) given a high emissions pathway (RCP 8.5)	1.2	2.4	4.2	7.6
Extreme (Maximum physically plausible)	Exceptionally unlikely to exceed (99.9% probability) given a high emissions pathway (RCP 8.5)	1.4	3.1	5.47	10.2

¹Source: Northeast Climate Adaptation Science Center, 2018. Massachusetts Climate Change Projections. University of Massachusetts Amherst. Published by MA Executive Office of Energy and Environmental Affairs. March 2018. Available at: http://www.massclimatechange.org/resources/resource::2152/massachusetts-climate-change-projections-statewide-and-for-major-river-basins?_sm_au_=iVVsofS0tQs2f6tR. Data is for the North Coastal Basin, which includes the majority of the land area of Revere.

Revere Municipal Vulnerability Preparedness (MVP) Grant Project 2014 Hazard Mitigation Plan - Review of Hazard Risks

Hazard Risks Summary

Table 1 displays hazards in the State of Massachusetts along with the severity of each hazard and the local hazard risk in Revere. This table was developed during the preparation of Revere's 2014 Hazard Mitigation Plan. Local officials identified flooding as the most prevalent serious natural hazard in the City.

Table 1. Hazard Risks Summary based on 2013 State Hazard Mitigation Plan and modified for Revere¹

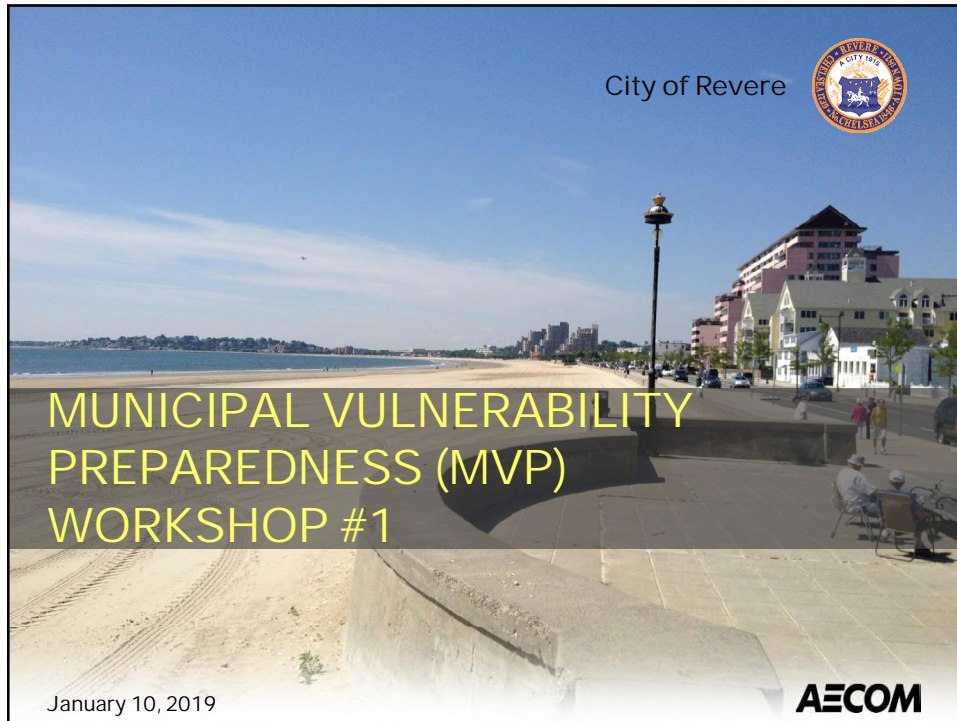
Hazard ²	Frequency in State	Severity in State	Hazard Risk in Revere
Flood ³	High	Serious	Same as State
Dam Failure	Very Low	Extensive	N/A ⁴
Hurricanes	Medium	Serious	Same as State
Tornadoes	Medium	Serious	Same as State
Coastal Hazards	High	Serious	Same as State
Tsunami	Very Low	Extensive	Catastrophic
Winter Storms	High	Minor	Serious
Earthquakes	Very Low	Serious	Same as State
Landslides	Low	Minor	Same as State
Brush Fires	Medium	Minor	Same as State
Drought	Low	Minor	Same as State
Temperature Extremes	Medium	Minor	Same as State

¹. Source: City of Revere Hazard Mitigation Plan 2014 Update

². Listed in order of frequency in Massachusetts

³. Flooding was the most prevalent serious natural hazard identified by local officials

⁴. There are no dams in Revere



Agenda

- | | |
|-------------|---|
| 8:30-8:40 | Welcome and Introductions |
| 8:40-8:50 | Workshop Overview and Objectives |
| 8:50-9:00 | Climate Change Projections |
| 9:00-9:10 | Characterize Hazards |
| 9:10-9:20 | Small Team Exercise Instructions |
| 9:20-9:30 | Refreshment Break |
| 9:30-11:10 | Small Team Exercise |
| 11:10-11:20 | Refreshment Break |
| 11:20-11:40 | Small Team Report Out |
| 11:40-11:50 | Summary Discussion |
| 11:50-12:00 | Next Steps—Workshop #2 January 31, 2019 |

Workshop Overview and Objectives

- MVP Goals
 - Increase the City's resilience to natural hazards and climate change by identifying prioritized actions and policies.
 - Build greater community awareness of climate change and resilience.
 - Engage stakeholders and provide them with a voice for City's future.
 - Enhance the City's current resilience planning efforts.
 - Receive the designation of a MVP community and eligibility for MVP action grants to implement priority actions.

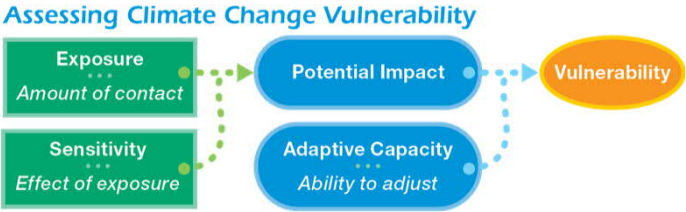
Workshop Overview and Objectives

- Workshop #1:
 - Define top local natural and climate-related hazards of concern
 - Identify existing and future strengths and vulnerabilities
- Workshop #2 (to be held January 31st):
 - Develop prioritized actions for the community
 - Identify immediate opportunities to collaboratively advance actions to increase resilience

Key Terms and Definitions

- Natural Hazard: Natural events that threaten lives, property, and other assets.
- Climate Change: Change in the state of the climate that can be identified by statistical changes of its properties that persist for an extended period.
- Risk: Potential for an unwanted outcome resulting from a hazard event, as determined by its likelihood and associated consequences.
- Exposure: Extent to which something is in direct contact with natural hazards or their related climate change impacts.
- Sensitivity: Sensitivity refers to the impact on a system, service, or asset when exposed to natural hazards.
- Vulnerability: Degree to which a system is susceptible to, or unable to cope with, adverse effects of hazards and/or climate change.



Key Terms and Definitions





Climate Change Projections

- Climate change projections available through the MA Climate Change Clearinghouse (www.resilientma.org)
- Downscaled projections prepared by the Northeast Climate Adaptation Science Center at the University of Massachusetts, Amherst
- North Coastal basin data is used for Revere

Climate Change Projections

CLIMATE CHANGES	RELATED NATURAL HAZARDS	PROJECTIONS BY THE END OF THIS CENTURY
Changes in Precipitation 	<ul style="list-style-type: none"> • Inland flooding • Drought • Landslide 	<ul style="list-style-type: none"> • Annual precipitation: Increase up to 16% (+7.3 inches) • Days with rainfall accumulation 1+ inch: Increase up to 50% (+4 days) • Days with rainfall accumulation 2+ inches: Increase up to 100% (+1 day) • Consecutive dry days: Increase 18% (+3 days) • Summer precipitation: Decrease
Sea Level Rise 	<ul style="list-style-type: none"> • Coastal flooding • Coastal erosion • Tsunami 	<ul style="list-style-type: none"> • Ocean elevation: Increase 4.0 to 10.2 feet relative to mean sea level


Climate Change Projections

CLIMATE CHANGES	RELATED NATURAL HAZARDS	PROJECTIONS BY THE END OF THIS CENTURY
Rising Temperatures 	<ul style="list-style-type: none">• Average/extreme temperatures• Wildfires• Invasive species	<ul style="list-style-type: none">• Average annual temperature: Increase up to 22% (+10.8 °F)• Days/year with daily minimum temperatures below freezing: Decrease up to 55% (-66 days)• Winter temperatures: Increase at a greater rate than spring, summer, or fall• Long-term average minimum winter temperature: Increase up to 52% (+10.9 °F)• Days/year with daily maximum temperatures over 90 °F: Increase by up to 775% (+62 days)
Extreme Weather 	<ul style="list-style-type: none">• Hurricanes/tropical storms• Severe winter storms/nor'easters• Tornadoes• Other severe weather	<ul style="list-style-type: none">• Frequency and magnitude: Increase

MUNICIPAL VULNERABILITY PREPAREDNESS City of Revere **AECOM**

Characterize Hazards

- What hazards have impacted Revere in the past? Where, how often, and in what ways?
- What hazards are impacting Revere currently?
- What effects will these hazards have on Revere in the future?



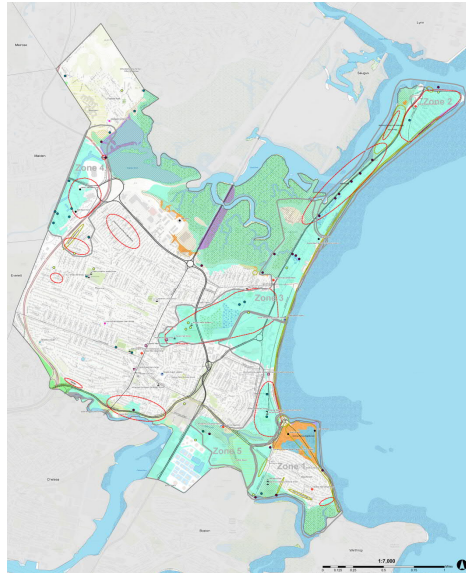
MUNICIPAL VULNERABILITY PREPAREDNESS City of Revere **AECOM**

Characterize Hazards


- What is exposed to hazards and climate threats within your community?
- What have been the impacts to operations and budgets, planning, and mitigation efforts?
- Do you have other concerns or considerations?




Characterize Hazards




Characterize Hazards




Inland Flooding




Tsunami




Severe Winter Storm



Drought



Average/Extreme Temperatures




Tornadoes


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Characterize Hazards




Landslide




Wildfires




Other Severe Weather




Coastal Flooding




Invasive Species



Earthquake



Coastal Erosion



Hurricanes/Tropical Storms

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Small Team Exercise Instructions

- Identify community vulnerabilities and strengths (25 minutes per sector)
 - Identify infrastructure, society, and environment “features” in the features column of the Risk Matrix
 - Provide information about location and ownership, where possible
 - Determine whether each feature is a vulnerability or strength
 - Add a “V” for vulnerability or a “S” for strength to the Risk Matrix



Infrastructural Features

- Infrastructure such as residential housing, schools, commercial buildings, roads, and utilities
- Can be vulnerable to hazards as well as strengthen the City
- Example of vulnerability:
 - Main road floods during storms, blocking emergency response
- Example of strength:
 - Critical road elevated and passable by emergency management



Societal Features

- People, places, and services that are at risk to hazards as well as those that add strength to the City's resilience
- Example of vulnerability:
 - Senior housing without back-up generators during heat waves
- Example of strength:
 - Reliable communications protocols across city departments




Environmental Features

- Natural resources that are vulnerable to hazards or that can provide protection for people and property
- Example of vulnerability:
 - Beachfront development reducing protection provided by dunes
- Example of strength:
 - Oyster reefs and tidal wetlands help reduce wave damage

Community Resilience Building Risk Matrix				www.CommunityResilienceBuilding.org			
H = High priority for action over the Short or Long term (and Ongoing)				Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)			
V = Vulnerability S = Strength				Priority Time			
				Short Term Ongoing			
Features	Location	Ownership	V or S				
Infrastructural				To be completed at Workshop #2			
Societal							
Senior housing without back-up generators during heat waves	South St.	Public	V				
Environmental							

Refreshment Break



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Small Team Exercise

- Team introductions and identify spokesperson (5 minutes)
- Determine top 4 priority hazards (20 minutes)
- Identify community vulnerabilities and strengths (25 minutes per sector)
 - Identify community-wide features as well as features specific to your breakout group zone

Refreshment Break



Small Team Report Out



Next Steps

- MVP Workshop #2 January 31, 2019
 - Identify and prioritize community actions in each sector
- Develop a comprehensive summary report that will help reduce vulnerability or reinforce strengths
- Open invitation listening session to present findings—date TBD

Revere Municipal Vulnerability Preparedness (MVP) Grant Project

MVP Workshop #2 January 31, 2019

Small Team Exercise Instructions

- | | |
|---|--|
| 1. Team introductions (name, organization/department) | 5 mins |
| 2. Identify a spokesperson (not the facilitator or scribe) | 1 min |
| 3. Revisit breakout group findings from Workshop #1 <ul style="list-style-type: none">• Top 4 priority hazards• <u>Vulnerabilities</u> and <u>strengths</u> for Infrastructural, Societal, and Environmental sectors | 15 mins |
| 4. Identify "actions" to reduce vulnerabilities or reinforce strengths for each sector | 15 mins for infrastructure
15 mins for society
15 mins for environment |
| 5. Identify the priority (<u>H</u> igh, <u>M</u> edium, <u>L</u> ow) and the timeframe/urgency (<u>O</u> ngoing, <u>S</u> hort-term, <u>L</u> ong-term) for each action | 5 mins for infrastructure
5 mins for society
5 mins for environment |
| 6. Identify the top 3-5 priority actions for small team report out | 10 mins |

Definitions

Action: Project, activity, or process taken to reduce or eliminate long-term risk to people, property, and natural systems from climate change and/or natural hazards and their impacts.

Natural Hazard: Natural events that threaten lives, property, and other assets.

Climate Change: Change in the state of the climate that can be identified by statistical changes of its properties that persist for an extended period.

Risk: Potential for an unwanted outcome resulting from a hazard event, as determined by its likelihood and associated consequences.

Exposure: Extent to which something is in direct contact with natural hazards or their related climate change impacts.

Sensitivity: Sensitivity refers to the impact on a system, service, or asset when exposed to natural hazards.

Vulnerability: Degree to which a system is susceptible to, or unable to cope with, adverse effects of hazards and/or climate change.

A hazard is the sun. The risk is sunburn. The vulnerability considers the length of exposure to the sun and how sensitive the skin is to it. An action is applying sunscreen to prevent sunburn.

Factors to consider when prioritizing actions:

- Number of residents and/or properties that would benefit
- Agreement on outstanding impacts from recent hazard events
- Necessity for advancing longer term outcomes
- Contribution towards meeting existing local and regional planning objectives

Timeframe/urgency examples:

- Ongoing (**O**) action: Current flood mitigation project
- Short-term (**S**) action: Update Revere's Hazard Mitigation Plan
- Long-term (**L**): Reduce/relocate housing stock in high-risk areas



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	Priority	Time
							H - M - L	Short Long Ongoing
Infrastructural								
Step 1 Review: 15 minutes				Step 2 Identify Actions: 15 minutes per sector (45 minutes total)			Step 3 Prioritize Actions/ Timeline: 25 minutes	
Societal								
Environmental								

Revere Municipal Vulnerability Preparedness (MVP) Grant Project 2014 Hazard Mitigation Plan - Review of Mitigation Measures

High Priority Mitigation Measures

Flooding, Drainage Infrastructure, and Dams

- Install pump station at Squire Road to complement the existing tide gate. Carryover from 2005 plan.
- Install new pump stations at Martin Street and Oak Island to handle stormwater and flooding.
- Upgrade the seawall along Miller Avenue, from North Shore Avenue to River Avenue
- Install new seawall from Cary Circle to Alden Avenue.
- Install new section of seawall fronting Rice Avenue near the Revere Yacht Club.
- Winthrop Parkway: Upgrade current failing tide gate.
- Pearl Avenue: replace headwall and install new 24 inch drain line along lower Pearl Avenue.
- Increase preventive practices to reduce clogging and ensure proper functioning of drainage infrastructure by purchasing maintenance equipment and having the City perform its own maintenance instead of contracting out. Revere would like to purchase a combination camera/vactor truck, for detecting clogged drain lines and cleaning catch basins, and a hydro-jet truck for cleaning clogged drain lines.
- Purchase three, 12 inch, trailer-mounted diesel pumps and hose for flood and storm water removal (although primarily a preparedness measure, this is a high priority for the City).
- Purchase three, 8 inch trailer-mounted diesel pumps and hose for flood and stormwater removal (although primarily a preparedness measure, this is a high priority for the City).
- Install fixed-location, backup, diesel generating capacity at 17 sewer pump stations.
- There are no dams located in Revere.

Measures to Ensure Compliance with NFIP

- The City should consider participating in the FEMA Community Rating System (CRS) program to lower flood hazard risk, raise community awareness and qualify for lower flood hazard insurance premiums.
- Floodplain Mapping: Maintain up to date maps of local FEMA identified floodplains. The City anticipates updated National Flood Insurance Rate maps in 2015.
- Acquisition of Vacant Flood Prone Lands: Acquire priority open space parcels in floodplain areas in order to maintain flood storage and water infiltration capacity. The Open Space and Recreation Plan lists the preservation and protection of Belle Isle Marsh

and Rumney Marsh as a top objective and the City should complete the Rumney Marsh and Belle Isle Marsh land swap between Revere and MA DCR.

- Complete the constructed wetland at Griswold Conservation Area
- Improve wetlands ordinance enforcement practices, focusing on wetlands encroachment and dumping issues.

Multi Hazard

- Emergency Power Generators: Upgrade all emergency power generators in emergency shelters and critical facilities as needed; provide alternative fuel sources and generator power source flexibility. Upgrading the DPW Facility fixed location generator to a new, multi-fuel, higher capacity generator is a top priority for Revere.
- Install new diesel, fixed location generator at the Reservoir Pumping Station.
- Purchase and install electronic evacuation signage at key intersections.
- Purchase mobile Incident Command Unit (although a preparedness measure, this is a high priority for the City).

Fire Related

- Increase brush fire capacity by purchasing new 3-ton, 4x4, brush fire truck with 300-400 gallon pumping capacity and 2,000 feet of one inch forestry hose (although a preparedness measure, this is a high priority for the City).
- Collaborate with Saugus on marsh fire prevention education, access and equipment sharing to address marsh fires in North Revere/Southeast Saugus area.
- Coordinate the Fire, Building and Planning Departments to conduct outreach and public education for landowners and developers to identify and mitigate conditions that aggravate brush fires including:
 - Limited access for emergency equipment due to condition of roadways;
 - Inadequate water supplies and the spacing, consistency and species of vegetation around house near brush fire areas.

Winter Storms

- The City shares a large percentage of its snow and ice road clearing duties with both MA DCR and MA DOT. Revere would like to better coordinate with both agencies to ensure mutual enforcement of winter no-parking ordinances during storm events and prompt sidewalk snow removal following storm events.
- Develop partnerships with utility providers and DPW to document known hazards and implement measures to increase resilience to winter storms
 - Informing the utility of the Town's tree maintenance program and establish standards for all tree pruning around utility lines;
 - Incorporating the inspection and management of hazardous trees into the drainage system maintenance process.
 - Inspecting utility poles to ensure they meet specifications and are wind resistant.

- Upgrading overhead utility lines- e.g. adjust utility pole size, utility pole span widths, and/or line strength.
- Using designed-failure mode for power line design to allow lines to fall or fail in small sections rather than as a complete system to enable faster restoration.
- Installing redundancies and loop feeds.

Medium Priority Mitigation Measures

Flooding, Drainage Infrastructure and Dams

- Consider updating site plan review and subdivision stormwater standards by referencing stormwater ordinance. Amend stormwater ordinance to design for a 100-year storm event, not the current 15-year event.
- Master Plan Update: Include a section on Climate Change Adaptation in the next update of the City's master plan.
- Dredge Washburn Avenue drainage outfall and chokepoint.
- Research feasibility of dredging sections of Trifone and Town Line Brooks to increase storm water and coastal surge storage.

Wind Related

- Update and implement the tree maintenance program with additional funding for staffing to identify and remove hazardous trees.
- Distribute information to property owners to reduce risk of tree failure to life, property and utility systems; identify potentially hazardous trees in critical areas
- Assess public buildings and schools for wind loads and tornado vulnerability and identify any needed retrofits.

Winter Storms

- Snow removal equipment needed: front-end loader with plow attachment, 10-wheel dump truck with plow and sander attachments, and snow blower attachment for Bobcat for sidewalk snow clearance.
- Protect buildings and infrastructure by assessing them for snow loads and identifying any needed retrofits to withstand snow loads and prevent roof collapse.
- Consider participating in a regional Sea Level Rise Action Work Group with neighboring coastal communities to draft and implement preparedness actions for winter storms, storm surge and associated sea level rise coastal hazards.
- Re-establish sand dunes from Cary Circle to Eliot Circle along Revere Beach by re-planting beach grass.
- Install levees along Belle Isle Avenue/Belle Isle Inlet to prevent tidal surge/over wash into adjacent residential neighborhood.

Lower Priority Mitigation Measures

Geologic Related

- Consider drafting and adopting a hillside slope development ordinance to prevent development on severely sloped land and prevent landslides and erosion.
- Public Building Assessments: Assess the earthquake vulnerability of all public buildings. Investigate options to make all public buildings earthquake-resistant.

Flooding and Drainage Infrastructure

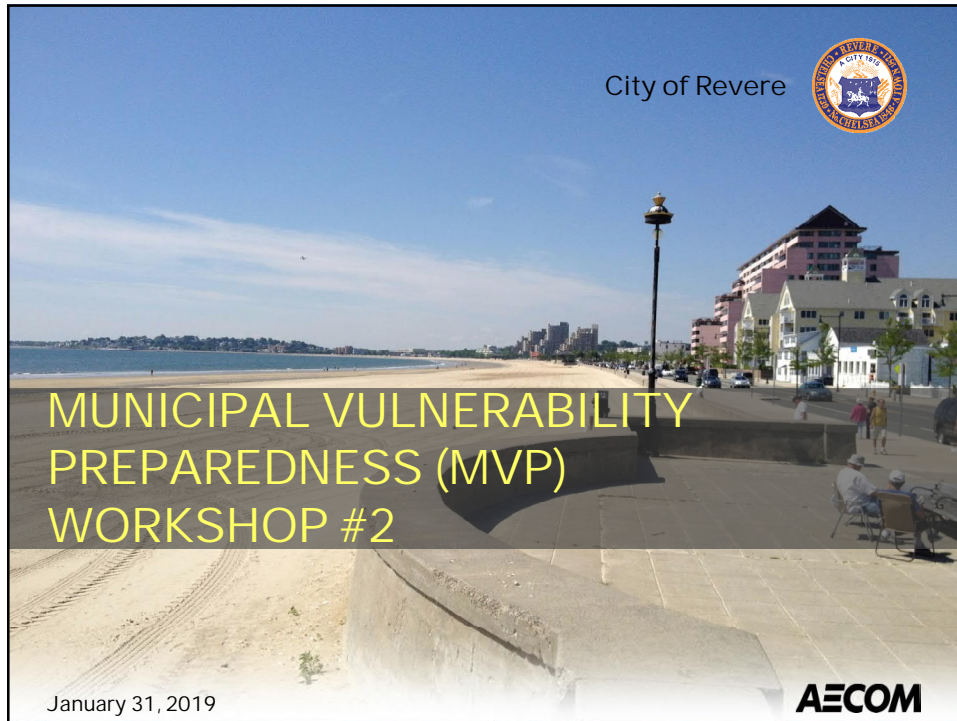
- Develop a City-base wetlands mapping capacity that would include an all local wetlands delineations data base
- Create and implement a wetlands, flooding, and stormwater education and outreach program for Revere residents that incorporates new NFIP map and program information

Drought

- Implement drought tolerant landscape design through measures such as:
 - Incorporate drought tolerant native species into development landscape regulations.
 - Using permeable driveways and surfaces to promote groundwater infiltration and reduce stormwater runoff.

Extreme Temperatures

- Promote Green Buildings and Parking areas to reduce urban heat island impacts: implement guidelines for new development and redevelopment to plant trees to shade buildings, parking areas and public ways; encourage the use of green roofs or cool roofing products to reflect sun and heat away from a building.



Agenda

- 1:00-1:10 Welcome and Introductions
- 1:10-1:20 Workshop Overview and Objectives
- 1:20-1:40 Review Outcome of Workshop #1
- 1:40-1:50 Small Team Exercise Instructions
- 1:50-2:00 Refreshment Break
- 2:00-3:30 Small Team Exercise
- 3:30-3:40 Refreshment Break
- 3:40-4:00 Small Team Report Out
- 4:00-4:20 Finalize Top Priorities
- 4:20-4:30 Next Steps

Workshop Overview and Objectives

- MVP Goals
 - Increase the City's resilience to natural hazards and climate change by identifying prioritized actions and policies.
 - Build greater community awareness of climate change and resilience.
 - Engage stakeholders and provide them with a voice for City's future.
 - Enhance the City's current resilience planning efforts.
 - Receive the designation of a MVP community and eligibility for MVP action grants to implement priority actions.

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Workshop Overview and Objectives

- Workshop #1 (held January 10th):
 - Defined top local natural and climate-related hazards of concern
 - Identified existing and future strengths and vulnerabilities
- Workshop #2:
 - Develop prioritized actions for the City
 - Identify immediate opportunities to collaboratively advance actions to increase resilience



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Recap of Workshop #1: Key Terms and Definitions

- Refer to handout for following definitions:
 - Natural Hazard
 - Climate Change:
 - Risk
 - Exposure
 - Sensitivity
 - Vulnerability
- **Action:** Project, activity, or process taken to reduce or eliminate long-term risk to people, property, and natural systems from climate change and/or natural hazards and their impacts.

Recap of Workshop #1: Key Terms and Definitions

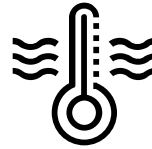
Assessing Climate Change Vulnerability



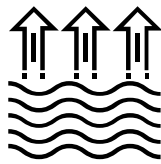
Recap of Workshop #1: Climate Change Projections



Changes in Precipitation



Rising Temperatures



Sea Level Rise



Extreme Weather

Recap of Workshop #1: Hazards in Revere

Zone 1 (Beachmont)

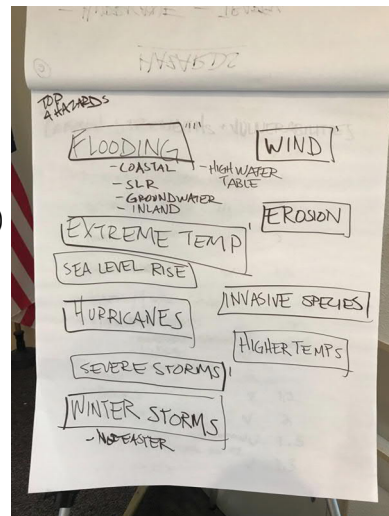
- Flooding (coastal and backshore)
- Extreme temperatures
- Hurricanes
- Winter Storms/Nor'easters

Zone 2 (Point of Pines)

- Flooding (sea level rise and groundwater)
- Wind
- Erosion
- Storms/Nor'easters

Zone 3 (Oak Island)

- Coastal flooding
- Inland flooding
- Storms/severe weather
- Invasive species



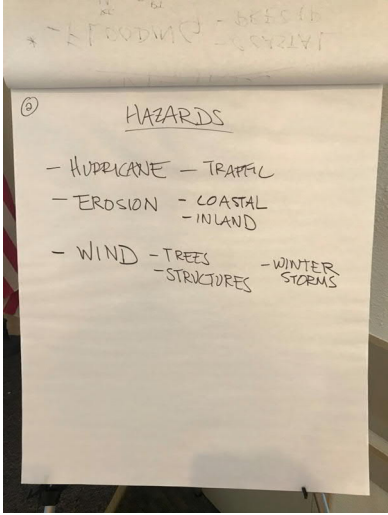
Recap of Workshop #1: Hazards in Revere

Zone 4 (West Revere)

- Flooding
- High water table
- Extreme temperatures
- Higher winds

Zone 5 (Sales Creek)

- Flooding
- Storms/extreme weather
- Sea level rise
- Extreme temperatures



Recap of Workshop #1: Vulnerabilities and Strengths in Revere

Infrastructural Features	Vulnerability or Strength
Seawalls and revetments	V/S
Roadways	V
Drainage system	V
Pump stations	V/S
Tide gates	V/S
Housing	V
Schools	V/S
Illegal sewer hookups	V
MBTA stations	V
Proposed development	V/S

Recap of Workshop #1: Vulnerabilities and Strengths in Revere

Societal Features	Vulnerability or Strength
Elderly	V
School children	V
Increasing flood insurance costs	V
Communications/reverse 911	S
Uninformed public/residents	V
Public safety access	V/S
Non-English speaking population	V
Low income population	V
Social services	V/S
Sheltering facilities	V/S

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Recap of Workshop #1: Vulnerabilities and Strengths in Revere

Environmental Features	Vulnerability or Strength
Saltwater marsh	V/S
Beaches/dunes	V/S
Recreational and open space	V
Landfill	V
Invasive species	V
Pollution/air quality	V
Wildlife habitat	V
Floodplains	V
Townline Brook	V
Development pressures	V

MUNICIPAL VULNERABILITY PREPAREDNESS City of Revere

Small Team Exercise Instructions

- Revisit breakout group findings from Workshop #1 (15 minutes)
 - Top 4 priority hazards
 - Vulnerabilities and strengths for Infrastructural, Societal, and Environmental sectors
- Identify “actions” to reduce vulnerabilities or reinforce strengths for the top 4 hazards for each sector (45 minutes)

Community Resilience Building Risk Matrix				www.CommunityResilienceBuilding.org			
H-M-L priority for action over the Short or Long term (and Ongoing)				Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)			
V = Vulnerability S = Strength				Priority Time			
Features	Location	Ownership	V or S	H	M	L	Short Ongoing
Infrastructural				Step 1 Review: 15 minutes			
Step 1 Review: 15 minutes				Step 2 Identify Actions: 15 minutes per sector (45 minutes total)			
Societal							
Environmental							

Small Team Exercise Instructions

- See handout for example actions
- Consider nature-based solutions: Strategies that use natural resources to enhance climate adaptation, resilience, and mitigation to mimic natural processes or work in tandem with man-made engineering approaches to address natural hazards.

Small Team Exercise Instructions

- Identify the priority (High, Medium, Low) and timeframe for each action (Ongoing, Short-term, Long-term) (15 minutes)
- Identify the top 3-5 priority actions for small team report out (10 minutes)

Community Resilience Building Risk Matrix				www.CommunityResilienceBuilding.org			
Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)							
H = High priority for action over the Short or Long term (and Ongoing)				Priority			
V = Vulnerability S = Strength				Time			
Features	Location	Ownership	V or S	H	M	L	Short Long Ongoing
Infrastructural				Step 1 Review: 15 minutes			
Step 1 Review: 15 minutes				Step 2 Identify Actions: 15 minutes per sector (45 minutes total)			
				Step 3 Prioritize Actions/Timeline: 25 minutes			
Societal							
Environmental							

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Small Team Exercise Instructions

- Prioritizing considerations:
 - Number of residents/properties that would benefit
 - Agreement on outstanding impacts from recent hazard events
 - Necessity for advancing longer term outcomes
 - Contribution towards meeting existing local and regional planning objectives
- Timeframe/urgency examples:
 - Ongoing (O) action: Current flood mitigation project
 - Short-term (S) action: Update Revere’s Hazard Mitigation Plan
 - Long-term (L): Reduce/relocate housing stock in high-risk areas

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Refreshment Break



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Small Team Exercise

- Team introductions and identify spokesperson (5 minutes)
- Revisit breakout group findings from Workshop #1 (15 minutes)
- Identify "actions" to reduce vulnerabilities or reinforce strengths for each sector (45 minutes)
- Identify the priority and timeframe for each action (15 minutes)
- Identify the top 3-5 priority actions for small team report out (10 minutes)

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Refreshment Break




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Small Team Report Out

- Identify top 3-5 priority actions



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Finalize Top Priorities

- Finalize highest-priority actions



Next Steps

- Generate final workshop products
- MVP Summary of Findings Report
- MVP Listening Session April/May 2019
- Submit MVP action grant application

Thank you, and great job!



Appendix E Input from Community Listening Session

Community Listening Session Materials

A public information and listening session titled "Climate Change & Revere: A Community Listening Session" was hosted by the City of Revere on April 4, 2019 from 6:30-7:30PM at the Rumney Marsh Academy Auditorium (140 American Legion Highway, Revere, MA). A recording of the listening session was posted online:

<https://www.youtube.com/watch?v=AZIZWd8tjS4>.


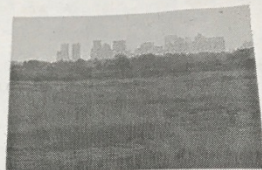

wounds and serious illness. After the war, she established the American Red Cross, and was the organization's first president.

Health care costs have been on the rise for years; it's important to plan your finances so if something happens, you and your family are secure.

expected expenses. Putting away a small amount each paycheck will help offset any future cost.

Christine Armstrong is an executive director with Morgan Stanley Boston, and a frequent contributor to Bloomberg Radio, WBZ's "Before the Bell" and Herald

High School 2nd book," said Kell an abundance of ence at Revere and will continue collaboration w Police Departm the safety of o munity." On Febru gunman open jory Stonema School in P killing seven staff memb seventeen identified expelled st as the ass scene on with othe arrested a in nearby He c the per charged premedi counts Cruz



CLIMATE CHANGE & REVERE

JOIN US FOR A COMMUNITY LISTENING SESSION

THURSDAY, APRIL 4
6:30-7:30 PM
Rumney Marsh Academy Auditorium

Learn more about the findings of the City's ongoing Municipal Vulnerability Preparedness planning process, actions that can be taken to make Revere more resilient, and share your feedback.

Contact: Elle Baker, City of Revere Project Planner, 781-286-8188, ebaker@revere.org

Listening Session Advertisement from the Revere Journal

Notes from the listening session question and answer discussion are provided below. Listening session participants were also given the opportunity to provide written comments on worksheets. Completed worksheets are provided on the following pages. The listening session sign in sheets are also attached.

This listening session feedback will be considered by the City as it moves forward with its resilience efforts.

Question and Answer Session at the MVP Community Listening Session:

Question:

Many of the infrastructure changes mentioned are very expensive projects, does an MVP designation offer benefits to the City of Revere?

Response:

- The State has allocated \$10 million for the current round of the MVP action grant program. This funding will be awarded to MVP communities to assist with implementation of priority projects identified through the MVP planning process.
- There may be up to \$1 million available per project through the MVP action grant program.
- There are also other funding opportunities such as CZM Coastal Resilience Grant Program, and the State is trying to align different grant programs and SRF to offer an extra point on the application to cities and towns that have the MVP designation.

Question:

There are 2 types of the projects to undertake. Planning for brick and mortar, like seawalls, and planning and preparedness / resiliency planning for residents and businesses in the city. We need to make residents and businesses more aware of opportunities. We talked at the workshop about making people more aware of funding opportunities available for planning and infrastructure. Perhaps we could have a booklet for residents to let them know what is available. We also need to inform local businesses.

Response:

- Very good point, this did come up in the workshop discussion.
- I need to clarify that what information is listed here on the presentation are the items that floated to the top of the list of priorities, there are many other items discussed in the summary of findings report.
- The complete universe of items that were discussed at the workshop are captured in the summary of findings report.

Question:

What actions will the MVP program take on? What about restoration to the salt marshes and the ecosystems that they provide?

- We have restored 4.5 acres of salt marsh helped flow storage capacity in Oak Island and environmentally removed invasive species,
- Another phase of this will incorporate 7-acres south of the eastern County Ditch next phase to that NS Road between B&M the eastern county ditch runs right through the center and we need to restore the next 7 acres in the south.
- Many salt marshes in areas in the city have been depreciated because of invasive species and they are an important resource for flood protection and need to be restored as we receive more funding.
- Significant environmental resource for flood protection and we have identified those areas and with more funding we will continue the restoration

Question:

I work for DCR and I am a Revere resident, I work right on the ocean and I notice often that there are cranes and development everywhere. Does the city plan to stop development and limit the amount of building and begin to focus more on dune restoration?

Response:

- At a certain point, we are going to have to figure out what we are doing in terms of development and that is part of what we are talking about with the master plan.
- I would say that there are a couple of priorities, one and the biggest is Wonderland as the potential site we develop and we hope that this will be a commercial development that we see there, I would be hard pressed to say we will do a hard stop on everything happening and that we are not going to build anymore and say we don't want you to invest in our community.
- In terms of the interest that we have gotten, it is in the area around the MBTA station and around the beach for good reason so there is a lot happening that has already been planned for a long time. And this is the time it is all coming to fruition.
- of it and many people here can tell you about the ups and downs over the last 30 years and the bottom falls out and we have vacant land
- It is a good point regarding coastal resiliency and we are working towards planning for the next 50 years and we need to think about it, that hasn't happened in the past.
- Preserving natural habitat and promoting responsible development and environmental planning and resiliency are not mutually exclusive, we are seeing some of the some of the most progressive and forward-thinking development happening now.
- Water Front square was designed with resiliency in mind and the fact is there is more space that is permeable now rather than the previously with 10- acres of pavement that just discharge water into the system and this responsible development will preserve the natural habitat.
- That is what is happening and that is our goal.

Question:

Some discussion has been about sand dunes on the beach. There is planning and mitigating required on land along the beach that belong to the DCR. We are all focusing on Revere, where does the state come in with resiliency support and planning.

Response:

- Thanks to our State Delegations and State Representative, RoseLee Vincent they secured a considerable amount funding in the environmental bond bill for Revere.
- Projects include: beach nourishment and erosion control, sea wall restoration and repair along Winthrop parkway and a feasibility study for Riverside and Point of Pines.
- These projects have earmarks for a total of 40 Mil for Revere and we will need to work with DCR as they are the sponsors and the operators of this space and the future looks bright because now the funds are there to go towards these resources, so work should be done in the next 5-10 years.

Question:

What about the brooks in West Revere, tide gates and flooding on Asti Ave? Comment to work with DEP and DCR and I have not seen them to be helpful. There is a resident on Toscano Ave and there has been no help from DEP and DCR, so they need to work on a better answer than that because that area needs to be taken care of.

Response:

We have met down there this past summer with the state and DCR and they have all promised to work together, it will be a massive undertaking to clean out that box culvert as it goes all the way back to Malden. We station people there during storms and we are taking steps to get this cleaned out. People are listening at the state level to help.

Importance of working with the state is not limited to the most obvious DCR, all of our major highways and major transit, owned by MBTA and Mass DOT, so it is a jurisdiction issue that clearly requires cooperation.

Question:

I think it is worth emphasizing, I read something about incorporating this into the Master Plan. How is that going to happen?

Response:

In regard to the master plan all to folks in our office are collaborating, there are about 8-categories, so we are all working together that make sure the MVP and Hazard Mitigation planning in 2020 to be incorporated among other items.

The next steps are to submit the MVP summary of findings report for approval.



Revere & Climate Change: A Community Listening Session

April 4, 2019

Name (Optional): _____

Email/phone (Optional): _____

Neighborhood: Riverside

What hazards are you concerned about for Revere? (Check all that apply)

- | | | |
|---|--|--|
| <input checked="" type="checkbox"/> Inland Flooding | <input type="checkbox"/> Tornadoes | <input type="checkbox"/> Invasive Species |
| <input type="checkbox"/> Tsunami | <input type="checkbox"/> Landslide | <input type="checkbox"/> Earthquake |
| <input checked="" type="checkbox"/> Severe Winter Storm | <input type="checkbox"/> Wildfires | <input checked="" type="checkbox"/> Coastal Erosion |
| <input type="checkbox"/> Drought | <input type="checkbox"/> Other Severe Weather | <input checked="" type="checkbox"/> Hurricanes/Tropical Storms |
| <input type="checkbox"/> Average/Extreme Temps | <input checked="" type="checkbox"/> Coastal Flooding | <input type="checkbox"/> Other: _____ |

What infrastructure/society/environmental assets are vulnerabilities or strengths?

What actions can Revere implement to address vulnerability and risk to natural hazards and climate change (please include action title and brief description)?

Build a wall along the Riverside and North Shore Road area. Stop all the over building.

What other comments do you have?



Revere & Climate Change: A Community Listening Session

April 4, 2019

Name (Optional): _____

Email/phone (Optional): _____

Neighborhood: Riverside

What hazards are you concerned about for Revere? (Check all that apply)

- | | | |
|---|--|---|
| <input checked="" type="checkbox"/> Inland Flooding | <input type="checkbox"/> Tornadoes | <input type="checkbox"/> Invasive Species |
| <input type="checkbox"/> Tsunami | <input type="checkbox"/> Landslide | <input type="checkbox"/> Earthquake |
| <input checked="" type="checkbox"/> Severe Winter Storm | <input type="checkbox"/> Wildfires | <input checked="" type="checkbox"/> Coastal Erosion |
| <input type="checkbox"/> Drought | <input type="checkbox"/> Other Severe Weather | <input type="checkbox"/> Hurricanes/Tropical Storms |
| <input type="checkbox"/> Average/Extreme Temps | <input checked="" type="checkbox"/> Coastal Flooding | <input type="checkbox"/> Other: _____ |

What infrastructure/society/environmental assets are vulnerabilities or strengths?

Water from River backs up INTO STORM DRAINS and floods neighbor hood streets.

What actions can Revere implement to address vulnerability and risk to natural hazards and climate change (please include action title and brief description)?

INSTALL backflow preventers on storm drain piping ~~that~~ that out falls into River so water doesn't backup into streets

INSTALL 4'-5' Continuous Seawall on Mills Avenue - from Gibson park to North Shore Rd.

Possibly Dredge the Pines River to alleviate Flooding in the

Riverside

What other comments do you have?



Revere & Climate Change: A Community Listening Session

April 4, 2019

Name (Optional): JOHN POLURRI

Email/phone (Optional): JPolurri@gmail.com

Neighborhood: POINT OP PINES

What hazards are you concerned about for Revere? (Check all that apply)

- | | | |
|---|--|---|
| <input type="checkbox"/> Inland Flooding | <input type="checkbox"/> Tornadoes | <input type="checkbox"/> Invasive Species |
| <input type="checkbox"/> Tsunami | <input type="checkbox"/> Landslide | <input type="checkbox"/> Earthquake |
| <input checked="" type="checkbox"/> Severe Winter Storm | <input type="checkbox"/> Wildfires | <input type="checkbox"/> Coastal Erosion |
| <input type="checkbox"/> Drought | <input type="checkbox"/> Other Severe Weather | <input type="checkbox"/> Hurricanes/Tropical Storms |
| <input type="checkbox"/> Average/Extreme Temps | <input checked="" type="checkbox"/> Coastal Flooding | <input type="checkbox"/> Other: _____ |

What infrastructure/society/environmental assets are vulnerabilities or strengths?

DUNE REPLENISHMENT AND DUNE CREATION SEEM TO BE MORE EFFECTIVE THAN SEAWALL CONSTRUCTIONS

What actions can Revere implement to address vulnerability and risk to natural hazards and climate change (please include action title and brief description)?

[Empty box for actions]

What other comments do you have?

[Empty box for other comments]



Revere & Climate Change: A Community Listening Session

April 4, 2019

Name (Optional): Melissa Ferrante

Email/phone (Optional): mferr258@comcast.net

Neighborhood: _____

What hazards are you concerned about for Revere? (Check all that apply)

- | | | |
|---|--|--|
| <input type="checkbox"/> Inland Flooding | <input type="checkbox"/> Tornadoes | <input checked="" type="checkbox"/> Invasive Species |
| <input type="checkbox"/> Tsunami | <input type="checkbox"/> Landslide | <input type="checkbox"/> Earthquake |
| <input checked="" type="checkbox"/> Severe Winter Storm | <input type="checkbox"/> Wildfires | <input type="checkbox"/> Coastal Erosion |
| <input checked="" type="checkbox"/> Drought | <input checked="" type="checkbox"/> Other Severe Weather | <input type="checkbox"/> Hurricanes/Tropical Storms |
| <input type="checkbox"/> Average/Extreme Temps | <input type="checkbox"/> Coastal Flooding | <input checked="" type="checkbox"/> Other: <u>Sea Level Rise</u> |

What infrastructure/society/environmental assets are vulnerabilities or strengths?

What actions can Revere implement to address vulnerability and risk to natural hazards and climate change (please include action title and brief description)?

What other comments do you have?

What about creating a living shoreline?

What about investing in renewable energy as an option?



Revere & Climate Change: A Community Listening Session

April 4, 2019

Name (Optional): MARY

Email/phone (Optional): _____

Neighborhood: West Revere

What hazards are you concerned about for Revere? (Check all that apply)

- | | | |
|---|--|--|
| <input checked="" type="checkbox"/> Inland Flooding | <input type="checkbox"/> Tornadoes | <input type="checkbox"/> Invasive Species |
| <input type="checkbox"/> Tsunami | <input type="checkbox"/> Landslide | <input type="checkbox"/> Earthquake |
| <input checked="" type="checkbox"/> Severe Winter Storm | <input type="checkbox"/> Wildfires | <input type="checkbox"/> Coastal Erosion |
| <input type="checkbox"/> Drought | <input type="checkbox"/> Other Severe Weather | <input type="checkbox"/> Hurricanes/Tropical Storms |
| <input type="checkbox"/> Average/Extreme Temps | <input checked="" type="checkbox"/> Coastal Flooding
<u>From Brooks</u> | <input type="checkbox"/> Other: <u>City Needs to Publicize
An Emergency Plan Soon!</u> |

What infrastructure/society/environmental assets are vulnerabilities or strengths?

What actions can Revere implement to address vulnerability and risk to natural hazards and climate change (please include action title and brief description)?

- City of Revere MUST INSIST That The State Give US
 Help With Deepening & Clearing of The Brooks in West Revere
 And Fix Tide Gates or Replace The ones that Do NOT
 Work

- Also Stop DVER Building, it Doesnt help Poor Drainage A Res
 To App Buildings

What other comments do you have?



Revere and Climate Change: A Community Listening Session, April 4, 2019
Sign-in Sheet

Name	Affiliation (Resident, Business Owner, etc.)	Contact Information (Email or Phone)
Paul Argenzio	City of Revere ^{Superintendent} of Public Work	eargenzio@Revere.org
Rick Secino	Rev. Vincent's office	Richard.Secino@manusa.gov
Robert F. Strelitz		
Kerby Wankowski		
Aaron Weeneth	AECOM	aaron.weeneth@aecom.com
Hilary Dimino	DCR - Greening Gateway Cities	hilary.dimino@state.ma.us
Eric Lampedecchio	Ward 5 Resident	elampedecchio@gmail.com
Eileen Ferrante	resident	mferr197525@comcast.net
Priscilla Nickerson	Community Liaison	Priscilla@revere.org
Moreen Bartol	Resident	moreen.bartol618@hotmail.com
Joe Maglionie	City of Revere	
Bob Marra	Revere Resident	Bmarra@Revere.org
Robert Bartol	Revere Resident	



Revere and Climate Change: A Community Listening Session, April 4, 2019
Sign-in Sheet

MM

Name	Affiliation (Resident, Business Owner, etc.)	Contact Information (Email or Phone)
MARK LOCKE	Resident	MAK4659@AOL.COM
FRANK STRINGI	REVERE CITY PLANNER	fstringi@revere.org
Loretta LaCentra	Resident	
Ricci LaCentra	Resident	
Rosalee Vincent	STATE Rep - Fence Check Revere Comm	617-722-2210
Andrew B. DeSantis		
Mary Edwards	Resident / Home owner	
John Polcari	POINT OF Pines Beach Assn	JPOLCARI@GMAIL.COM
Diane Kelly	School Dept.	dkelly@revere.k12.org
Melissa Ferdiante	RESIDENT	MFER1258@Comcast.net
Joe O'Brien	City or Town	joeb@revere.k12.org
Carol Tye	Revere School Cante	ctye@revere.k12.org
Nathaniel Heiser	BIC	nathheiser@aol.com



Revere and Climate Change: A Community Listening Session, April 4, 2019

Sign-in Sheet

Name	Affiliation (Resident, Business Owner, etc.)	Contact Information (Email or Phone)
Elle Baker	City Resident	elle.baker224@gmail.com

