TECHNICAL REPORT

Climate Change Vulnerability Assessment and Adaptation Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven and Acushnet



Prepared by SeaPlan for
Buzzards Bay National Estuary Program
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Abstract

The City of New Bedford and the neighboring Towns of Acushnet and Fairhaven are particularly vulnerable to the impacts of sea level rise (SLR), especially in the event of a hurricane barrier failure in a storm. The projected interaction between SLR, increased storm intensity, and heavier precipitation is expected to impact the area's public and private property including associated water quality infrastructure and at-risk populations. A SeaPlan led team, which included RPS ASA and Fuss & O'Neill, modeled hypothetical worst case inundation scenarios using a combination of hurricane parameters and SLR scenarios, and used the model results to conduct a vulnerability analysis of water quality infrastructure, public property and populations. We also quantified economic and structural damages from storms, and formulated recommendations for adapting water quality infrastructure to prepare for storm events. The results of the vulnerability analysis showed that hurricane barriers around New Bedford Harbor began to be compromised by Category 2 hurricanes with 4-foot SLR and Category 3 hurricanes at current mean higher high water (MHHW). At a Category 3 storm with 4-foot SLR, maximum inundation depths in the area would reach 32 feet. This scenario would also result in inundation at the site of 100% of Designated Port Areas, 36% of publically-owned structures, 26 pump stations, and one wastewater treatment facility. It would also affect over 30,000 residents of environmental justice communities. Damage quantification analyses estimated $3.5 billion in projected economic damages to buildings and substantial damage to 1,399 buildings. Municipalities can use a water quality infrastructure adaptation project adaptation matrix developed in the report to prioritize projects which will protect critical water quality infrastructure from storm-related damages. Recommendations include adding on-site generators, checking for buoyancy, and flood-proofing doors, electrical systems and air intakes at vulnerable structures. The data generated during this study will further the municipal, state, and federal government's understanding of public infrastructure vulnerability and help municipalities plan for future storm events.

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Executive Summary

With the threat of climate change impacts such as sea level rise (SLR), and potentially more severe storms and precipitation events, coastal communities need to consider adaptation practices to protect populations and vital infrastructure. To address this need, the Buzzards Bay National Estuary Program (NEP) contracted SeaPlan to assess potential climate change vulnerability and mitigation strategies for water quality infrastructure in the three communities surrounding New Bedford Harbor under various SLR and storm surge inundation scenarios. The City of New Bedford and the Towns of Acushnet and Fairhaven share the harbor and are home to 50% of the Buzzards Bay watershed population, so it is important to assess to what degree these populations are at risk, and to identify climate change adaptation practices that are most critical for the the three municipalities.

SeaPlan, along with project partners RPS Applied Science Associated (RPS ASA) and Fuss & O'Neill, conducted inundation modeling using the National Oceanic and Atmospheric Administration's (NOAA) Sea, Lake and Overland Surge from Hurricanes (SLOSH) model to produce more than 60,000 storm surge predictions representing various combinations of SLR and hurricane parameters. These parameters included radius of maximum winds, forward speed, track direction, landfall location, and barometric pressure. We aggregated the storm surge results into 20 inundation depth grids, each representing worst case inundation for a particular hurricane category and SLR scenario. We then used the inundation data to determine inundation vulnerability of priority infrastructure, public property, and populations, using MassGIS and other local databases, and to estimate potential damages and economic losses using the Federal Emergency Management Agency's (FEMA) Hazus model. A panel of experts, including water quality infrastructure engineers and planners, analyzed a subset of the modeled data to evaluate the vulnerabilities and formulate recommendations for water quality infrastructure. Throughout the project, stakeholder engagement was an essential component in order to integrate ideas and values of local municipalities. The results and data products from the project were compiled into two online data visualization tools. The mapping tool uses the ArcGIS Online Story Map application to visually compare flooding scenarios and identify vulnerable infrastructure, while the risk communication tool compares estimates of economic losses between hurricane scenarios.

The results of the vulnerability analysis showed that hurricane barriers around New Bedford Harbor began to be compromised by Category 2 hurricanes with four feet of SLR and Category 3 hurricanes at current mean higher high water (MHHW). Rising baseline sea levels exacerbated inundation depths, extents, and projected damages in all hurricane scenarios. A range of storm parameters were modeled from low intensity (Category 1 with no SLR) through catastrophic (Extreme Category 4 with 4-foot SLR). The following summary describes results of the vulnerability analysis through a Category 3 with 4-foot SLR only, as higher intensity storms have never been recorded in the area. The relative risk of these or worse catastrophic storms making landfall in the area in the future would require additional analyses. Expected impacts from the modeled hurricane Category 3 SLR scenarios for the entire study area (New Bedford, Fairhaven and Acushnet) include:

- Maximum inundation depths of 11 to 32 feet above sea level
- 65 to 100 percent of Designated Port Area will be within inundation zones
- 4 to 36 percent of publically-owned structures
- Inundation at the locations of 6 to 39 percent of state-owned buildings
- Economic damages to buildings (which include replacement costs) ranging from $559 million to $3.5 billion
- Substantial structural damage might occur to 1,399 buildings with a Category 3 hurricane with 4-foot SLR
- Between 9,315 and 34,223 residents of environmental justice communities will be affected in the Category 3 scenarios

The report identifies the following water quality infrastructure features as high risk, based on their locations in the Category 3 floodplain at baseline conditions (no SLR):

- 1 pump station in Acushnet,
- 10 pump stations in Fairhaven,
- 4 pump stations and 1 wastewater treatment facility in New Bedford.

Additionally, 24 combined sewage overflows (CSO) are located in the City of New Bedford, and many of these will be significantly adversely affected by SLR.

Based on the modeling results and on typical standards for the design of wastewater infrastructure, the project team recommends that municipalities plan for at least a Category 3 storm occurring at current MHHW and that they take actions to evaluate and protect water quality infrastructure against damage at those predicted water levels. Based on available data from each municipality, we developed 24 site-specific adaptation actions that the municipalities could undertake to protect wastewater infrastructure from structural damages and to ensure functionality during inundation events and to be prepared for SLR. Examples of projects include adding on-site generators, checking structures for buoyancy, and flood-proofing doors, electrical systems and air intakes. The potential total study area construction costs for these projects could range from $1,240,000 - $5,200,000; however, that does not include costs for the necessary additional planning, modeling, and requisite engineering design that would be necessary to ground-truth and refine these recommendations.

To help the towns prioritize adaptation projects, the report includes a prioritization matrix, which calculated a priority ranking score based on project cost, inundation risk, and the relative system-wide importance of each facility. The following projects received the highest priority rankings based on this prioritization tool:

- Conduct a hydraulic modeling study of New Bedford's CSO system to assess the system's ability to store water during various hurricane scenarios (cost unknown)
- Add a floodproof door and extend vents on the Slocum St. pump station in Acushnet. Potential cost range is $10,000 - $25,000.
- Check South St. pump station in Fairhaven for buoyancy; potentially add floodproof door and remote controls. Potential cost range is $10,000 - $250,000.
- Floodproof doors, raise electrical service, and assess gas service at E. Rodney French Blvd. and Cove Rd. pump stations in New Bedford; Potential cost range is $25,000 - $250,000 for each pump station.

These recommendations are based on relatively coarse planning-level analysis, and should be viewed as starting points. It is recommended that all future actions be further refined based on site-specific investigations and any new information available to municipal decision-makers. Additional recommendations and considerations for each municipality can be found in the prioritization matrix of this report.

Through this study, the municipalities of New Bedford, Acushnet, and Fairhaven have taken important steps toward understanding and evaluating the potential impacts and vulnerabilities to climate change. This report provides important information essential for planning and prioritizing climate adaptation actions and identifying issues requiring more study. The information from this report can be used to prioritize specific actions to reduce those impacts and to target future more detailed vulnerability assessments.

If more detailed modeling is required for future predictions and analyses, the municipalities might consider leveraging the results of this project to hurricane parameters using the Finite-Volume Coastal Ocean Model (FVCOM) or other fine-scale modeling approaches which incorporate wave exposure, flood duration, and erosion. With respect to adaptation practices, it is important that each community continue to evaluate risk of public buildings and water quality infrastructure using the latest available information and implement cost effective measures to minimize threats to the critical infrastructure upon which their residents depend.

Project Background and Overview

New Bedford Harbor, which is shared by the City of New Bedford and the Towns of Acushnet and Fairhaven, is protected by a hurricane barrier that was completed by the US Army Corps of Engineers in 1966 (USACE 1997). The barrier and dikes protect a heavily urbanized and industrial area, an environmental justice community, a nationally important fishing fleet, and a center for the seafood processing industry. About 50% of the Buzzards Bay watershed population lives in these three communities.

Beginning in 2012, the Buzzards Bay National Estuary Program (NEP) and Massachusetts Office of Coastal Zone Management (MA CZM) have jointly conducted a draft evaluation of sea level rise (SLR) impacts, using LiDAR data, to New Bedford Harbor. These studies revealed apparent low areas on the hurricane barrier, which may increase the vulnerability of otherwise protected areas. The inconsistencies between NGVD elevations and NAVD88 LiDAR data, as well as possible errors in the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) have made it challenging to evaluate the vulnerability of some critical public infrastructure (Costa et al. 2013). This work generated particular concern about sea water intrusion into the combined sewer overflows (CSOs) in New Bedford and other water quality infrastructure vulnerabilities (Webler et al. 2012). Given these concerns, Buzzards Bay NEP recognized a need for a more rigorous evaluation of how SLR might affect storm impacts in the greater New Bedford area.

To address this need, the Buzzards Bay NEP and MA CZM contracted SeaPlan to model hypothetical storm surges, quantify associated damages, identify vulnerable structures and populations, develop data products and tools, and create an informed series of recommendations for enacting short and long term adaptation actions. SeaPlan is a Boston-based non-profit science and policy group which focuses on fostering decision making and planning through best available science and stakeholder engagement. The team also included modeling and data visualization tool development from RPS ASA, and water quality and engineering expertise from Fuss & O'Neill. The over-arching goals of the project were to:

- Improve the understanding of local officials in New Bedford, Fairhaven, and Acushnet about the vulnerabilities of public infrastructure (especially wastewater and stormwater) to future SLR and potential increased frequency and intensity of storms through the use of easily-accessible and interpretable data products; and
- Identify priority adaptation strategies to guide municipalities in implementing future changes in infrastructure maintenance planning and lead to a reduction in long-term vulnerabilities of public and municipal infrastructure

This technical report details the methodology, results, and conclusions from this study. The interactive mapping tool and the risk visualization tool found at seaplan.buzzardsbay.org summarize the results of this study and can serve as decision making tools for municipal leaders and other stakeholders.

Methodology

The study was comprised of the following five project components:

1. Inundation modeling
2. Vulnerability analysis and damage quantification
3. Water quality engineering analysis and recommendation development
4. Stakeholder engagement
5. Data visualization tools

Inundation modeling using the National Oceanic and Atmospheric Administration's (NOAA) Sea, Lake, and Overland Surges from Hurricanes (SLOSH) model resulted in over 60,000 scenarios run with SLOSH. The results were aggregated to develop 20 "summary depth grids" representing maximum inundation for each combination of hurricane category and SLR scenario. The team used these depth grids to produce maps and tables which summarized vulnerable infrastructure and populations, and to estimate economic and structural damage using the Federal Emergency Management Agency's (FEMA) Hazus model. Results of the vulnerability analysis informed the water quality engineering analysis, which resulted in a series of recommendations for CSOs, pump stations and wastewater treatment facilities. A series of stakeholder engagement meetings and workshops informed our modeling approach and subsequent analyses which highlighted key priorities for municipal officials, as well as state and federal agencies. The development of online data visualization tools was a key component of our outreach strategy. The following sections describe the methodology for each component of the project.

Inundation Modeling

The team used the SLOSH model (Jelesnianski et al. 1992) to forecast hypothetical storm surges for New Bedford, Fairhaven and Acushnet under current and future conditions. SLOSH was developed by the NOAA/National Weather Service Meteorological Development Laboratory and is used operationally by NOAA's National Hurricane Center. SLOSH includes a surface wind model and can simulate overtopping of barrier systems, levees, and roads, flow through barrier gaps, and inland inundation. The US Army Corps of Engineers (USACE) used SLOSH as part of its Southern Massachusetts Hurricane Evacuation Study (USACE 1997) which was updated in 2013.[1]

A comparison of several storm surge planning tools can be found in blue call-out box on the next page. Although SLOSH lacks some of the physics of more robust circulation models, a major advantage is that it requires very little computational time, meaning that for a given area of concern, an ensemble of SLOSH simulations (i.e., thousands of runs) can be performed to examine the effect of slight perturbations in storm track, speed, and size on storm surge.

[1] Updated maps from this study can be found at http://www.mass.gov/eopss/agencies/mema/hurricane-inundation-maps.html

Model Inputs

The stakeholder engagement activities described in later paragraphs informed the model parameters used in the analysis. Participants at the kick-off and agenda development meetings vetted the project team's recommendations for project-specific model inputs and methodology. The three main components of SLOSH model inputs are the SLOSH basin, which provides the computational grid for the area of interest, a matrix of hurricane parameters, and the base water level. The hurricane parameters include pressure deficit, radius of maximum winds, landfall location, forward speed, and track direction. The model uses the hurricane parameters defined for each model scenario to calculate water in each model grid cell at each model time step.

We used the Providence/Boston (PV2) basin (Figure 1), which is used operationally by the NOAA National Hurricane Center. The grid's center point is between Providence and Boston. The highest resolution of the grid is in Narragansett Bay, where the resolution is 0.2 NM. Of the basins available for the region, the PV2 basin is the most recent and offers the highest resolution (0.5 NM at the New Bedford Hurricane Barrier). The vertical elevations in the Providence/Boston basin digital elevation model (DEM) are relative to NAVD88.

The matrix of storm parameters used in SLOSH was developed from the catalog of storms used by NOAA to generate the composite Maximum Envelope of Water (MEOW) and Maximum of MEOWs (MOM) products produced for each hurricane category for the PV2 basin. To account for the uncertain impacts of climate change on hurricane intensity, the project team recommended expanding the ranges of pressure deficit, forward speed, and radius of maximum winds parameters.

We used feedback from the kick-off meeting, described in future sections, to prepare a draft input matrix, and then performed a sensitivity analysis to determine the parameters that were most influential causing high water levels in the area of interest. The analysis revealed that the largest pressure deficit and fastest forward speeds caused the largest storm surges. It also showed additional sampling of the radius of maximum winds and track direction should be included in the matrix. The team added these additional parameters to the input matrix, which is summarized in Table 1. Figure 2 depicts the landfall locations used in the model.

COMPARISON OF STORM SURGE PLANNING TOOLS

There are several models and tools that are used to predict storm surge inundation depths and extents. While this does not contain an exhaustive list of these tools, it outlines several approaches which are applicable in the region. Municipal, state, and federal planners are often familiar with FEMA's FIRMs, which depict the 1% risk area (100-year storm) or a 0.2% risk area (500-year storm) of inundation vulnerability. Base Flood Elevations (BFEs) within the floodplains indicate the inundation depth resulting from these storms. FIRMs are used to determine flood insurance rates and requirements, and also to establish regulations and standards for development within a floodplain. BFEs are calculated using storm surge stillwater elevations, wave heights, and other wave parameters (FEMA 2007).

Like the model used to create FEMA's Flood Insurance Rate Maps (FIRMs), the NOAA Sea Lake, and Overland Surges from Hurricanes (SLOSH) model is used to identify areas that are vulnerable to inundation from storm surges. While FIRM BFEs are calculated using storm surge stillwater elevations, wave heights and other wave parameters, SLOSH uses stillwater elevations along with a matrix of hypothetical hurricane parameters to generate inundation extents. Wave heights are not included in the model. In the Buzzards Bay area, the 1% FIRM area corresponds roughly to Category 2 hurricanes modeled by SLOSH, while the .2% FIRM area roughly corresponds to a SLOSH Category 3 hurricane.

The Finite Volume Coastal Ocean Model (FVCOM) currently in development at the School of Marine Science and Technology at the University of Massachusetts Dartmouth is another example of a modeling tool that can be used to model storm surges. This fine-scale model uses an unstructured grid which is beneficial in modeling complex coastal features, and also features the ability to incorporate wind-wave interactions (Chen et al. 2003; Qi et al. 2009).

Table 1. Final matrix of hurricane parameters used as SLOSH model inputs. Values marked with an asterisk were added to the matrix based on feedback from municipal officials at the kick-off meeting. Bold values were added based on the results of the sensitivity analysis.

Parameter	Values	# Variations
Landfall Location	Evenly spaced along the shoreline	12
Pressure Deficit (ΔP)	20, 40, 60, 80, 90* mb	5
Radius of Maximum Winds (R)	**20***,30, **40**, 45, **50**, **55*** NM	6
Forward Speed (T)	20, 30, 40, 50, 60, **70*** mph	6
Track Direction (Θ)	N, NNE, NNW, NW, **NtW***, **NWtW**, **NtE***	7
	Matrix Total Cases	**15,120 per water level 60,480 total**

The base water level input to SLOSH is typically defined as a tidal elevation. In order to address the purpose of this study, we used four base water levels: current conditions and three SLR scenarios. In this case, we used a tidal elevation alone and in combination with 1, 2, and 4 feet of SLR for each set of hurricane parameters. Current conditions were defined using mean higher high water (MHHW). MHHW is the average of the higher high water height of each tidal day and thus represents areas that are, on average, wet once per day. Although there are two NOAA CO-OPS stations (Station 8447712 at New Bedford, Clarks Point, MA and Station 8447584, New Bedford Bridge station) in the study area, neither provide offsets between tidal datums and NAVD88 (as required by the SLOSH model when using the PV2 basin). Therefore, the MHHW water level referenced to NAVD88 at NOAA CO-OPS Station 8452660 at Newport, RI is transformed to the NOAA CO-OPS New Bedford Bridge station (8447584) using a the 1.05 multiplicative relationship calculated by NOAA using a series of simultaneous observations between the two stations. The locations of the NOAA CO-OPS stations are presented in Figure 3 and the four water levels that SLOSH was initialized with are provided in Table 2.

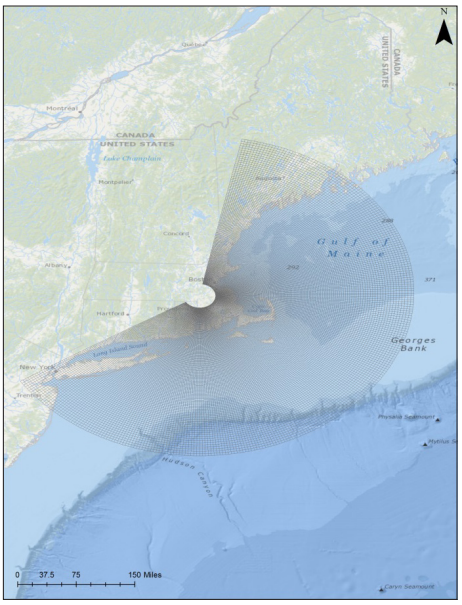

Figure 1. Boston Providence depth grid used as SLOSH model input

Depth Grid Processing

Running all combinations of hurricane parameters in the input matrix (Table 1) under the four base water level scenarios resulted in a total of 60,480 storm tide grids (15,120 per water level). To summarize the model outputs, the team aggregated the results by hurricane category (Categories 1-4 and extreme 4, based on pressure deficit parameters of 20, 40, 60, 80, and 90 mb) and base water level scenarios (0, 1, 2, and 4-foot SLR) to create 20 summary grids based on the MOM approach used by NOAA. The MOM approach takes the maximum storm tide value for each grid cell from a group of model results. Thus, the resultant grid does not represent the storm tide specific to one particular event (or set of storm parameters), but provides the worst-case water level elevation for each location (grid cell). The results of this aggregation approach are 20 summary grids showing the worst case water level in each SLOSH grid cell for all combinations of base water levels and hurricane category.

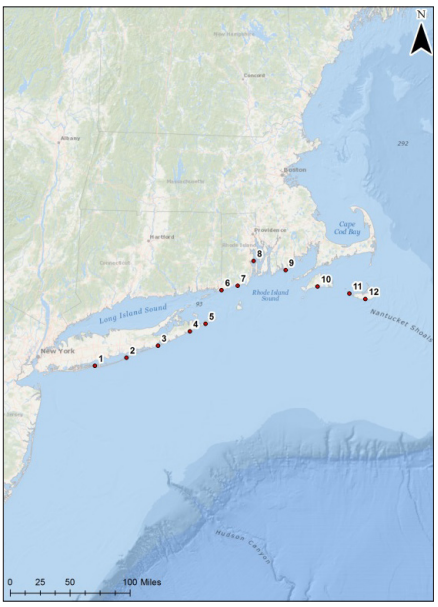

Figure 2. Landfall locations used as SLOSH model input

The team downscaled the SLOSH results onto a much higher resolution DEM, using two LiDAR datasets, including the one developed by Buzzards Bay NEP and MA CZM for their New Bedford Harbor Study, as well as a United States Geological Survey (USGS) National Elevation Dataset (NED). We then assessed flooding extent and depth using a series of ArcGIS-based scripts which account for spatial variation inherent in storm surge model output and which remove areas of hydraulically disconnected flooding.

Figure 3. NOAA monitoring stations used for base water level inputs in SLOSH model

Table 2. Base water level inputs used in SLOSH Model. The tidal elevation was defined as mean higher high water (MHHW) for each water level scenario. MHHW is the average of the higher high water height of each tidal day and thus represents areas that are, on average, wet once per day. Location names and associated numbers refer to tide prediction stations.

Tidal Elevation	Newport, RI (8452660)	New Bedford, MA (8447584) Offset = Newport*1.05	New Bedford, MA (8447584) with SLR		
	Feet Relative to NAVD88		1 ft	2 ft	4 ft
MHHW	1.81	1.9005	2.9005	3.9005	5.9005

To account for small features, such as swing gates on the hurricane barriers which are not represented as open in the LiDAR datasets but which control flooding in the harbor when closed during storms, we manually post-processed the depth grids. In those cases where the flooding did not extend over the top of or around the barrier, we clipped the depth grids to remove inundation behind the barrier. We also removed areas of the depth grid which depicted static flooding from SLR in scenarios that did not breach the hurricane barrier. Finally, we clipped the results using an aggregated shoreline product created from the LiDAR data and a NOAA high resolution shoreline dataset. The final depth grid maps can be found in Appendix A.

For visualization purposes in summary maps and in the online mapping tool, depth grids were converted to polygons and simplified to depict inundation extents only.

Vulnerability Assessment and Damage Quantification Methodology

Data Inventory

The team began the vulnerability assessment by inventorying, categorizing, and assessing relevant spatial datasets available from MassGIS, Buzzards Bay NEP, and other local data sources. After reviewing the list with meeting participants and municipal officials, the team developed a final list of datasets to be included in the vulnerability analysis and resulting spatial data products and tools, and modified the datasets as needed. A summary of the data, data sources, and modifications can be found in Table 3. More detailed metadata can be found in the downloadable geodatabase[2] associated with the project available at http://climatechange.buzzardsbay.org/seaplan-study.html.

Table 3. Data processing summary

Dataset	Source	Project-specific Modifications
CSOs and Stormwater Pipes	Buzzards Bay NEP (Discharge Points dataset)	• Merge datasets from New Bedford, Fairhaven and Acushnet • Filter out roadcuts
Water Quality Infrastructure (wastewater treatment plants and pump stations)	Public property assessor's data via Buzzards Bay NEP; data from municipal officials	• Select wastewater infrastructure from municipal assessor's data using attribute values • Create water quality features not present in assessor's data using location information from municipal officials and Google Earth imagery
Public Property Structures	Public property assessor's data via Buzzards Bay NEP	• Select public property structures from municipal assessor's data using attribute values
Built Public Parcels	Public property assessor's data via Buzzards Bay NEP	• Select public property structures from municipal assessor's data using attribute values
Government Buildings	Public property assessor's data via Buzzards Bay NEP	• Select public property structures from municipal assessor's data using attribute values
State-owned Buildings	MA Division of Capital Asset Management & Maintenance/MAssets	• Select buildings within study area
Designated Port Areas	Public property assessor's data via Buzzards Bay NEP; MA CZM	• Select DPA structures from municipal assessor's data using list of DPAs from MA CZM
Environmental Justice Communities	US Census via MassGIS	• Select environmental justice communities within study area

[2] A geodatabase is a data storage framework used by ESRI ®ArcMap ™ to manage spatial datasets used in the program.

Data Processing

We imported these datasets and the SLOSH output grids into ESRI ®ArcMap ™ v. 10.2. Using the Extract Multi Values to Points geoprocessing tool in the Spatial Analyst toolbox, we assigned a depth value from each SLOSH grid to each point feature. In the case of polygon features, we assigned a mean depth to each polygon feature using zonal statistics tools and a spatial join.

We also used LiDAR data to identify low points on the New Bedford hurricane barrier using a shapefile of points along the crest of the barrier with 5m spacing. For each point, we created a profile and queried the elevation within +/- 5m of the digitized structure crest to account for uncertainty of the precise location of the crest in the digitized structure and any offset between the imagery and the LiDAR. We then highlighted points on the structures that had maximum elevations that were lower than 1.5 standard deviations from the mean elevation to identify barrier low points.

Hazus

We used the Federal Emergency Management Agency's (FEMA) Hazus model to quantify and visualize damages from each inundation scenario. Hazus is a GIS-based program that models damages and loss from hazards such as floods. Hazus is capable of quantifying the physical, economic, and social impacts of various flood scenarios and SLR time horizons. Hazus includes base asset and population information for the entire United States and is easily applied to any community in the country. Using the flood inundation layers generated by additional SLOSH modeling, the team applied Hazus to each of the 20 summary inundation scenarios.

We ran each inundation scenario individually, first by defining the study region using Census Block data included in Hazus and municipal boundary data from MassGIS. The SLOSH depth grid defined the floodplain, and the team chose assets of interest from the default Hazus database to run the damage analysis. Hazus calculated damages and loss to general building stock, essential facilities (medical care, police stations, fire stations, emergency centers, schools), transportation systems, utility systems, and also calculated the amount of debris and direct social losses associated with each flood scenario.

A major caveat associated with the Hazus analysis is that the default data included in the program is aggregated on a national level using data from the 2000 Census, and as such, may be out of date or on a coarser scale than locally-sourced datasets. Although the option exists within Hazus to incorporate user-supplied data which may be more accurate, precise, or descriptive than the default data, preparing appropriate data for Hazus was beyond the scope of this project. As such, it is important to interpret the results with caution, treating them as conservative estimates. The project team recommends that the results be used to compare the scale of damages among hurricane scenarios, rather than to make firm projections about damages.

[3] Available from http://climate.buzzardsbay.org/floodplain-expansion-results.html

Water quality engineering analysis and recommendation development Methodology

The project team developed recommendations for wastewater treatment facilities and pump stations based on two inundation scenarios. Because of the large quantity of data that resulted from the inundation modeling, we prioritized our recommendations based on inundation depths for these facilities for two modeled inundation scenarios. We chose these evaluation scenarios based on typical standards of engineering design specifications. Typical wastewater design recommendations are to protect wastewater infrastructure against the 500-year flood. FEMA guidance is as follows:

Under Executive Order 11988, Floodplain Management, Federal agencies funding and/or permitting critical facilities are required to avoid the 0.2% (500-year) floodplain or protect the facilities to the 0.2% chance flood level.

Following the standard of protecting critical facilities against damages from a 500-year storm, the team chose the scenarios based on the 2009 FEMA floodplain projections for a 500-year storm.[3] The inundation scenario from the team's modeling approach that most closely resembled the FEMA 500-year storm floodplain was the modeled Category 3, baseline (no SLR) water level scenario. The team used this scenario, as well as the modeled Category 3, 4-foot SLR scenario to evaluate vulnerability for each wastewater treatment facility pump stations, and to make recommendations based on each feature's vulnerability.

Our analysis was based on the information that was made available during the task through our data inventory, through interviews and documents provided by municipal officials, and remote visual inspection of some facilities through online digital imagery, but did not include site visits. Much of the data necessary to fully characterize in detail infrastructure associated with each CSO, wastewater treatment facility, and pump station are stored as paper copies in various locations, and as such, the costs and level of effort necessary to locate, catalog, and digitize this information exceeded the scope of this project. At this level of analysis, this report focuses on defining problem areas and identifies tangible action items communities can undertake to better understand and address vulnerabilities. This should be considered only a cursory engineering review that does not replace a more detailed site specific inspection and evaluation that will be required to be conducted in a future phase of this project.

We obtained data on CSOs from two sources. The "Discharge Points" GIS dataset, available through the Buzzards Bay NEP website, contains the locations of some of the City of New Bedford's CSOs. The engineering firm CDM Smith and the City of New Bedford also provided information on CSO tide gates and regulators (Table 4); however these data were not spatially explicit, and could not be directly linked to the available spatial data. Although the team assigned inundation depths to the CSO spatial dataset as part of the vulnerability analysis, the engine ering analysis determined that more information would be needed to assess site-specific vulnerability of individual CSOs based on the locations of each CSO in the floodplain, as CSOs are less likely to be affected by individual storms than by sustained inundation due to SLR. Recommendations for future studies are based on modeling work that would assess the system as a whole under various SLR scenarios, rather than on the vulnerability of individual features.

We used SLOSH model results to assign vulnerability ratings to wastewater treatment plants and pump stations. Facilities that are in the floodplain for both Category 3 scenarios received a vulnerability rating of 3 (high risk), those in the floodplain only during the Category 3 storm with 4-foot SLR received a risk rating of 2 (medium risk), and those that weren't in the floodplain in either scenario received a risk rating of 1 (low risk). Additionally, we used Google Earth imagery to visually

Table 4. Summary of CSO regulator elevation data provided by the City of New Bedford and CDM Smith

Regulator Number and Location	Receiving Water Body	Structure Invert	Weir/Outlet Height	Weir/Overflow Elevation	NAVD 88
022A - Sawyer St. and No. Front St.	Acushnet River	4.47	3.6	8.07	9.79
022C - Tallman St. - West of Belleville Ave.	Acushnet River	9.5	0.17	9.67	11.39
022D - Purchase St. and County St.	Acushnet River	35.45	1.5	36.95	38.67
022G - Holly St. and Belleville Ave.	Acushnet River	2.03	0.9	2.93	4.65
023A - Coffin Ave. and Riverside Ave.	Acushnet River	-3.07	1.27	-1.8	-0.08
024A - Hathaway St. and Riverside Ave.	Acushnet River	-3.2	1	-2.2	-0.48
026A - Truro St. and River Rd.	Acushnet River	0.2	1.08	1.28	3
027A - Mill St.	Acushnet River	1.5	0.88	2.38	4.1
027B - Ohio St. and Acushnet Ave.	Acushnet River	15.5	2.25	17.75	19.47
027E - Grenier St. and Belleville Ave. - East	Acushnet River	10.1	1.33	11.43	13.15
030A - Potomska St. and Second St.	Acushnet River	0.74	0.75	1.49	3.21
030B - South St. and Second St.	Acushnet River	0.72	2.2	2.92	4.64
031A - Grinnell St. and Second St.	Acushnet River	0.76	0.87	1.63	3.35
031B - Second St. - North of Grinnell St.	Acushnet River	1.5	1	2.5	4.22
031C - Howland St. and Second St.	Acushnet River	0.9	1.13	2.03	3.75
031D - Bonney St. and Grinnell St.	Acushnet River	21.06	1.85	22.91	24.63
031E - Howland St. P.S.	Acushnet River	-4.38	9	4.62	6.34
032A - Russell St. and Second St.	Acushnet River	3.86	1	4.86	6.58
032B - Madison St. and Second St.	Acushnet River	6.8	1.33	8.13	9.85
032C - Walnut St. and Acushnet Ave.	Acushnet River	17.05	0.9	17.95	19.67
032D - Griffin St. and Second St.	Acushnet River	Unk.	Unk.	Unk.	Unk.
034A - Union St. and Acushnet Ave.	Acushnet River	28.13	1.15	29.28	31
035A - Hillman St. and Foster St.	Acushnet River	63.45	1	64.45	66.17
035B - Pleasant St. and Maxfield St.	Acushnet River	48.7	0.5	49.2	50.92
020A - Wamsutta St. at Rt. 18	Acushnet River	3.91	0.83	4.74	6.46
020B - Logan St. and Acushnet Ave.	Acushnet River	5.9	1.29	7.19	8.91
036A - Willis St. and Purchase St.	Acushnet River	26.5	2	28.5	30.22
036B - Pearl St. and Purchase St.	Acushnet River	21.28	0.45	21.73	23.45
037A - Pope St. and Purchase St.	Acushnet River	17.92	5.45	23.37	25.09
040A - Coggeshall St. P.S.	Acushnet River	-8.98	11.28	2.3	4.02
041A - Belleville Ave. and Bellville Rd	Acushnet River	2.8	0.1	2.9	4.62
041B - Belleville Ave. P.S.	Acushnet River	-1.22	2.05	0.83	2.55
021A - Washburn St. and No. Front St.	Acushnet River	4.65	0.98	5.63	7.35
022F - Purchase St. and Deane St.	Acushnet River	41.02	2	43.02	44.74
022H - Nauset St. at NERI Connection	Acushnet River	42.54	2.3	44.84	46.56
022E - Sawyer St. and County St.	Acushnet River	33.18	0.77	33.95	35.67

Table 8. Continued

Regulator Number and Location	Receiving Water Body	Structure Invert	Weir/Outlet Height	Weir/Overflow Elevation	NAVD 88
027C - Belleville Ave. and Mill St.	Acushnet River	15.2	0.1	15.3	17.02
027D - Grenier St. and Belleville Ave. - West	Acushnet River	8.92	0.58	9.5	11.22
035C - Maxfield St. and Acushnet Ave.	Acushnet River	-4.77	1.5	-3.27	-1.55
003A - Padanaram St. and Cove Rd.	Clarks Cove	-3.1	4.7	1.6	3.32
003B - Padanaram St. and Norwell St.	Clarks Cove	3.12	1.35	4.47	6.19
004C - Dike Station	Clarks Cove	-9.66	0	-9.66	-7.94
005A - Dudley St. and West Rodney	Clarks Cove	-0.9	3.75	2.85	4.57
006A - Lucas St. and West Rodney	Clarks Cove	2.41	0.67	3.08	4.8
006B - Oaklawn St. and West Rodney	Clarks Cove	2.22	0.67	2.89	4.61
006C - Capitol St. and West Rodney	Clarks Cove	1.53	2	3.53	5.25
006D - Lucas St. and West Rodney	Clarks Cove	-1.77	3.5	1.73	3.45
007A - Capitol St. and West Rodney	Clarks Cove	2.7	3.21	5.91	7.63
008A - Calumet St. and West Rodney	Clarks Cove	1.58	0.7	2.28	4
009A - Aquidneck St. and West Rodney	Clarks Cove	3.93	2.6	6.53	8.25
010A - Bellevue St. and West Rodney	Clarks Cove	1	1.14	2.14	3.86
004A - Rockdale Ave. and Cove Rd.	Clarks Cove	-6.1	6.37	0.27	1.99
004B - Orchard St. and Cove Rd.	Clarks Cove	-3.9	1.9	-2	-0.28
004D - Orchard St. and Rivet St.	Clarks Cove	2.2	1.5	3.7	5.42
004E - Bonney St. and Rivet St.	Clarks Cove	0.59	3.7	4.29	6.01
004F - Bonney St. and Rivet St.	Clarks Cove	0.59	0	0.59	2.31
004G - Crapo St. and Rivet St.	Clarks Cove	1.48	2.7	4.18	5.9
004H - Bonney St. and Cove Rd.	Clarks Cove	-3.1	1.6	-1.5	0.22
004I - David St. and West Rodney	Clarks Cove	0	4.8	4.8	6.52
012A - Ricketson St. and East Rodney	Outer Harbor	-0.61	0.5	-0.11	1.61
012B - Bellevue St. and East Rodney	Outer Harbor	-0.44	0.29	-0.15	1.57
013A - Aquidneck St. and East Rodney	Outer Harbor	0.5	0.6	1.1	2.82
015A - Butler St. and East Rodney	Outer Harbor	-4.07	2.57	-1.5	0.22
016A - Frederick St. and East Rodney	Outer Harbor	0.8	0.6	1.4	3.12
017A - Rodney St. and East Rodney	Outer Harbor	-1.42	1.51	0.09	1.81
017C - David St. and East Rodney	Outer Harbor	-3.38	0.33	-3.05	-1.33
017D - Ruth St. and East Rodney	Outer Harbor	-2.33	0.5	-1.83	-0.11
018A - Cove St. and East Rodney	Outer Harbor	-1.78	0.5	-1.28	0.44
018B - Cove St. and Cleveland	Outer Harbor	-1.65	0.67	-0.98	0.74
020C - Merrimac St PS	Acushnet River	Unk.	Unk.	Unk.	Unk.
Note: All elevations refer to City of New Bedford Datum					

evaluate pump stations for structural features that put them at higher or lower risk of damage from inundation and made adaptation recommendations accordingly. The City of New Bedford and the Town of Fairhaven provided supplementary details on pump stations which provided the basis for more in-depth recommendations for those features.

We also ranked the cost of adaptation measures (1 = high, 2 = medium, 3 = low), and ranked the relative impact of risk to the community in the event of damage to the structure. Projects with a projected cost of less than $100,000 were considered low cost, those with projected costs of over $250,000 were considered high cost, and those that fell between $100,000 and $250,000 were considered medium cost. If the projected costs were expressed as a range of values, the rank was assigned based on the higher value. Low cost projects would receive a higher ranking and would therefore contribute to a higher prioritization score because they would be more achievable within the constraints municipal budget. We accounted for relative importance of individual pump stations by giving an additional ranking value of 2 to pump stations in Fairhaven that pump water from upstream pump stations. If these structures malfunction, they will affect the functionality of the rest of the pump stations in the system; therefore, they require extra consideration. We multiplied the rankings such that each facility received a numerical score, with higher scores indicating facilities and projects that should be prioritized by the town. A dash in the priority ranking field denotes vulnerable structures for which there was insufficient information to provide a recommendation and/or cost estimate. No prioritization scores were assigned in these cases. The team also developed a summary of proposed adaptation actions for each municipality, based on the results section of this report.

Stakeholder engagement

Throughout the project, the team held in-person meetings and workshops to present project overviews and updates, to ask for input from municipal and state officials on priority areas of focus, and to vet recommendations and project approaches with key stakeholders. Representatives from the Buzzards Bay NEP, Coastal Zone Management, and from the Department of Public Works in each municipality served as a project advisory team. A summary of the meeting dates, locations and objectives can be found in Table 5. Detailed meeting agendas and summaries can be found in Appendix B.

Data Visualization Tool Development

Using priority datasets and results from the SLOSH and Hazus models, the team created two data visualization tools as part of its outreach approach for the project. To create an interactive online map viewer, we uploaded simplified polygons depicting the hurricane inundation extents resulting from SLOSH, as well as priority datasets used in the vulnerability maps, into an ArcGIS Online Story Map application. To visualize the economic losses associated with various hurricane scenarios, we summarized economic loss data generated using the Hazus model into a custom risk visualization tool which provides a snapshot of estimated damages from various hurricane scenarios.

Table 5. Summary of meetings and objectives.

Meeting	Date	Location	Objectives
Kick-off Meeting	12/16/2013	New Bedford Wastewater Treatment Facility	• Present study scope to municipal and state planning agencies • Present interim data inventory to meeting participants • Hold a listening session to obtain feedback and input on project scope and data inventory • Strategize for filling any data gaps
Workshop Agenda Development Meeting	2/4/2014	Fairhaven Wastewater Treatment Facility	• Present project update, identifying lingering data gaps and next steps • Plan interactive half-day workshop for April
Interactive Half-Day Workshop	4/17/2014	Acushnet Council on Aging	• Provide a project overview • Present major findings of vulnerability assessment, the Hazus damage assessment, and preliminary recommendations • Present draft versions of data visualization tools, including the web viewer and the risk visualization tool • Receive feedback from workshop participants on refining results, recommendations, and tools
Presentation of Draft Findings	6/12/2014	New Bedford Wastewater Treatment Facility	• Provide a summary of the project's key findings • Obtain feedback on final data products, reports, and tools

Results

The following sections detail results from the SLOSH inundation modeling, the vulnerability analysis, and the engineering analysis and recommendation development. We also describe results from the stakeholder engagement activities, as well as a description of data visualization tools. In general, results of the SLOSH modeling and subsequent analysis showed that impacts from Category 1 and 2 storms through a 2-foot SLR scenario were likely to be minimal. We predict that impacts will increase substantially as SLR approaches 4 feet for a Category 2 storm. At this point, storm surge-inducted inundation begins to occur around the New Bedford Hurricane Barrier, though the barrier is not actually overtopped. In general, impacts increase steadily with hurricane category and are exacerbated by projected increased SLR scenarios. Based on initial discussions with municipal officials, the team modeled inundation scenarios and resulting damages based on hurricane categories 1 through 4, despite the fact that a hurricane exceeding a Category 3 has not made landfall in New England in recorded history. Extreme hurricane scenarios were modeled for informational purposes only and should be interpreted as theoretical. For comparative purposes, Table 6 provides an overview summary of historical New England storms and their associated categories and impacts.

Table 6: New England Hurricanes of the 20th and 21st centuries and their impacts

Date	Comments	Peak Intensity	Intensity at Landfall	Estimated Intensity in Buzzards Bay	Maximum Storm Surge in New England, if known (ft)	Elevation at New Bedford Hurricane Barrier, if known (NGDV-ft)	Estimated Regional Economic Damage ($1,000,000)
9/21/1938	Hurricane of '38	Category 5	Category 3	Category 2-3	20	12.5	$400
9/14/1944	Great Atlantic Hurricane of '44	Category 4	Category 3	Category 2-3		8.1	$100
9/11/1950	Hurricane Dog	Category 5	No landfall				$3
8/31/1954	Hurricane Carol	Category 3	Category 3	Category 1-2	12	11.9	$460
9/11/1954	Hurricane Edna	Category 3	Category 3		6		$40
8/18/1955	Hurricane Diane	Category 3	Tropical Storm	Tropical Storm			$832
9/12/1960	Hurricane Donna	Category 5	Category 2	Category 1-2	13	6.3	$40
9/27/1985	Hurricane Gloria	Category 4	Category 1	Category 1	6.8	5.2	$900
8/19/1991	Hurricane Bob	Category 3	Category 2	Category 1	15	7.6	$2,500
8/28/2011	Hurricane Irene	Category 3	Tropical Storm	Tropical Storm	8	5.6	$15,000
10/29/2012	Hurricane Sandy	Category 3	Extratropical Cyclone	Tropical/Extratropical Hybrid	8	6.8	$50,000

Sources: http://www.mass.gov/eopss/agencies/mema/ready-massachusetts/new-england-hurricanes-of-note.html (list derived from this), additional information from NOAA http://www.nhc.noaa.gov/outreach/history/#new and the US Army Corps of Engineers

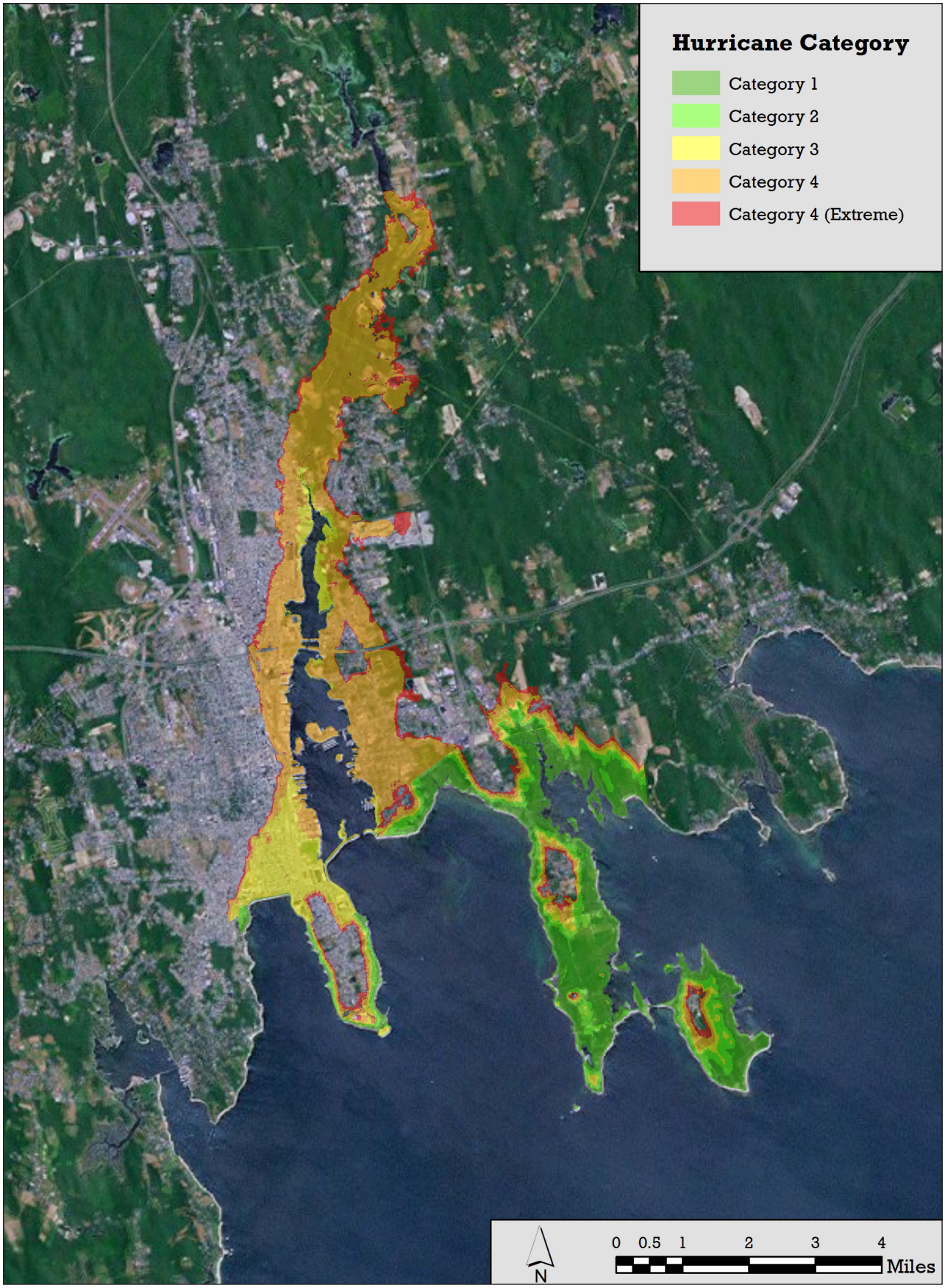

Figure 4. Summary inundation extents for hurricane scenarios modeled using baseline (no SLR) water levels.

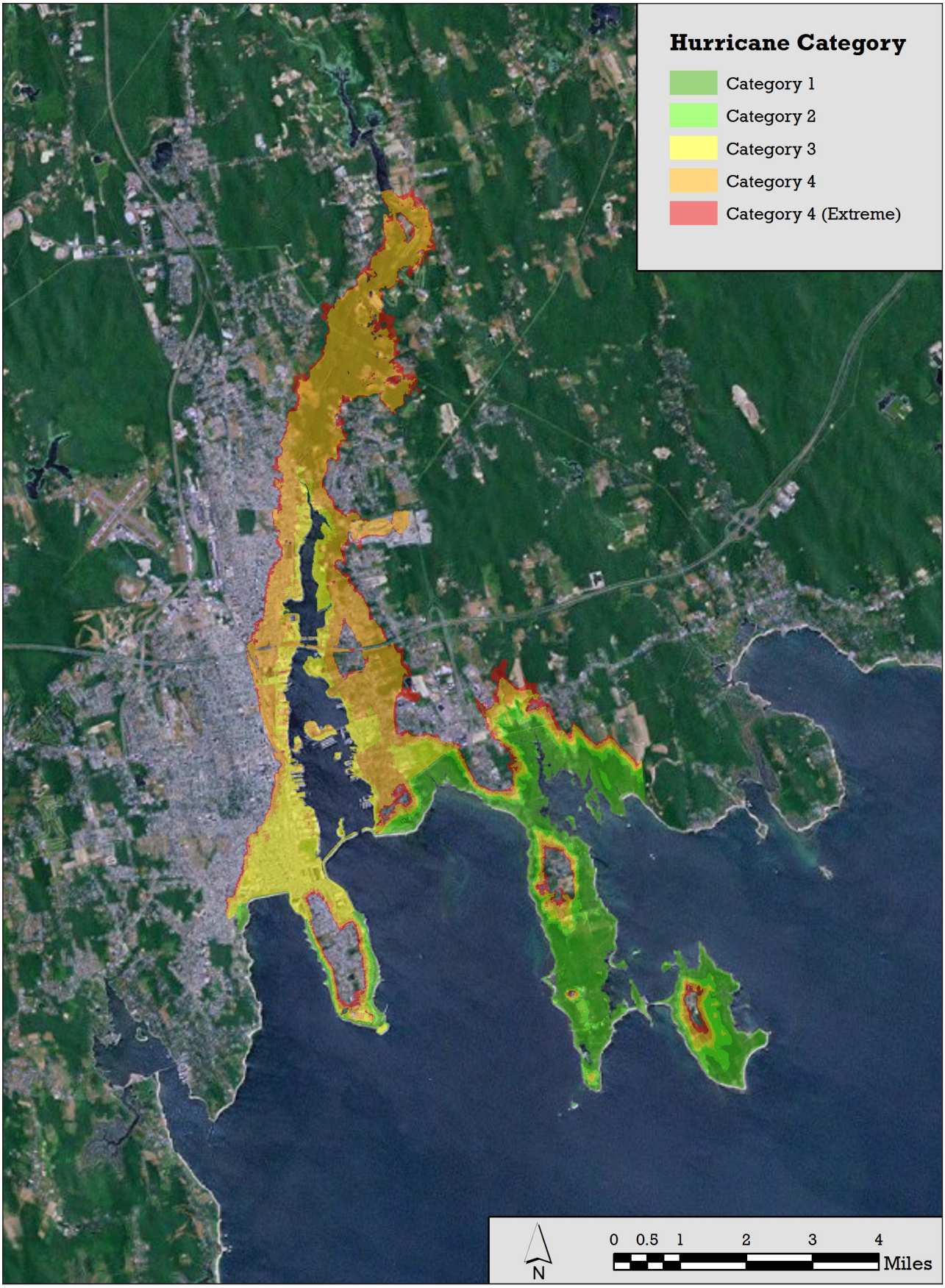

Figure 5. Summary inundation extents for hurricane scenarios modeled using 1-foot SLR water levels

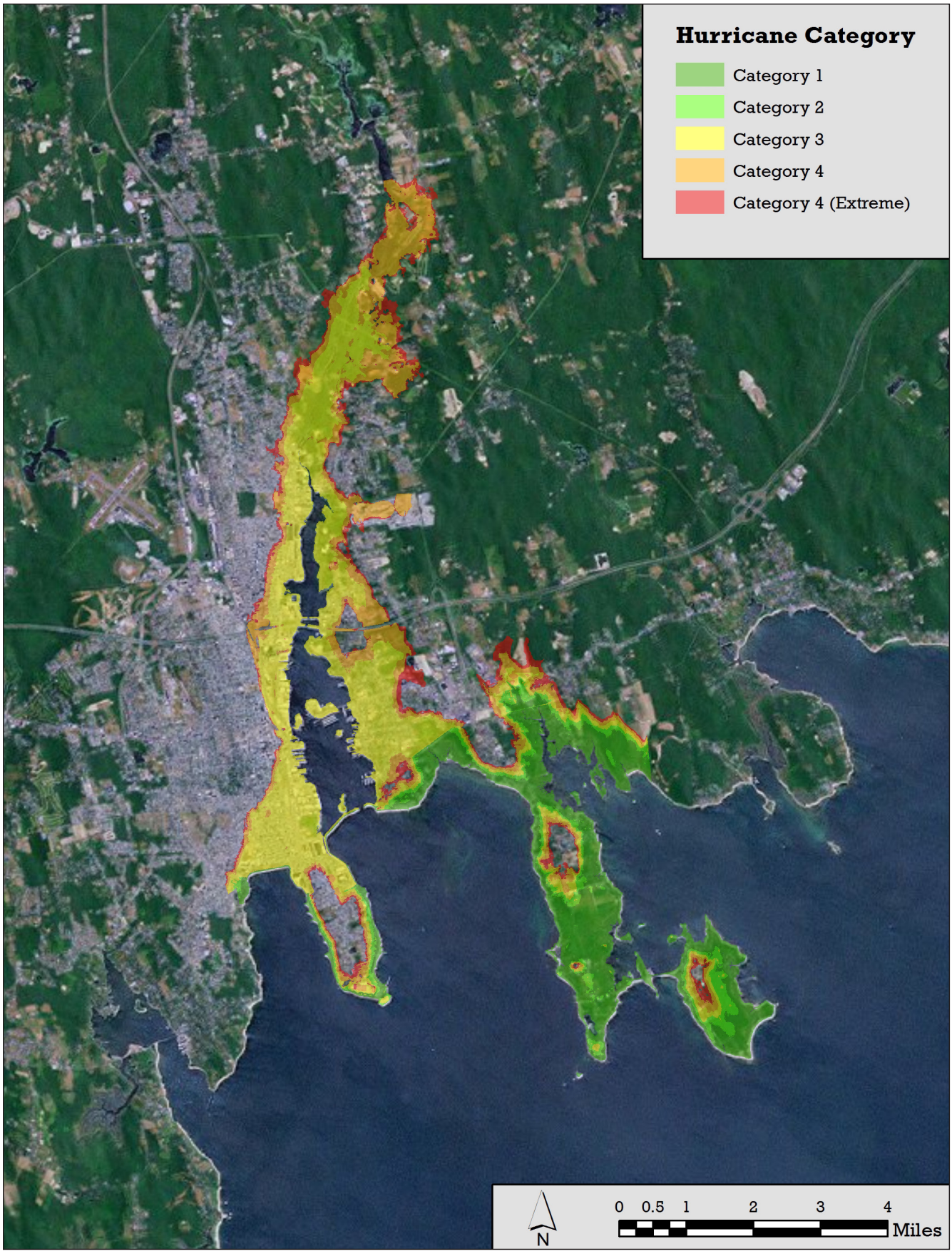

Figure 6. Summary inundation extents for hurricane scenarios modeled using 2-foot SLR water levels

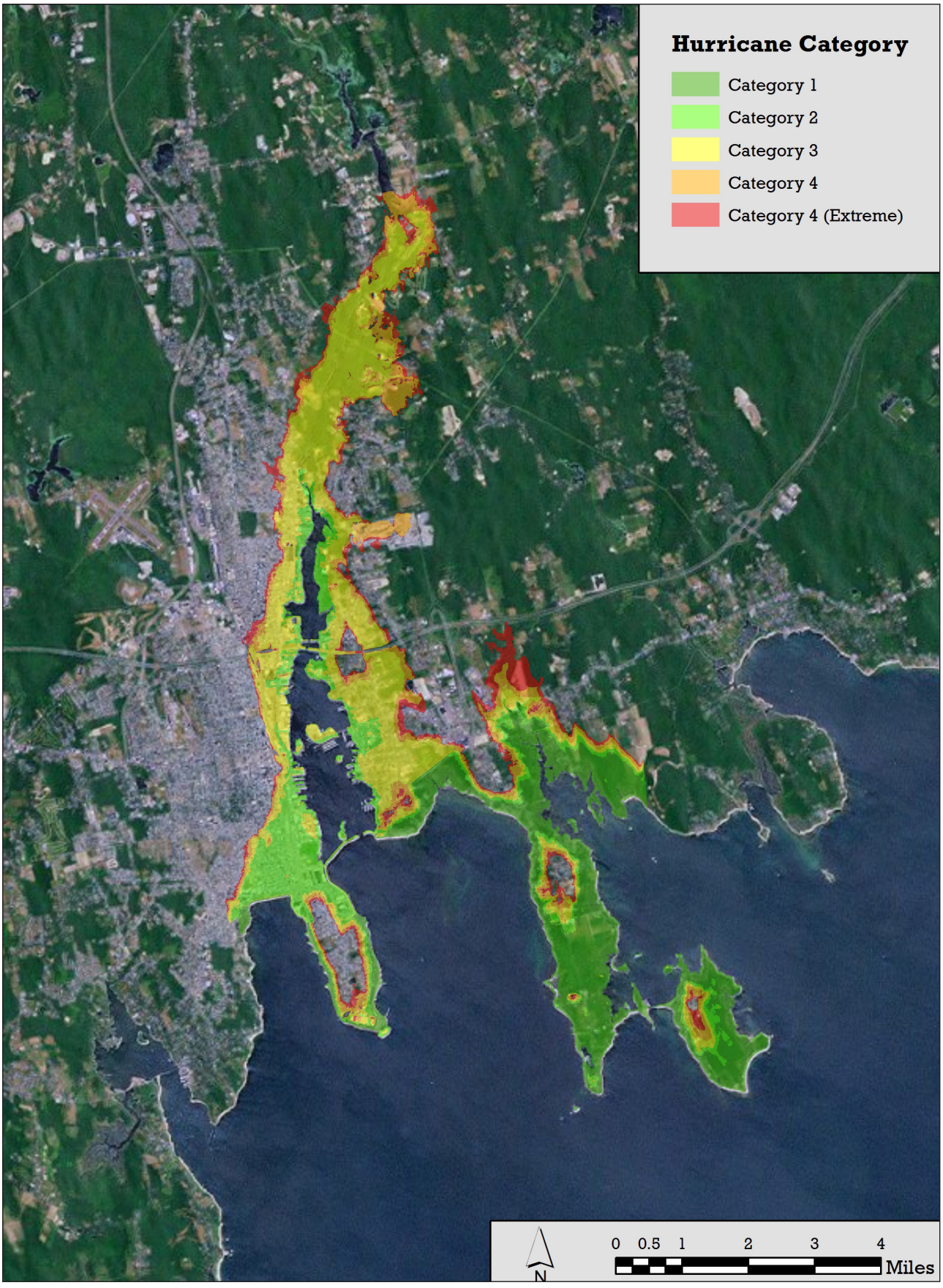

Figure 7. Summary inundation extents for hurricane scenarios modeled using 4-foot SLR water levels

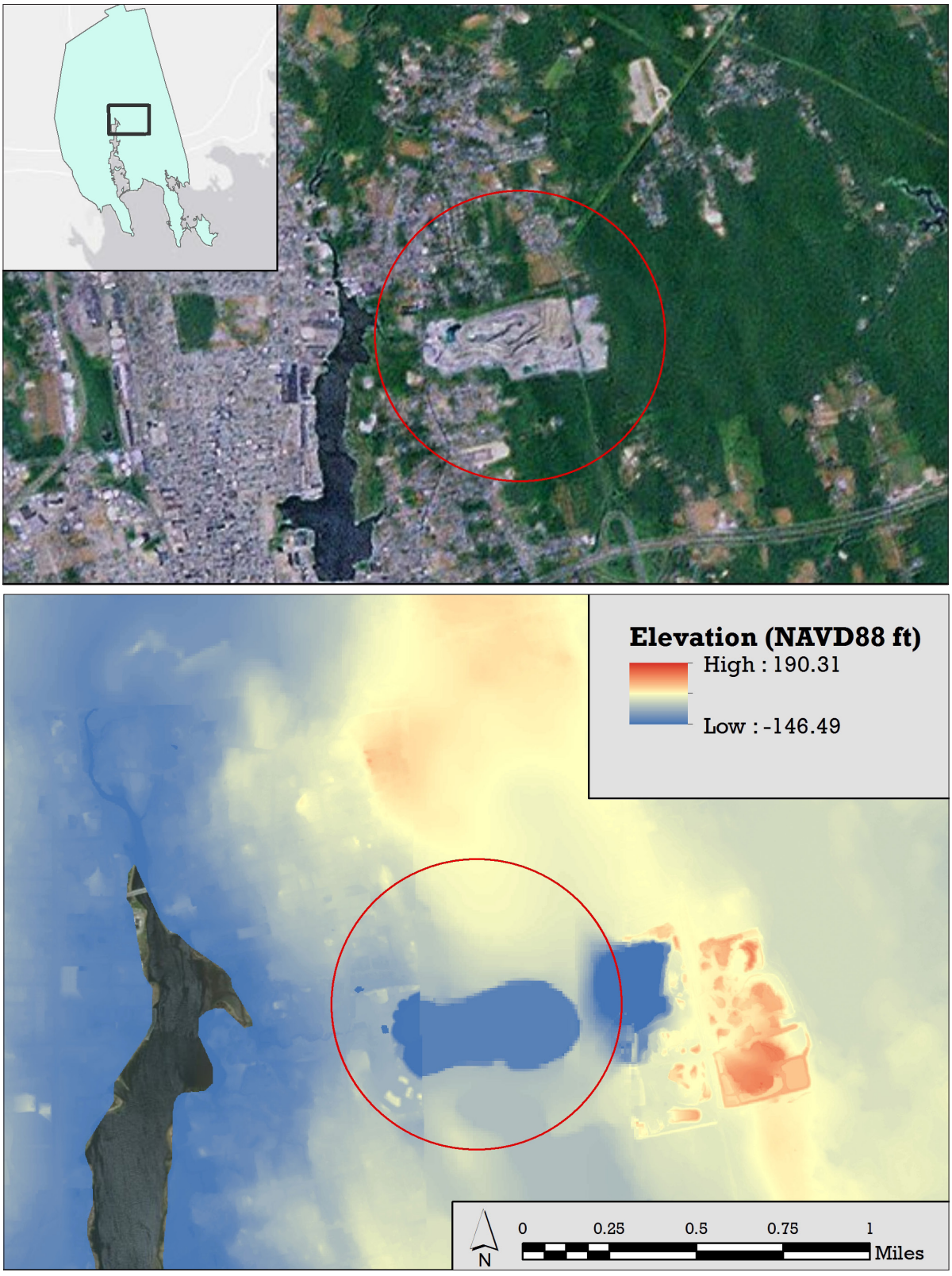

Figure 8. Tilcon Quarry and DEM showing negative (below sea level) elevations at that location

Inundation modeling

The SLOSH model resulted in 20 summary depth grids depicting worst case inundation depths at each location (grid cell). As described above, these depth grids represent worst case flooding for each storm category (5) at each base water level (4) [5 x 4 = 20 scenarios]. Maps of each of the depth grids can be found in Appendix A. Figures 4 – 7 depict simplified versions of the depth grids. These figures show how increasing hurricane intensities increase inundation extents at each of the input water levels. These figures provide the basis for the interactive online map viewer.

Maximum flood depths in the study area range from 11 feet in the Category 1, no SLR scenario to 43 feet in the most severe scenario (Extreme Category 4 with 4-foot SLR). Even higher maximum flooding depths were predicted in Tilcon Quarry in Acushnet, which is an area inland from the east bank of New Bedford Harbor (Figure 8). This area has large negative (below sea level) elevations, and thus has higher maximum inundation depths than those along the harbor. The maximum flood depths reported in this section and in the maps reflect the maximum flood depths above sea level modeled along New Bedford Harbor, and do not account for the higher flood depths reported in the quarry.

In the worst case scenario, the surge elevation increases as it moves up the New Bedford Harbor from approximately 30 feet at the mouth of the Harbor just inside the hurricane barrier to 43 feet just north of the Acushnet border. The worst case storms move approximately north and make landfall west of the site, meaning that hurricane winds and storm translational speed are additive. The combination of forward speed and wind pushes water directly north causing a high surge along the main coast of Buzzards Bay, which is then focused as the surge is funneled into the harbor, amplifying the elevation as it moves up the harbor. This most extreme case also has the most extreme amplification of the surge as it progresses up the harbor. The effect is must less pronounced in the Category 1 case, where the difference is only 0.98 ft.

The summary depth grids resulting from SLOSH modeling indicate that the hurricane barriers become ineffective at preventing inundation beginning with Category 2, 4-foot SLR hurricane scenarios, with inundation depths and extents increasing as hurricane scenarios and baseline water levels increase. A summary of inundation scenario impacts on hurricane barriers can be found in Table 7.

Table 7. Summary of hurricane impacts: Scenarios resulting in inundation around and over hurricane barriers

Storm Scenario	New Bedford Barrier	Clarks Cove Dike	Fairhaven Dike
Cat 2, 4-ft SLR	Inundates around barrier	Inundates around dike	No impact
Cat 3, 0' SLR	Inundates around barrier	Inundates around dike	No impact
Cat 3, 1-ft SLR	Inundates around barrier	Inundates around dike	Inundates around and over dike
Cat 3, 2-ft SLR	Inundates around and over barrier	Inundates around barrier; begins to inundate over barrier	Inundates around and over dike
Cat 3, 4-ft SLR Cat 4, all SLR scenarios	Inundates around and over barrier	Inundates around and over barrier	Inundates around and over dike

The analysis demonstrated that the factors which produced the highest water levels in the SLOSH inundation results were:

1. Storm landfall in eastern CT and Rhode Island
2. Angle of approach (Θ) between 168° and 180° from North (storm headed NtW to N)
3. Radius of maximum wind (Rw) 40 to 50 NM
4. Highest forward speed (60 or 70 mph)

Depth grids can be downloaded in a geodatabase from climate.buzzardsbay.org/seaplan-study.html.

Vulnerability Assessment Results

The LiDAR data revealed low points in the hurricane barrier at several locations. The maximum elevations ranged from 19.09 - 22.24 feet. Figures 9 – 11 show elevations along the New Bedford hurricane barrier, as well as the Fairhaven and Clarks Cove dikes. Points that are more than 1.5 standard deviations away from the mean are highlighted in yellow to show low points along the barrier system. These low points could potentially contribute to hurricane barrier failure in major storms, although on the maps of the Clarks Cove and Fairhaven dikes, low points are likely the results of anomalies in the LiDAR data.

The team used the values from the summary depth grids to assign worst case scenario inundation depths to features which were identified by the project advisory team as priority interest to the municipalities. As depths were assigned to the locations as defined by the spatial data derived in the data inventory, which, in most cases, are center points, it is not possible to assume uniform flood depth for each feature. Rather, the listed depth for each scenario should be interpreted as the maximum inundation depth at the location of the center point of each feature.

INFRASTRUCTURE, PROPERTY AND POPULATION DATA FEATURES INCLUDED IN THE VULNERABILITY ANALYSIS

Detailed tabular data of inundation depths and for each hurricane scenario for the following features can be found in Appendix C:

- CSOs and storm drains
- Wastewater treatment plants and pump stations
- Designated port areas
- Built public structures
- Government buildings
- State-owned structures
- Environmental justice communities

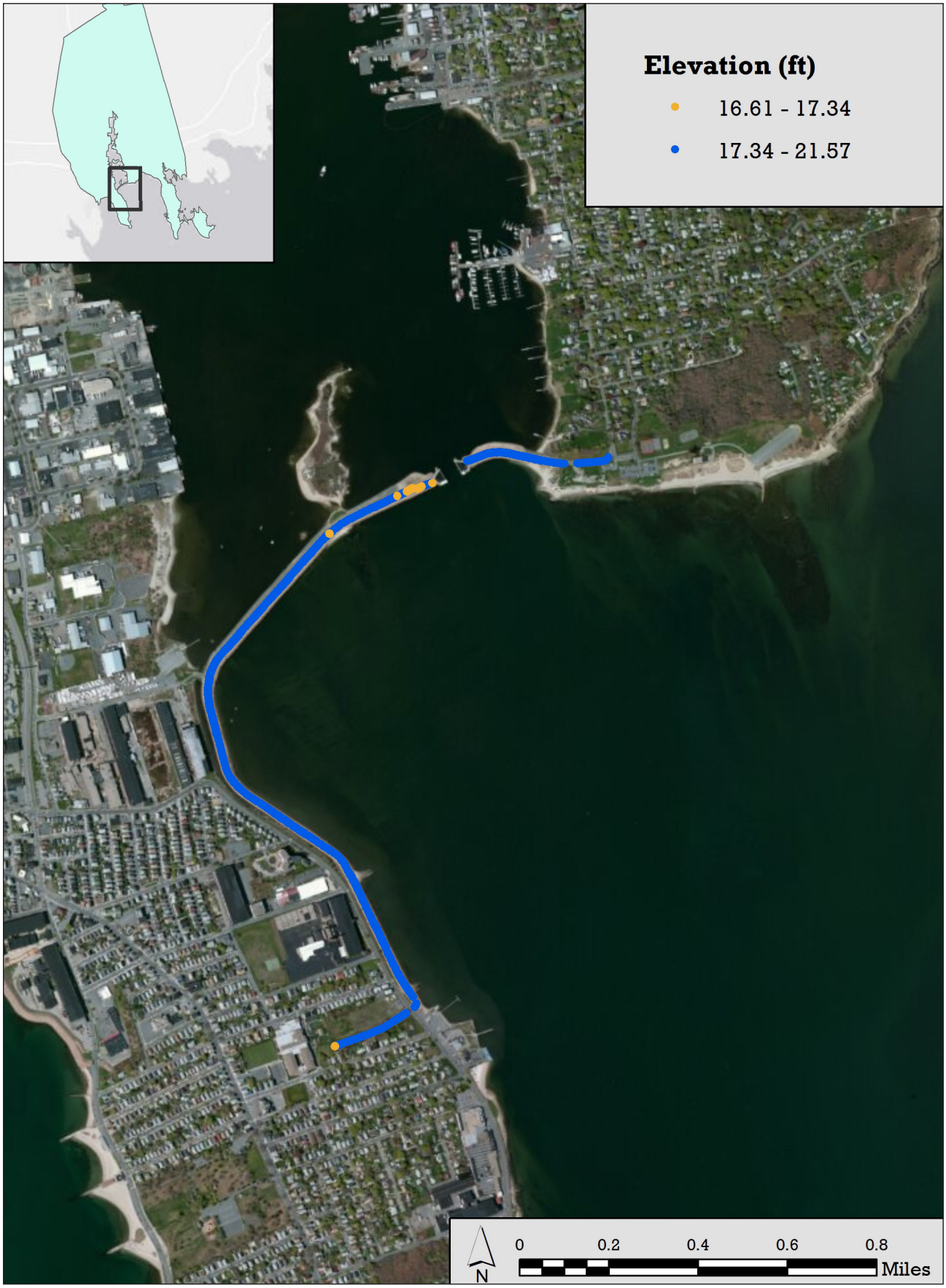

Figure 9. New Bedford Hurricane Barrier elevations.

Figure 10. Clarks Cove Dike elevations.

Figure 11. Fairhaven Dike elevations.

Figures 12 – 17 show inundation depths at the locations of specific infrastructure features. These features include:

- New Bedford Wastewater Treatment Plant
- Fairhaven Wastewater Treatment Plant
- Slocum Street Pump Station in Acushnet
- Clarks Cove CSO (located at Aquidneck Rd and West Rodney French Blvd)
- New Bedford Harbor CSO (located at Merrimac Street and Herman Melville Blvd)
- Pope's Island Marina

These features were identified by municipalities and the project advisory team as either priority concerns or representative examples of vulnerable areas. While more information is needed to assess the vulnerability of CSOs, as noted above, municipal representatives suggested that we depict the inundation depths at the locations of these CSO to illustrate the vulnerability of water quality infrastructure in these two representative locations. Similarly, we chose to represent the inundation depths of the Pope's Island Marina to illustrate the potential vulnerability of New Bedford Harbor infrastructure, businesses, and populations during the various storm scenarios.

Reference maps for visualizing the vulnerability of each structure can be found in Figures 18 – 24. Features are symbolized by color based on the number of scenarios at which the feature is vulnerable to flooding. If the feature is vulnerable in 1-5 storm scenarios, it is given a risk ranking of low and colored green. If the feature is vulnerable in 6-10 storm scenarios, it is given a risk ranking of moderate and colored yellow. If the feature is vulnerable in 11-15 storm scenarios, it is given a risk ranking of high and colored orange. If the feature is vulnerable in 16 – 20 storm scenarios, it is given a risk ranking of very high and colored red. If the feature is not vulnerable in any of the modeled scenarios, it is colored blue.

The interactive mapping tool found at seaplan.buzzardsbay.org provides a visual summary of the inundation mapping by allowing the user to visualize water infrastructure, public buildings and populations that are at flooded locations during each scenario.

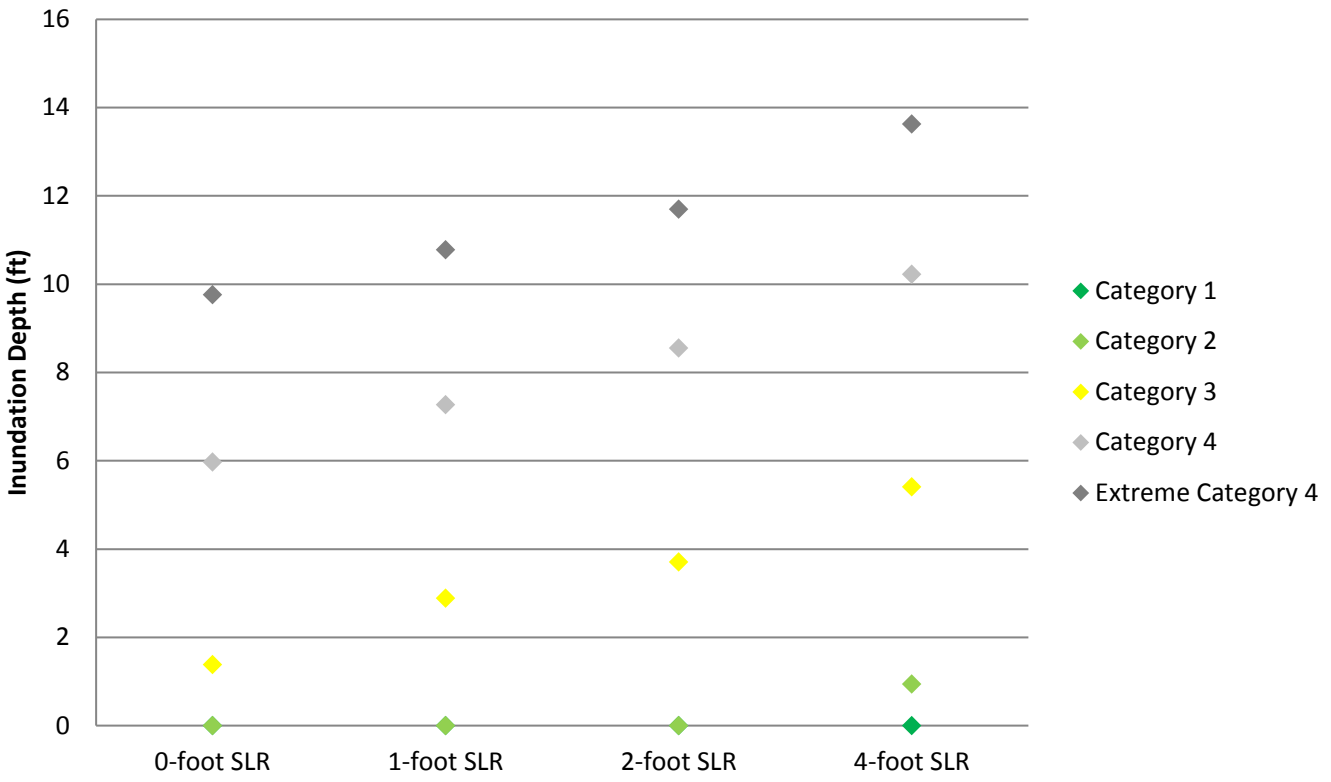

Figure 12. Inundation Depths at New Bedford Wastewater Treatment Facility.

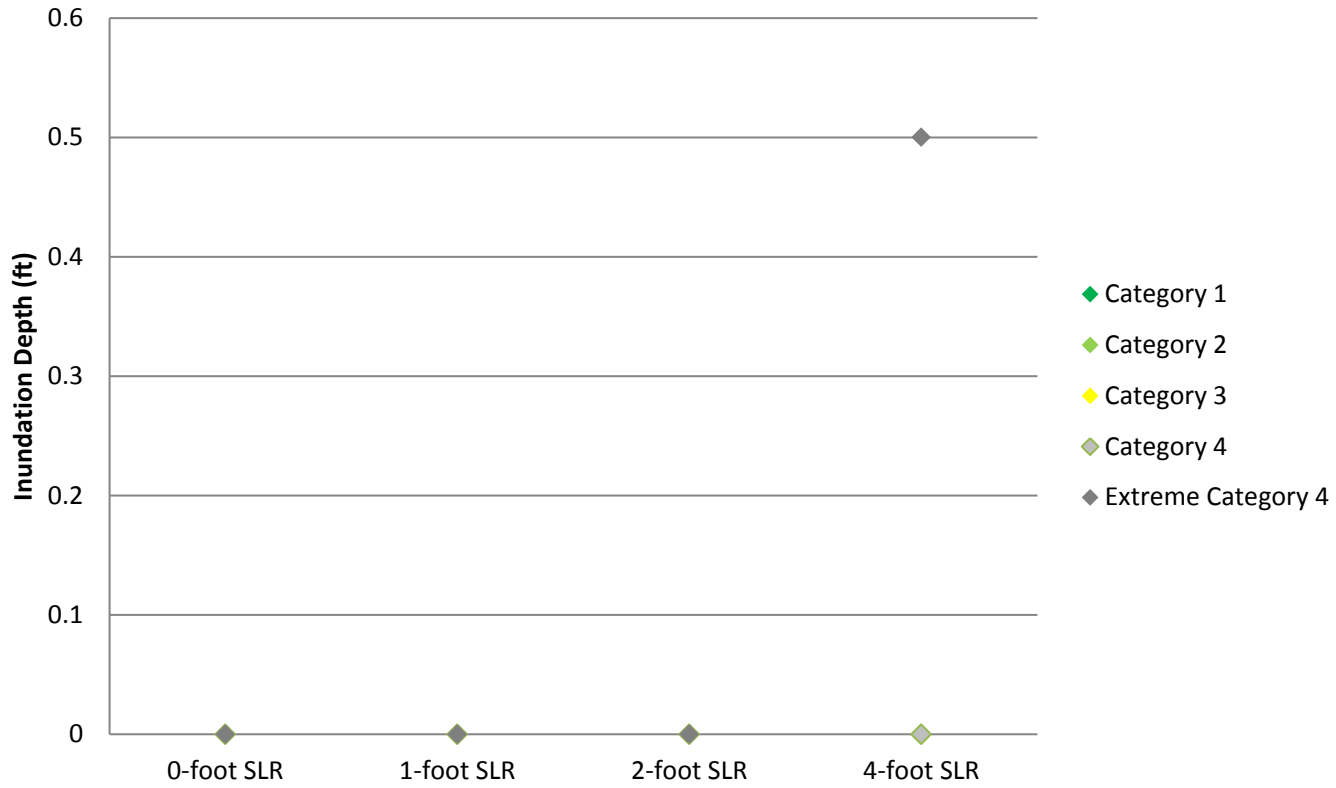

Figure 13. Inundation Depths at Fairhaven Wastewater Treatment Facility.

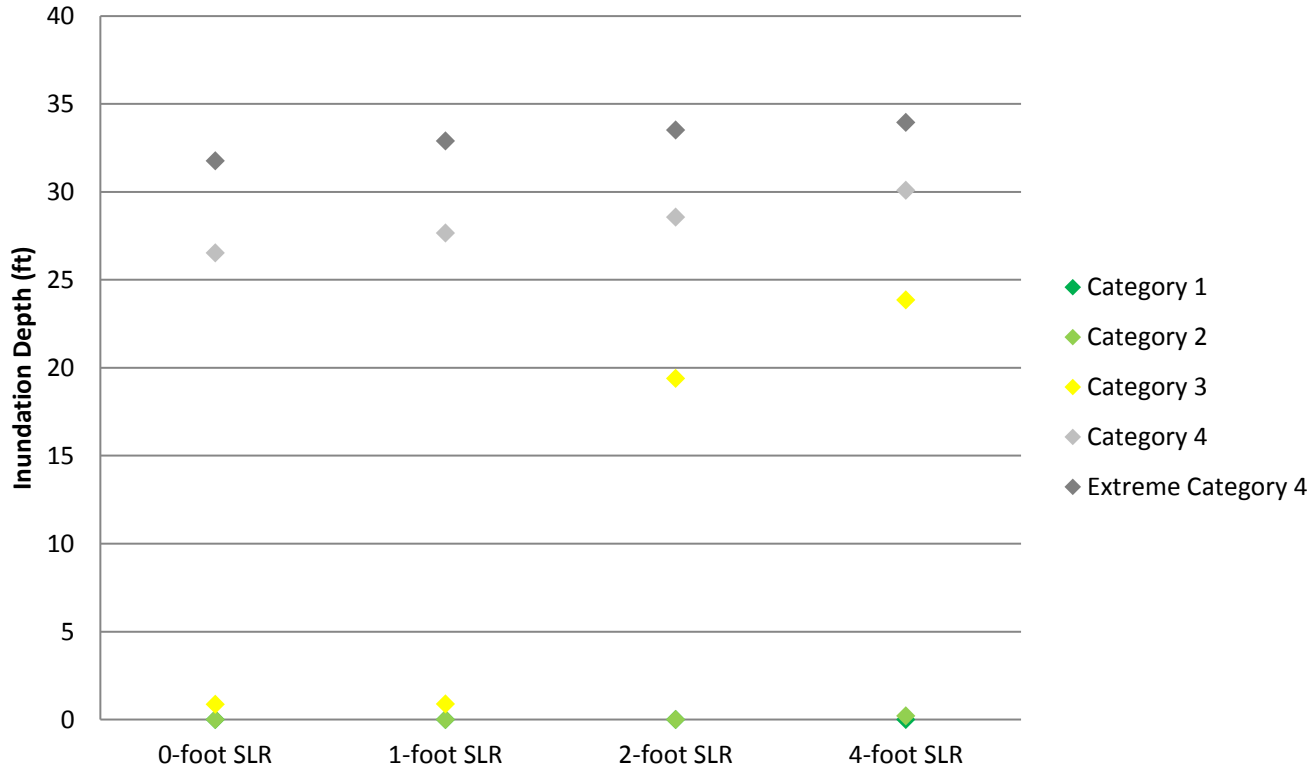

Figure 14. Inundation Depths at Slocum Street Pump Station, Acushnet.

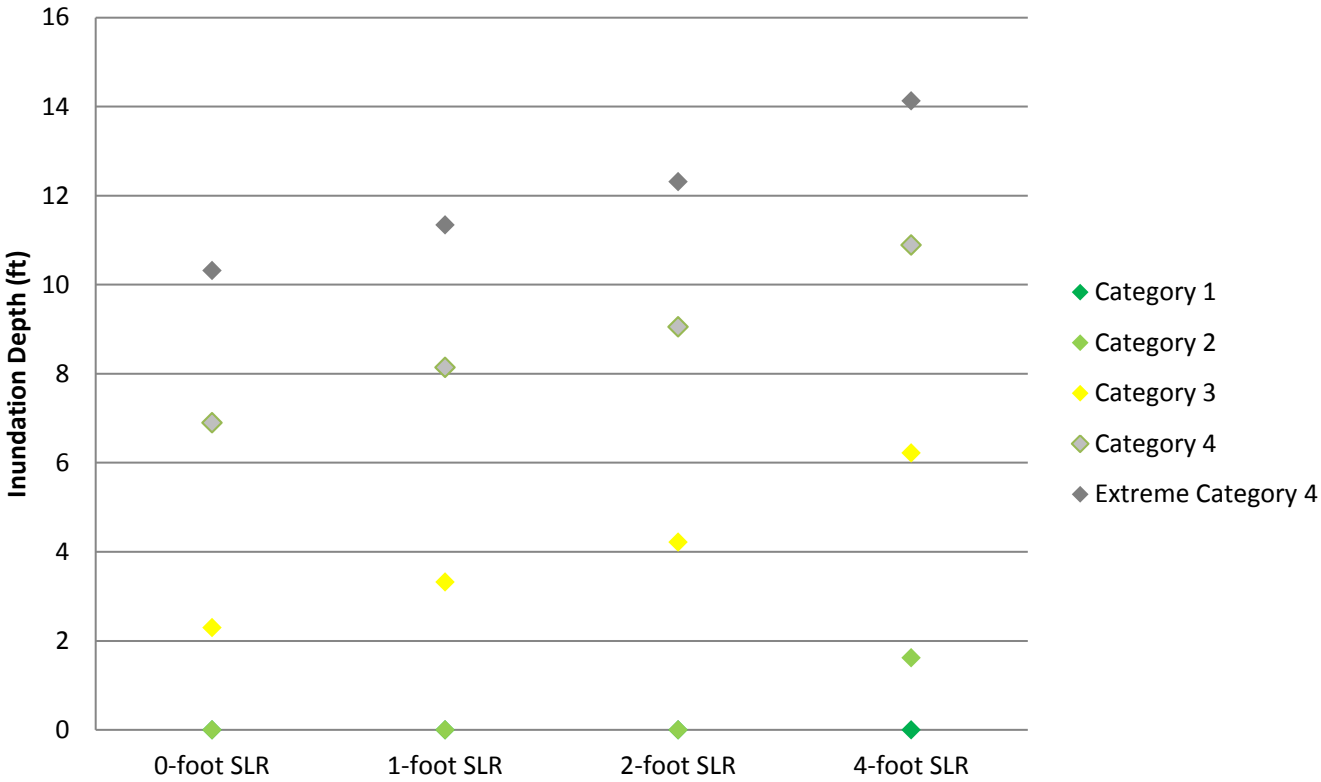

Figure 15. Inundation Depths at Clarks Cove CSO (W. Rodney French Blvd. between Seymour St. and Bayview St.). More information is needed to assess the vulnerability of individual CSOs; however, this figure illustrates the potential vulnerability of water quality infrastructure in this representative location.

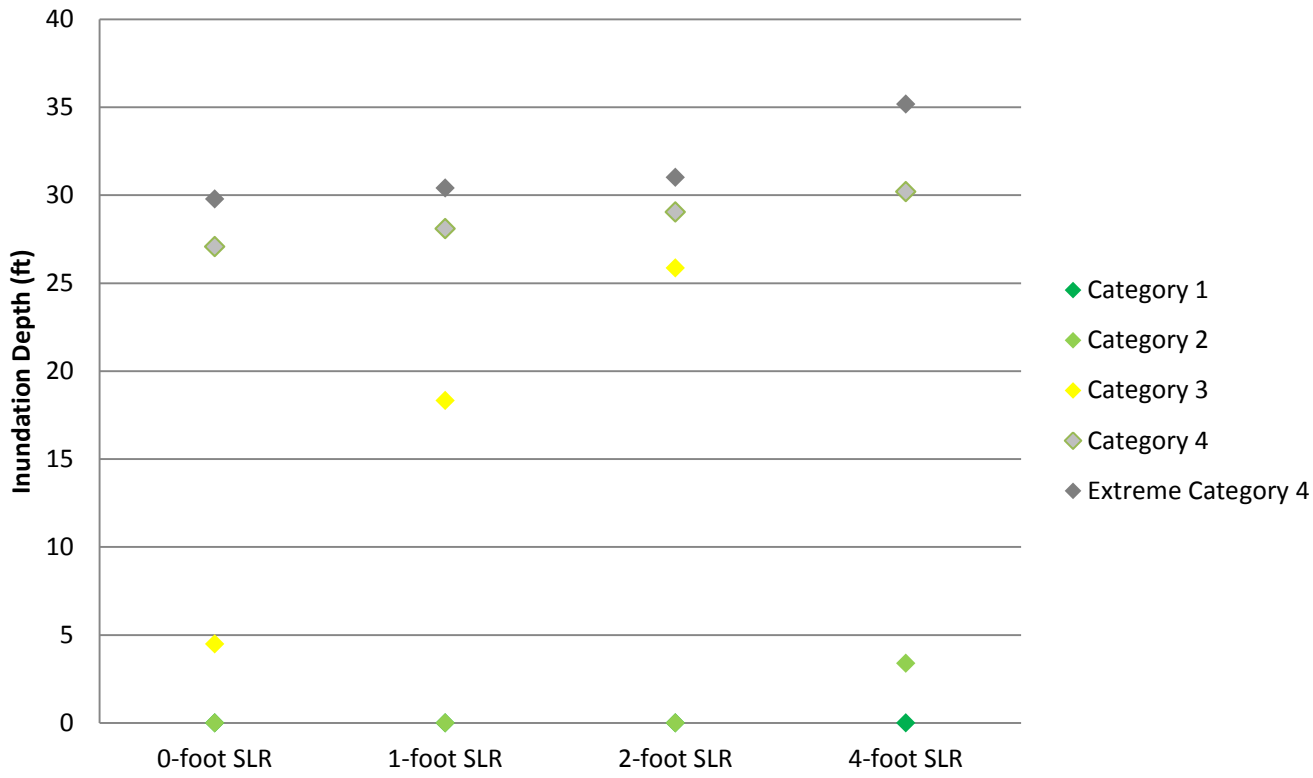

Figure 16. Inundation Depths at New Bedford Harbor CSO (corner of Purchase St. and Wamsutta St.). More information is needed to assess the vulnerability of individual CSOs; however, this figure illustrates the potential vulnerability of water quality infrastructure in this representative location.

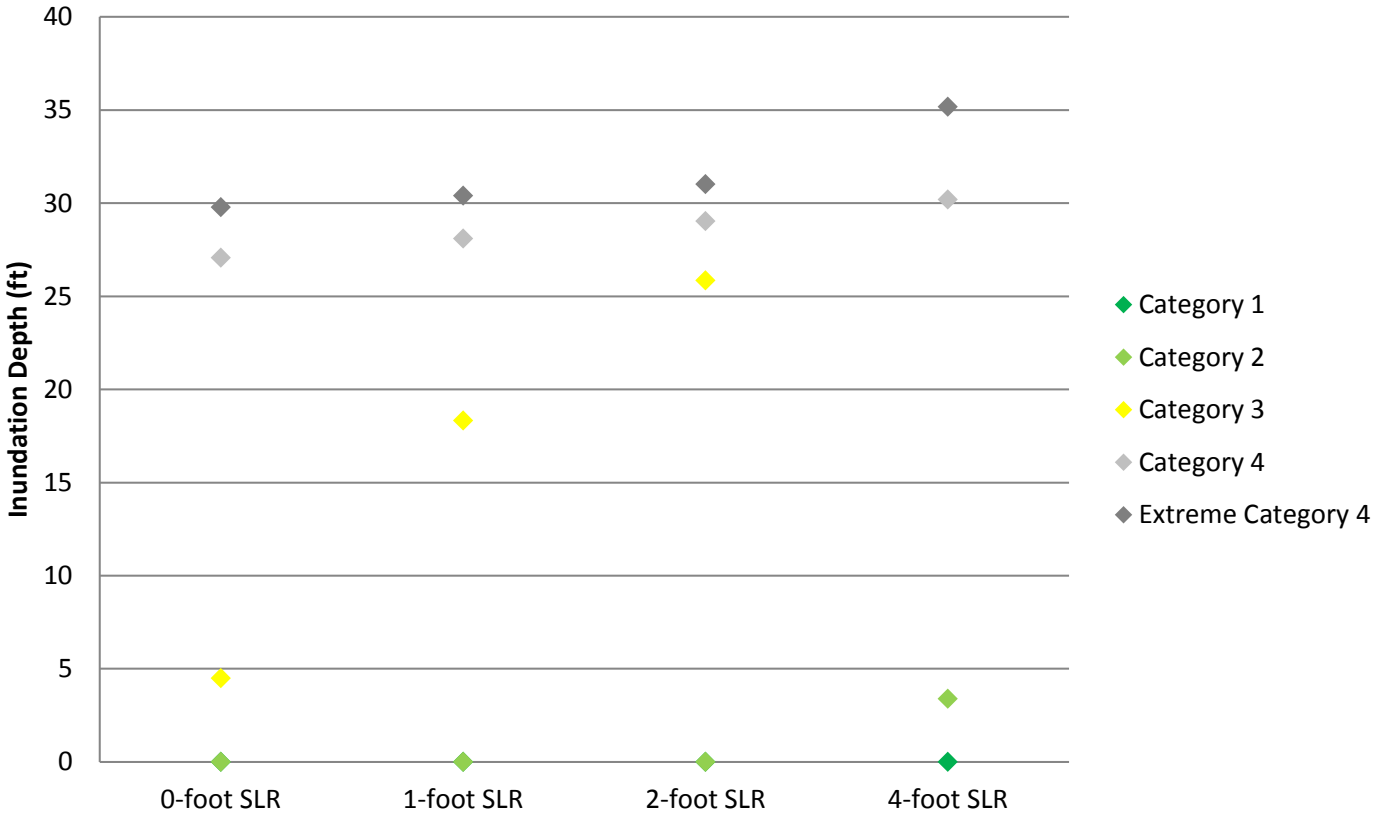

Figure 17. Inundation Depths at Popes Island Marina Pump Station.

Hazus

We ran the Hazus model 20 times, one for each inundation scenario generated by SLOSH, using a different SLOSH output grid on each run. Each model run resulted in tabular data, spatial data, and summary reports which detailed structural and economic damages to buildings, infrastructure, and populations. While this report focuses on structural and economic impacts to buildings, the summary reports found in Appendix D also provide estimates of impacts on transportation features, emergency facilities, debris impacts and populations.

In general, substantial physical and economic damage to buildings and infrastructure in the study area occurred with hurricane categories 3 and above, and damages in each hurricane category were exacerbated by rising sea levels; however the model did predict some damages even in less severe scenarios. In a Category 1 storm with 1-foot SLR, two buildings would be substantially damaged. The total replacement value, or building exposure estimate for this scenario is $1.9 billion. This estimate includes not only the cost of the buildings themselves (substantially damaged or otherwise), but also the engineering cost to replace or repair a damaged building. By contrast, the predicted building damages for the most extreme scenario, (Extreme Category 4 with 4-foot SLR), includes 3,830 substantially damaged buildings with a building exposure estimate of $4.1 billion (Figures 25 and 26).

We did not extend Hazus analysis to a property-specific level for wastewater treatment facilities as the project team was not confident that the default data used in the model would accurately account for the complexities of predicting damages to the underground structures of these facilities.

Hazus output reports which summarize physical and economic damage estimates from each hurricane scenario can be found in Appendix D. Spatial datasets which summarize economic loss and structural damage from all scenarios can be downloaded in the project geodatabase available at climate.buzzardsbay.org/seaplan-study.html. The online risk visualization tool also functions as a summary of Hazus results by visualizing damage estimates by town and by hurricane parameter. The economic loss data in the viewer and in the downloadable geodatabase is a measurement of direct economic loss, which includes capital stock losses (building loss, contents loss, and inventory loss), and

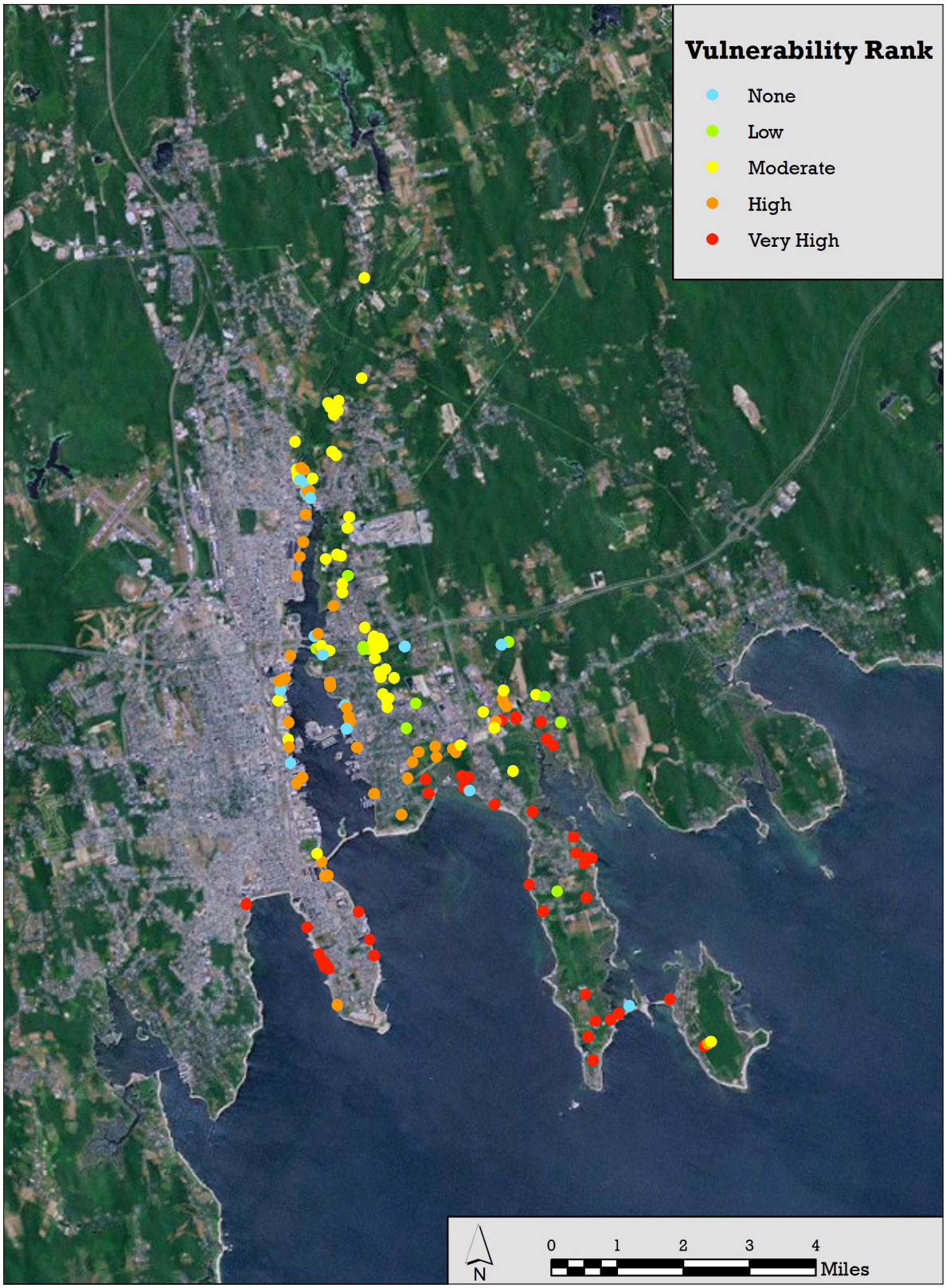

Figure 18. **Water quality infrastructure features (pump stations and treatment plants)** by vulnerability rank.

Figure 19. **Outfalls** by vulnerability rank. If the outfall is vulnerable in 1-5 storm scenarios, it is given a risk ranking of low and colored green. If the outfall is vulnerable in 6-10 storm scenarios, it is given a risk ranking of moderate and colored yellow.

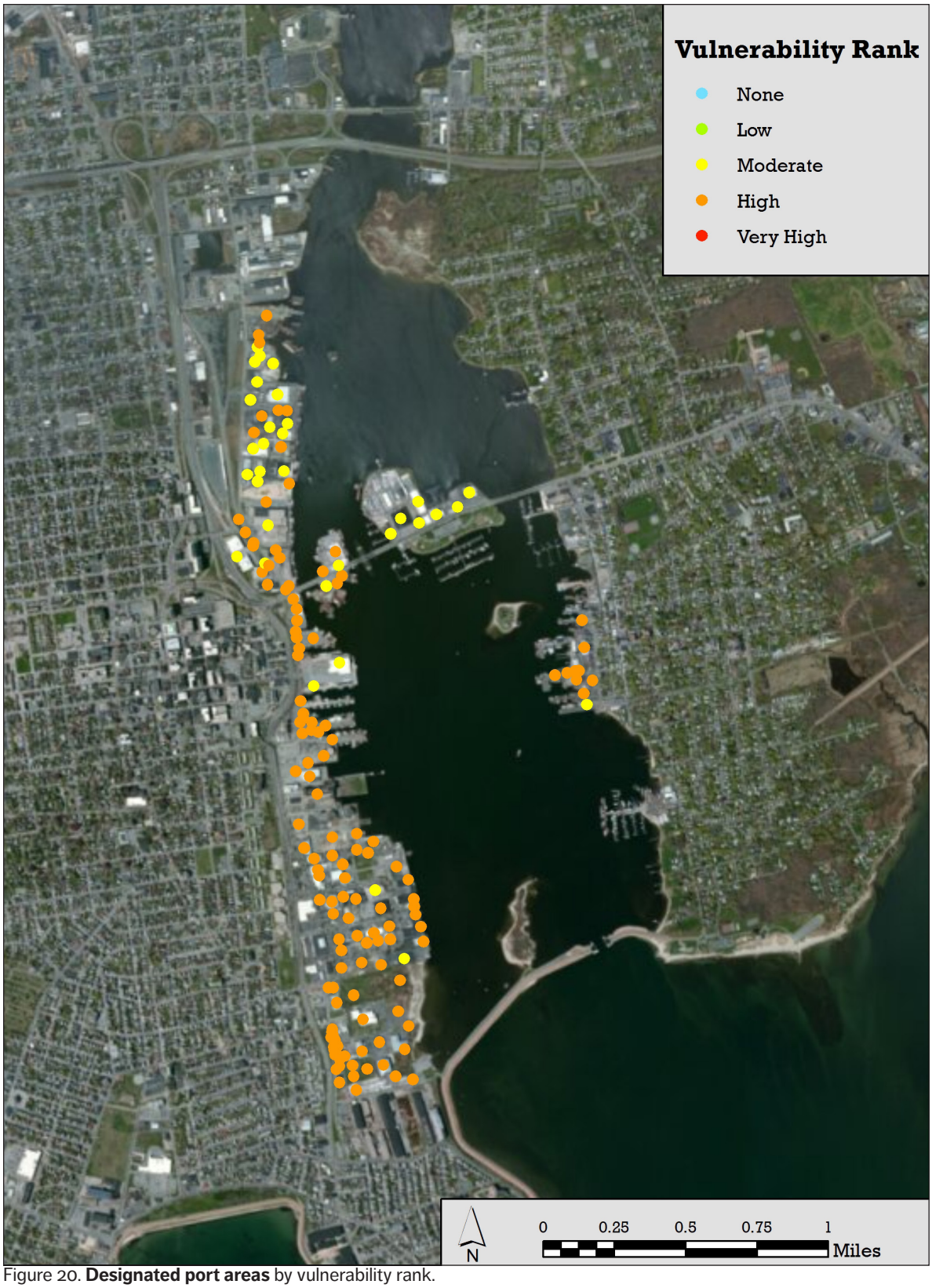

Figure 20. **Designated port areas** by vulnerability rank.

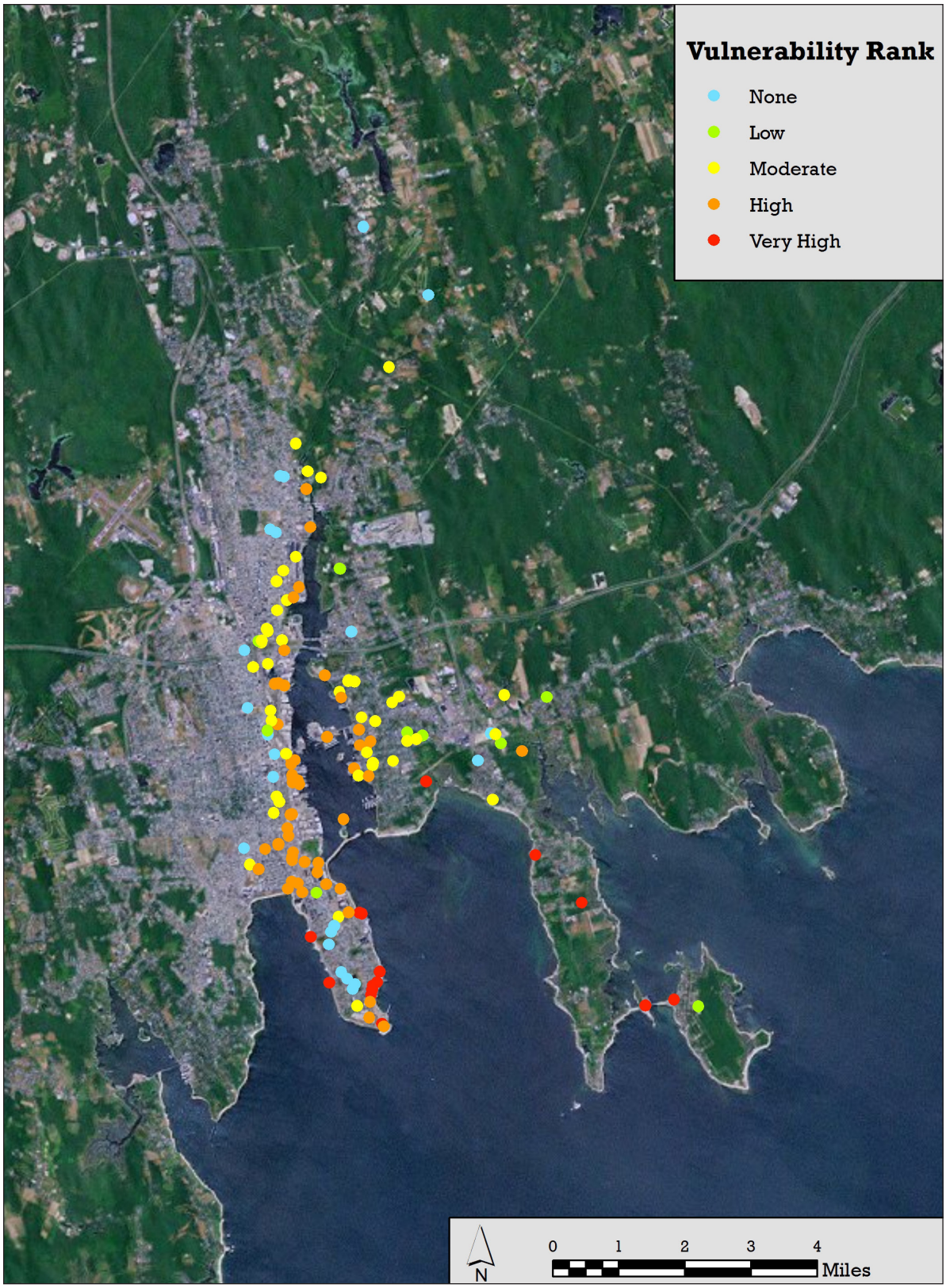

Figure 21. **Built public structures** by vulnerability rank.

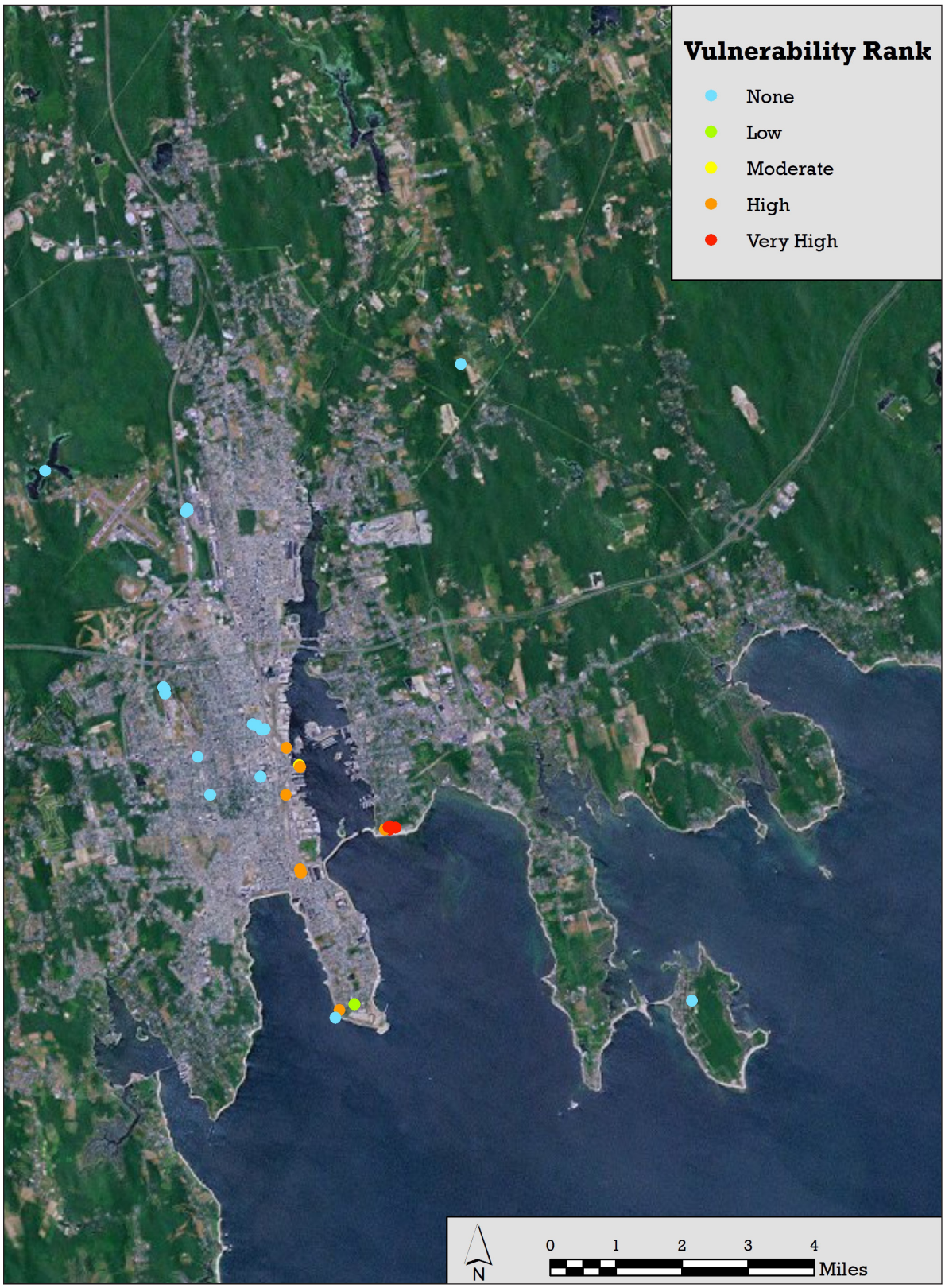

Figure 22. **State-owned buildings** by vulnerability rank.

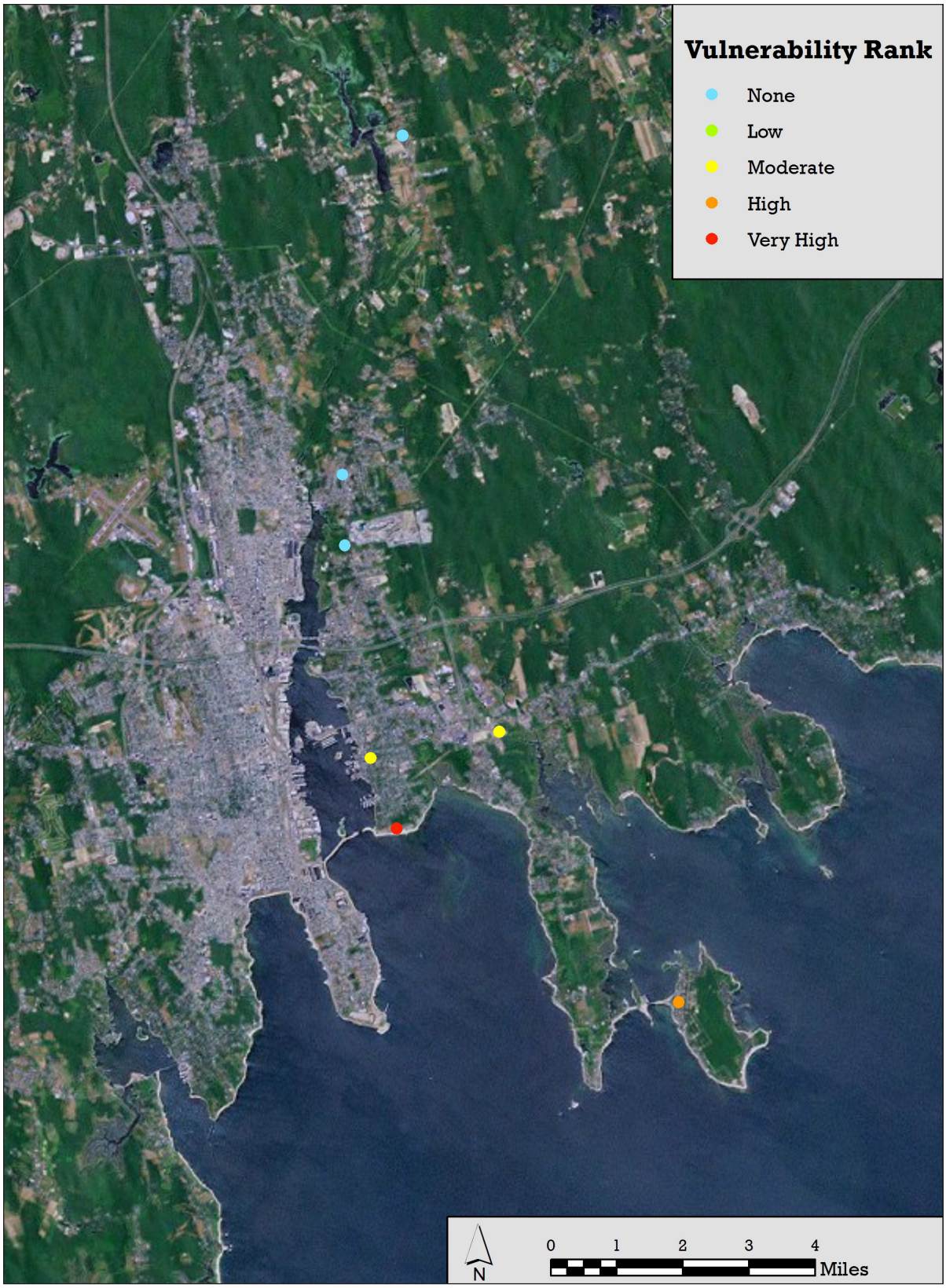

Figure 23. **Government buildings** by vulnerability rank.

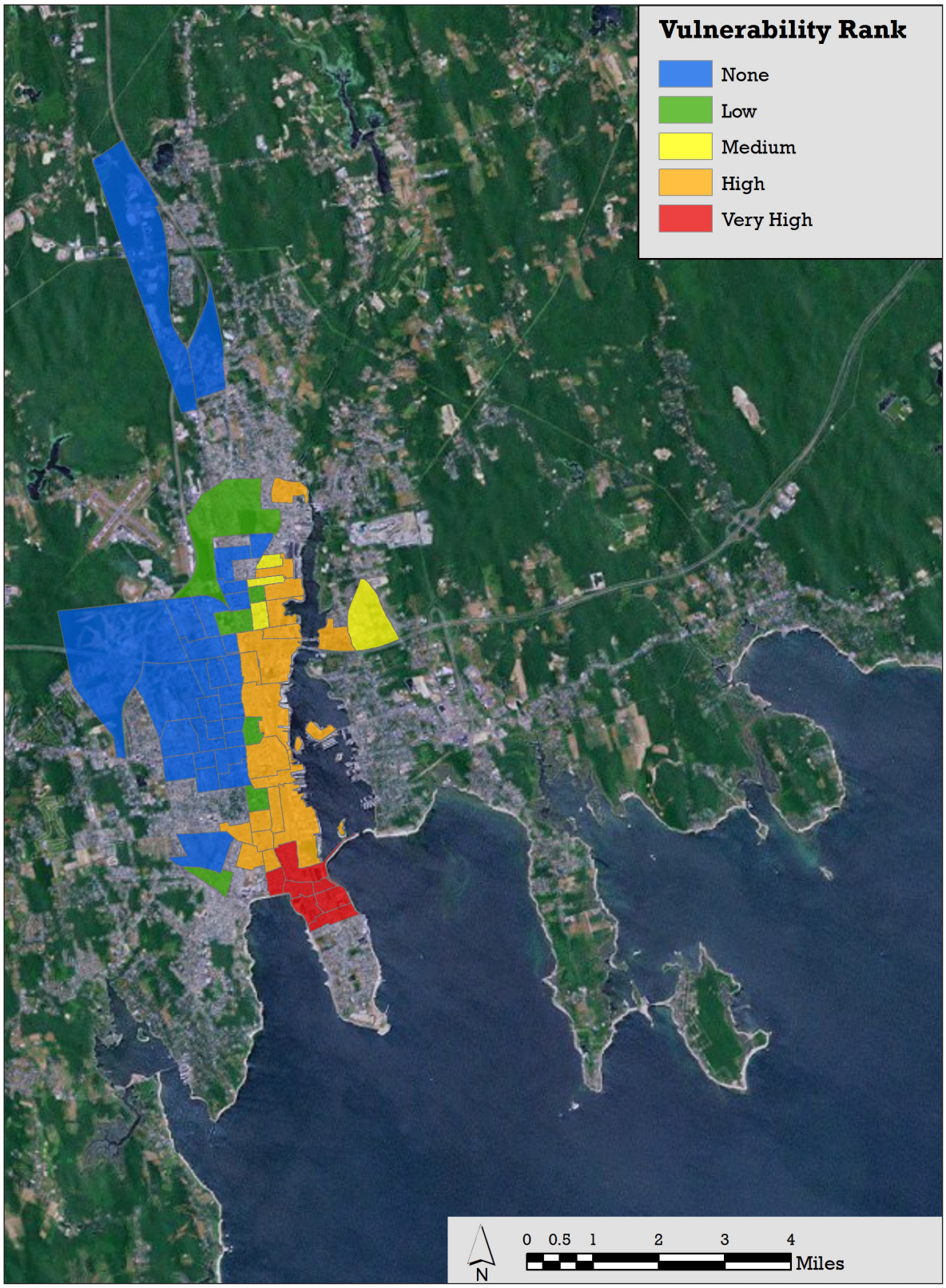

Figure 24. **Environmental justice communities** by vulnerability rank.

income losses (relocation loss, capital losses, wage loss and rental income loss). It does not include estimated repair and replacement costs. Costs of repair and replacement costs are factored into the estimates of building exposure, which are reported in other sections of this document. Building exposure data is not aggregated the level of Census Block level in Hazus, which is why no downloadable spatial datasets were developed using these estimates.

Water quality engineering analysis and recommendation development Results

The inundation depths at the locations of priority water quality infrastructure features (CSOs, pump stations and wastewater treatment facilities) informed the development of recommendations for the municipalities in the study area to begin to address vulnerabilities. Recommendations were developed based on the available data from each municipality; however, the considerations used to develop these recommendations were consistent for each municipality. Below, we describe the general considerations, approaches, and recommendations for CSOs, pump stations and treatment plants for the entire study region. We then provide specific recommendations for each water quality infrastructure feature and municipality in the prioritization matrix (Table 8), which provides details about risks, costs, and other considerations at specific structures and assigns a relative value ranking top priority adaptation projects for the municipalities to consider. In order to provide information that is most helpful to individual municipalities, we also developed separate recommendation summaries specific to each municipality. These summaries contain a simplified version of the prioritization matrix and can be found in Appendix E.

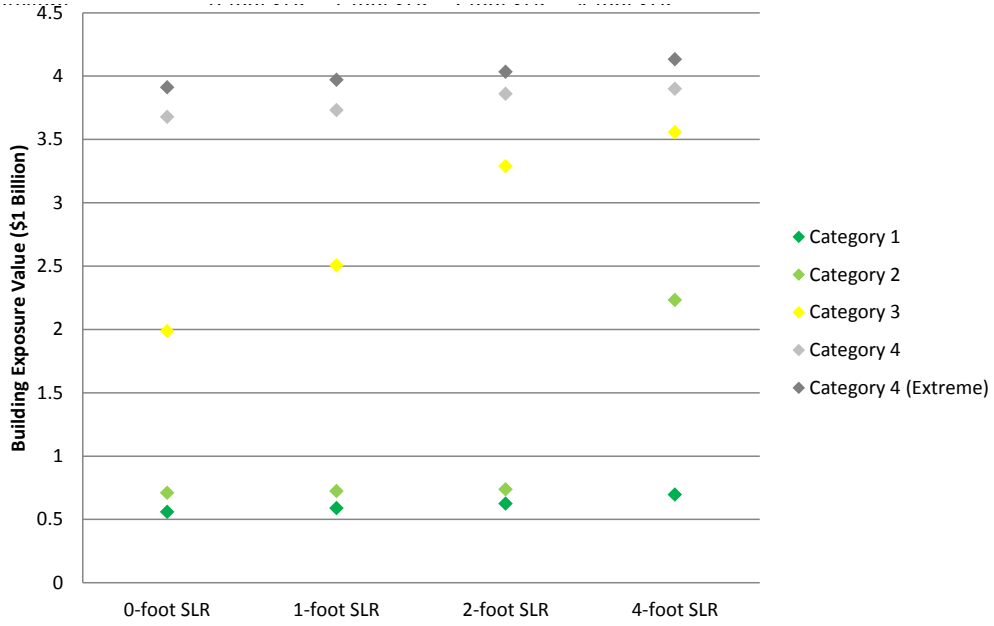

Figure 25. Summary of estimated building exposure values from the Hazus model. This estimate includes not only the cost of the buildings themselves (substantially damaged or otherwise), but also the engineering cost to replace or repair a damaged building.

CSOs

The City of New Bedford has 24 active, permitted CSOs. CSO discharges are controlled by regulators, many of which are already below MSL (mean sea level) and MHW (mean high water) (Figure 27). This means that there are likely to be additional regulators, sets of controls and/or storage available that would prevent the system from flooding during normal operation. Additionally, 15 of these outfalls have a tide gate that would preserve system storage. The project team understands that several regulators currently flood with water from the river and/or bay during storms and other extreme tide events resulting in in situ river/bay water draining to the treatment plant. This inflow into the system unnecessarily impacts the system hydraulic loads and likely negatively impacts the waste water treatment system performance. SLR will only exacerbate these flooding issues. However, it is not currently possible to quantify the extent of these impacts beyond understanding that increased SLR will add backflow to the existing CSO outfalls and reduce their hydraulic performance.

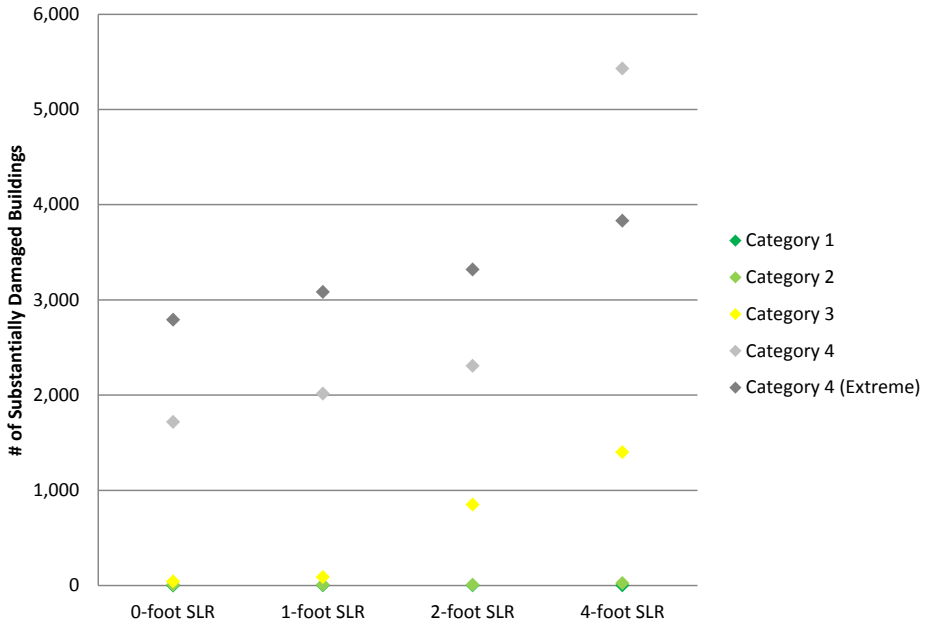

Figure 26. Summary of estimated structural damages to buildings using Hazus model.

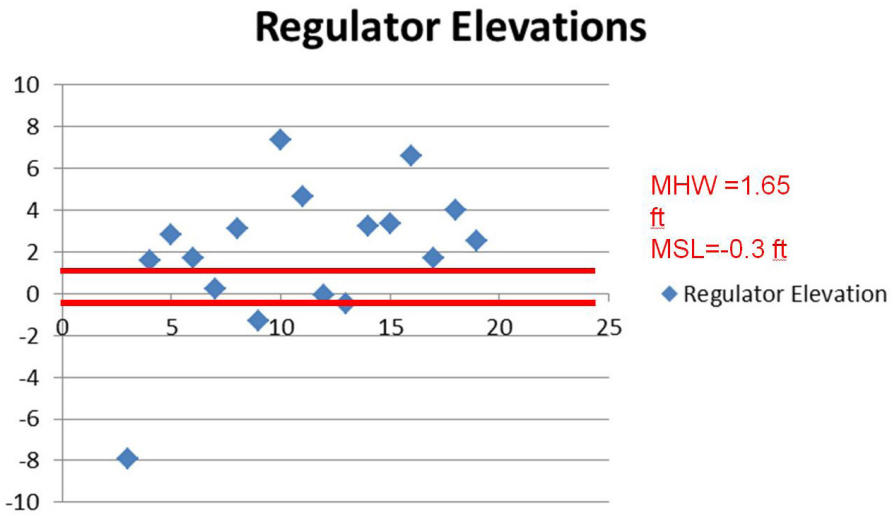

Figure 27. CSO Regulator Elevations. Regulator elevations (ft) are shown on the y-axis. Red lines on the chart depict mean high water (MHW) and mean sea level (MSL) at baseline (no SLR) scenarios.

In the short-term, the team recommends that the City of New Bedford pursue smaller adjustments and repairs to CSOs, where possible; however, more information is needed as to whether increased water levels at discharge locations would prevent regulators from functioning properly. As such, we suggest that assessing the impacts of storm surges will require hydraulic modeling of the system, which answers questions about the storage capacity of the system and its ability to drain. In general, the hydraulic modeling would need to assess the ability of the system to temporarily store water during target evaluation storms and then release that water as tides recede for SLR scenarios. In terms of priority study activities, we recommend that CSO hydraulics should be modeled for those CSOs where regulator weir elevations are below SLR elevations for specific SLR scenarios (Table 4). This study modeled flooding from hurricane events, however, in the long term, if there is more than 1 – 2 feet of SLR, there will be limited abilities to make any changes to individual CSOs that will prevent overflows. Under these projected SLR scenarios, dramatic and costly changes will have to be made to sewer infrastructure to prevent saltwater intrusion and to eliminate CSOs due to seawater intrusion into the system. Once these sea levels are reached, it will be necessary to devote substantial resources to increase overall sewer capacity.

Pump stations

The infrastructure housed at pump stations, including motors, electrical service and electronic controls, generators, buried compressors and fuel tanks, and manholes can all influence a pump station's ability to operate during flooding events. There are 15 pump stations, in the floodplain of a Category 3 hurricane with no SLR. This includes 1 in Acushnet, 4 in New Bedford, and 10 in Fairhaven. When 4-foot SLR is added to the scenario, there are an additional 11 additional pump stations in the flood plain. This includes 1 additional pump station in Acushnet, 5 in New Bedford, and 5 in Fairhaven. Generally the pump stations are above ground on level ground near the shoreline and are very exposed. A few are below ground. Figure 28 summarizes the inundation depths at each pump station for these scenarios.

Adaptation actions should prioritize structures that fall within the Category 3 floodplain at current water levels, and focus secondarily on those which are at risk during Category 3 storms with 4-foot SLR. Individual assessments of each structure should be performed to determine the following:

- Whether the structure has already been floodproofed
- To confirm elevations of possible points of entry for water (e.g. vents, door sills, windows)
- The vulnerability of critical infrastructure within each pump station
- What would be required to floodproof
- Whether the facility is currently able to operate during flood conditions (e.g. equipped with generator, ability to remotely operate)

Once potential risks to a facility are understood, potential mitigation measures should be identified and more accurate opinions of costs can be developed to retrofit existing facilities. From an initial evaluation of the pump station locations under these scenarios, we have found that access to many structures will not be possible except by boat

Table 8. Prioritization Matrix. This table shows the water quality infrastructure evaluated for water quality engineering adaptations. Facilities that are in the floodplain for both Category 3 (0-ft SLR and 4-ft SLR scenarios received a vulnerability rating of 3 (high risk, highlighted in red), those in the floodplain only during the Category 3 storm with 4-foot SLR received a risk rating of 2 (medium risk, highlighted in orange), and those that weren't in the floodplain in either scenario received a risk rating of 1 (low risk, highlighted in green). Adaptation costs are ranked 1 (high), 2 (medium) and 3 (low). Some additional features are assigned a facility importance ranking of 2 to pump stations in Fairhaven that reflects their overall importance to system function. These ranks are multiplied to get the priority ranking score. Proposed projects with higher scores should be considered high priority for the municipality.

Structure Location	Municipality	500 year flood depth with baseline water levels	500 year flood with 4' SLR	Inundation Risk	Preliminary Recommendations	Facility Importance Rank	Project Cost	Comments	Priority Ranking
Combined Sewer Overflows (CSOs)									
Various	New Bedford	N/A	N/A	Unknown	Hydraulic modeling of CSO system to assess storage capacity of system and ability to drain during various SLR scenarios, especially for those CSOs where regulator weir elevations are below SLR elevations for evaluation scenarios.		1	There is not currently enough data to assess the extent of the impacts of the modeled storm scenarios on CSOs. in the long term, if there is more than 1 – 2 feet of SLR, there will be limited abilities to make any changes to individual CSOs that will prevent overflows. Under these projected SLR scenarios, dramatic and costly changes will have to be made to sewer infrastructure to prevent saltwater intrusion and to eliminate CSOs due to seawater intrusion into the system.	-
Pump Stations									
Blueberry Drive	Acushnet	0.00	0.00	1	None			Above ground structure with brick construction. Door sill is close to ground	1
Allen Street	Acushnet	0.00	4.74	2	Consider berm or wall with weir boards for access. Need for generator is unknown. Potential cost range is $25,000 to $75,000		3	Above ground structure type unknown, likely pre-manufactured housing for pump station. If so, likely cannot be floodproofed and earth-en berm will be required.	6
Slocum Street	Acushnet	0.85	23.84	3	Add floodproof door and extend vents. Potential cost range is $10,000 to $25,000. on site generator will be expensive and not included in these costs. Controlling water levels above roof line likely not feasible.		3	Below ground structure. Vents likely could be flooded with SLR scenario.	9
Rivard Street	Fairhaven	0.00	0.00	1					1
Marguerite Street	Fairhaven	0.00	0.00	1				Above ground structure type unknown.	1
Pine Grove Road	Fairhaven	0.00	0.00	1				Below ground structure. Vents likely could be flooded with SLR scenario.	1
Rocky Point Road**	Fairhaven	7.44	11.25	3				No information available	3
Abbey Street**	Fairhaven	12.50	16.75	3	None			Has on-site generator	3
Boulder Park**	Fairhaven	13.20	17.33	3	Needs elevation			No data available	3
Taber Street*	Fairhaven	0.00	20.73	2	Potentially require floodproof door. Potential cost range is $10,000 to $250,000.		2	Above ground structure with brick construction. Door sill is close to ground.	4
Pilgrim Avenue*	Fairhaven	0.00	20.65	2	Potentially require flood proof door as well as generator and remote controls. Structure should be checked for buoyancy. Potential cost range is $10,000 to $250,000.		2	Above ground brick structure, first floor within 2-3 ft of ground. Generator on site.	4
Bridge Street*	Fairhaven	0.00	18.05	2	Potentially require floodproof door as well as generator and remote controls. Structure should be checked for buoyancy. Potential cost range is $10,000 to $250,000.		2	"Above ground brick structure, first floor within 2-3 ft of ground. This is no longer a pump station; used for odor control only. "	4
Middle Street*	Fairhaven	0.00	18.82	2	This is a drainage (not sewer) pump station and therefore should be assessed to determine how essential it is to operate during coastal floods. Potential cost range is $10,000 to $50,000.		3	Above ground structure. Door sill is 1 to 2 feet above ground.	6
Causeway Road**	Fairhaven	3.93	7.66	3	Structure would require complete reconstruction. Potential cost range is $200,000 to $500,000	2	1	Above ground wood structure. Door sill is just above ground. Generator on site. Pumps water from upstream pump stations	6
Camel Street**	Fairhaven	8.04	11.66	3	Below ground pump station. Flood door for vault required and on site generator should be considered. Potential cost range is $50,000 - $250,000		2	Town has indicated that a portable generator is used during storms; however, access to site would be limited during projected inundation scenarios.	6
Manhattan Avenue**	Fairhaven	8.71	12.49	3	Minimum likely requirement is floodproofing doors. Potential cost range is $10,000 to $250,000		2	Above ground structure with pump station on site. Doors are elevated 15 feet.	6
Bernese Street**	Fairhaven	8.73	12.59	3	None	2		Generator on-site with elevated doors. Pumps water from updstream pump stations.	6
Shore Drive**	Fairhaven	12.18	15.98	3	Floodproof access hatch and provide on-site generator. Potential cost range is $100,000 - $250,000		2	Below grade pump station with no generator	6
Waybridge Road**	Fairhaven	12.59	16.40	3	On-site generator recommended. Potential cost range is $10,000 to $250,000		2	Aboveground pump station with elevated first floor which is 10-12" above grade. Town has indicated that a portable generator is used during storms; however, access to site would be limited during projected inundation scenarios.	6
Seaview Avenue**	Fairhaven	12.81	16.59	3	On-site generator with above ground structure recommended. Potential cost range is $10,000 to $250,000		2		6
South Street	Fairhaven	0.00	11.74	2	Potentially require floodproof door as well as generator and remote controls. Structure should be checked for buoyancy. Potential cost range is $10,000 to $250,000.	2	2	Above ground structure with brick construction. Door sill is close to ground. Pumps water from upstream pump stations.	8
Arsene Street	Fairhaven	0.00	0.00	1	None				1
Rowe Street	New Bedford	0.00	0.00	1	None				1
Peckham Road	New Bedford	0.00	0.00	1	None				1
Sassaquin Avenue	New Bedford	0.00	0.00	1	None				1
Pequot Street	New Bedford	0.00	0.00	1	None				1
Phillips Road	New Bedford	0.00	0.00	1	None				1
Marlborough Street	New Bedford	0.00	0.00	1	None				1
Forbes Street	New Bedford	0.00	0.00	1	None				1

* Town has indicated that these pump stations, which are behind the hurricane barrier, may be older structures therefore more vulnerable in the event of flooding at that location.

** This facility reportedly is not operated during flooding events. As a result, adaptations to allow pump station to operate during the flood events are likely not required. However, adaptations to these structures may still be required in order to protect key infrastructure in the facilities (e.g. motors and electrical service) and allow the facilities to be able to operate after the storm.

Structure Location	Municipality	500 year flood depth with baseline water levels	500 year flood with 4' SLR	Inundation Risk	Preliminary Recommendations	Facility Importance Rank	Project Cost	Comments	Priority Ranking
Hanover Street	New Bedford	0.00	0.00	1	None				1
Welby Road	New Bedford	0.00	0.00	1	None				1
Church Street	New Bedford	0.00	0.00	1	None				1
Joyce Street	New Bedford	0.00	0.00	1	None				1
Aviation Way	New Bedford	0.00	0.00	1	None				1
Shawmut Avenue	New Bedford	0.00	0.00	1	None				1
Valley View Drive	New Bedford	0.00	0.00	1	None				1
Joy Street	New Bedford	0.00	0.00	1	None				1
Hathaway Road	New Bedford	0.00	0.00	1	None				1
Apple Tree Lane	New Bedford	0.00	0.00	1	None				1
Merrimac Street	New Bedford	0.00	0.00	1	None				1
Coggeshall Street	New Bedford	0.00	16.66	2	Floodproofing of doors, windows and vaults will be required. Existing vents will need to be raised. Electrical infrastructure such as services, generators and transformers will either need to be raised or protected with floodwall system with flashboards for access. Structure and vaults should be checked for buoyancy. Controlling water levels above roof line likely not feasible. Potential cost range is $150,000 to $350,000.		1	Above ground brick structure with brick construction. Door sill is about 0.8' above ground. Window sills are about 4.7' above ground. Several concrete vaults with hatches or accessways exist below grade that likely provide pathway for flooding inside of building. A vent to one of the vaults also has a low point at about the same elevation of the window sills. Two other vents also exist at a lower elevation. Building electrical service is below inundation levels. A transformer adjacent to the site and generator is on right at grade.	2
Howard Avenue	New Bedford	0.53	23.44	3	"Require floodproof doors and windows including accessways to below grade vaults. Above ground tank will have to be anchored and vaults checked for buoyancy. Generator should be provided for site. Controlling water levels above roof line likely not feasible. Potential cost range is $150,000 to $350,000. "		1	"Above ground structure with brick construction. Two stainless steel doors have sills at grade. Window sills are as low as 2.7' above ground. Below grade vaults exist with hatches or grates providing access to the vaults. Above ground storage tank exists at grade. Generator transfer switch and connection are located about 3.2' above grade. A below grade electrical vault also exists on this site. Above ground structure with brick construction. Two stainless steel doors have sills at grade. Window sills are as low as 2.7' above ground. Below grade vaults exist with hatches or grates providing access to the vaults. Above ground storage tank exists at grade. "	3
Belleville Avenue	New Bedford	0.00	17.73	2	Require floodproof doors for entries and loading dock as well as floodproofing electrical vault and air intakes. Also, incoming sewer manholes will need to have covers bolted and gasketed. Potential cost range is $25,000 to $200,000.		2	Above ground brick structure. Door and loading dock landing is about 3.3' above ground. Air intake or exhaust is about 3' above ground. Below grade electrical vault will be vulnerable to flooding. Equipped with SCADA and telemetry so can be remote operated. Generator is located on site.	4
MacArthur Drive	New Bedford	0.00	13.27	2	Potentially require floodproof door, generator and floodproofing of vaults that could be points of entry. Potential buoyancy of building should also be assessed. Controlling water levels above roof line likely not feasible. Potential cost range is $100,000 to $250,000.		2	Above ground brick structure.First floor is at about 3.1' above ground at entry door landing. Several buried concrete vaults are adjacent or nearby the structure. Contents of those vaults are not known but likely points of entry into pump station. The vaults may be inlet works, wet wells or electrical vaults.Site is not equipped with a generator and pigtail connection is at door sill elevation. Some electrical service enters building from ground. Facility will be equipped with SCADA and telemetry to allow remote operation.	4
Wamsutta Street	New Bedford	0.00	23.53	2	Potentially require floodproof doors as well as floodproofing at-grade entryway and building penetrations. Generator will also need to be protected likely with wall system. Potential buoyancy of building should also be assessed. Controlling water levels above roof line likely not feasible Potential cost range is $75,000 to $250,000.		2	Above ground structure with brick construction. Door sill is close to ground. No generator, likely pigtail.	4
Popes Island	New Bedford	0.00	16.69	2	Access hatch to pump station will need to be floodproofed. Electrical service and control panels will need to be raised and floodproofed. Ability to operate pump station remotely will need to be confirmed. Generator should also be provided that will need to be protected as well. Potential cost range is $100,000 to $250,000		2	Below ground pump station. Electrical service and control panels are at about 2.8' above grade. Vent is about 4.25' above grade. No generator	4
South Water Street	New Bedford	6.82	15.12	3	Potentially require floodproof door and floodproof windows. Generator and electrical service will likely need to be raised or protected. Little information available for this site to identify other needs. Potential cost range is $100,000 to $250,000.		2	Above ground structure. Door sill is just above ground. Generator is reportedly located on site.	6
East Rodney French Boulevard	New Bedford	11.39	15.74	3	Floodproof doors and windows. Vents will need to be protected with cutoff wall. Electrical service will need to be raised and gas service needs to be evaluated. Controlling water levels above roof line likely not feasible. Potential cost range is $25,000 to $150,000.		2	"One door sill and vent are located 3.6' above grade. One door sill is 1.8' above grade. Ground elevations vary at both doors. Electrical service meter box located 2.3' above grade. Electrical junction boxes appear to be as low as 0.8' above grade. Intake/exhaust vents for generator are about 1.8' above grade. Gas service is at grade for backup generator. "	6
Cove Road	New Bedford	11.89	15.12	3	Floodproof existing doors. Electrical service should be raised and floodproofed with transformer protected as well. Generator vent should be protected with cut off wall. Gas service needs to be assessed. Controlling water levels above roof line likely not feasible. Potential cost range is $50,000 to $250,000.		2	"Protected by existing levee; The ability to enhance the existing flood control system around this structure should be assessed as part of any consideration to providing further flood protection for this structure. First floor 4' above grade with two stainless steel doors providing access. Electrical box is located 3' above grade. Transformer is located at grade. Gas service is also located at grade. Generator intake/exhaust vents is located 4.4' above grade. Odor control system is located outdoors but is not critical to system operation and would not be required to be protected. Generator is on site in building. Odor control system is located outdoors but is not critical to system operation and would not be required to be protected. Generator is on site in building."	6
Wastewater Treatment Facilities									
South Rodney French Boulevard	New Bedford	1.38	5.40	3	None			Protected by existing levee; The ability to enhance the existing flood control system around these structure should be assessed as part of any consideration to providing further flood protection for this structure.	-
Arsene Street	Fairhaven	0	0	1	None			Generator above ground brick, inside building	1
West Island	Fairhaven	0	0	1	None				1

during the inundation scenarios evaluated.

The Cove Road pump station in New Bedford is protected by an existing levee, although, there is the potential for inundation around this levee in the evaluated scenarios. The ability to enhance the existing flood control system around this structure should be assessed as part of any consideration to providing further flood protection for this structure. Use of short earthen levees or other flood protection structures will likely not be feasible for most of the other vulnerable facilities. The sites are too small to provide the space required for new structures and still allow equipment to access the facilities.

Structural floodproofing will likely be the only option available for these sites. The need for floodproofing may be minimal for some of these sites where pump stations are elevated.Several pump stations are below grade. These likely will be a greater challenge to floodproof.

Wastewater treatment plants

The Category 3 storms at both baseline water levels and 4-foot SLR levels show over ground flooding at the New Bedford Wastewater Treatment Facility. Future studies should assess the storm scenarios that this treatment facility should be protected from and should focus on thorough evaluations of the flood control system and critical infrastructure for those scenarios. Ideally, flood controls should keep the entire site dry for the specified inundation scenario.

The New Bedford facility is protected by an existing revetment; however, this does not appear to provide sufficient

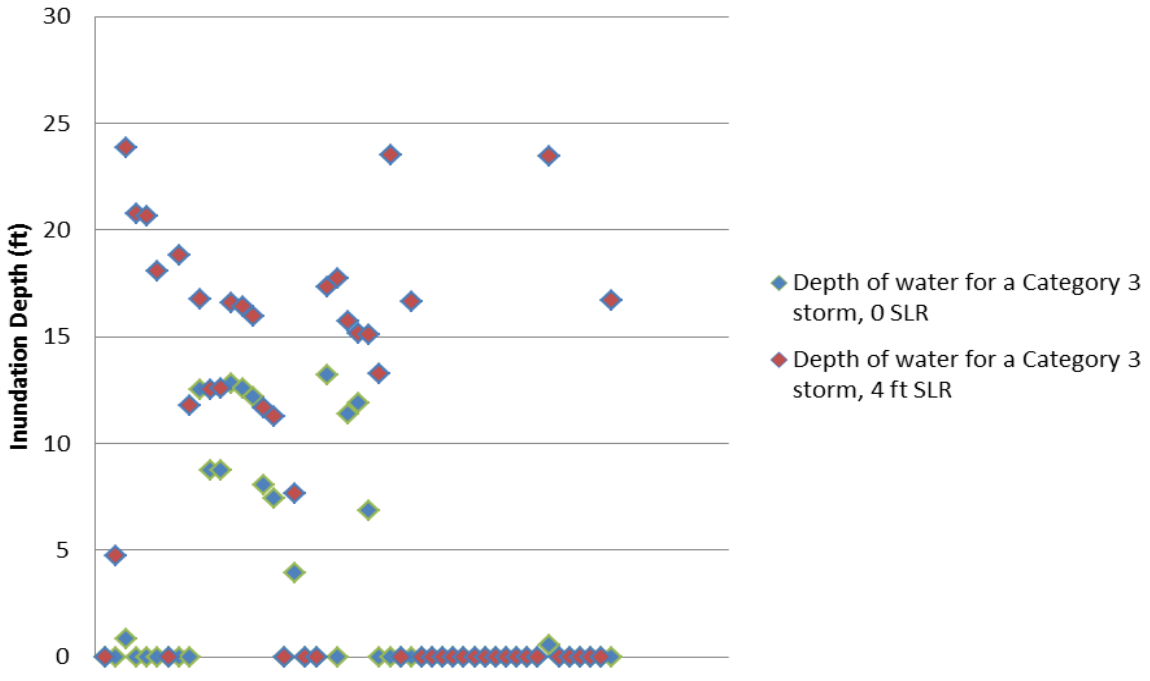

Figure 28. Inundation depths for pump stations. Depths reflect the inundation above sea level at the location of each pump station

protection from inundation around the treatment plant in hurricane scenarios more severe than Category 2 with 4-foot SLR. The ability to enhance the existing flood control system around these structures should be assessed as part of any consideration to providing further flood protection for this structure. Neither of the wastewater treatment facilities located in Fairhaven are at risk for flooding in either of these scenarios.

A site-specific assessment should be conducted to assess vulnerability to flooding. This would include a site visit to determine point of entry and where flood waters could damage equipment/structures and a survey to identify actual elevations of critical points to compare with target flood elevations. Once potential risks to the facility are understood, potential mitigation measures should be identified and more accurate opinions of costs can be developed to retrofit existing facilities.

Stakeholder engagement

Kick-off Meeting

On December 16, 2013, the kickoff meeting and listening session took place at the New Bedford Wastewater Treatment Facility and included the project team, as well as representatives from Buzzards Bay NEP, MA CZM, municipal departments of public works, and other interested parties. The project team presented an overview of the project and proposed approach. This was followed by a listening session in which meeting attendees provided feedback on data availability, priority concerns on water quality infrastructure, and hurricane parameters that should be involved in the SLOSH matrix. Major results from the meeting included: an updated list of datasets to include in the analysis, including designated port areas, public property with assessed values, and state-owned facilities; a plan to prioritize water quality infrastructure, especially CSOs, in the report recommendations; an approval of draft model parameters to be used in SLOSH; and a modified timeline for the remainder of the project.

Workshop Agenda Development

On February 4, 2014, a workshop planning meeting took place at the Fairhaven Wastewater Treatment Facility and included project team members from SeaPlan and RPS ASA, as well as representatives from Buzzards Bay NEP, MA CZM, municipal departments of public works, and other interested parties. At this meeting, the team presented a project update, and planned the interactive workshop. The outcomes of this meeting included an approval of the SLOSH input matrix, overview of the workshop agenda, ideas for workshop dates, and locations, and a consensus on the workshop audience and list of invitees.

Interactive Half-day Workshop

The half-day workshop for an audience of municipal staff and municipal appointed boards and commissions, waterfront

users, state and federal agency took place at the Acushnet Council on Aging on April 17, 2014. The meeting included a presentation of the major findings of the vulnerability assessment, the Hazus damage assessment, a demonstration of draft data visualization tools, and preliminary recommendations in both a formal PowerPoint presentation and via the wall maps. The meeting was then divided into three interactive breakout sessions: Data Visualization Tools, Analysis and Results, and Recommendations in which meeting participants had a chance to explore tools and results in greater detail, ask in-depth questions, provide feedback specific to the session's theme. Major outcomes of the workshop included ideas for refining cartographic representations in the online interactive map viewer, a discussion of how the project outcomes will affect future land-use planning, economic analysis, and emergency management, and a plan to acquire more detailed data on water quality infrastructure from municipal representatives.

Presentation of Draft Findings

The final meeting took place on June 12, 2014, and focused on presenting the draft findings and the draft report, as well as final versions of the interactive online tools. Meeting attendees included representatives from each municipality, as well as any additional interested representatives from MA CZM, MEMA, and the EPA. During this meeting, participants had the opportunity to provide comments on the draft results and recommendations outlined in the draft technical report available on the project website. The consulting team had an opportunity to clarify and reconcile comments received prior to the meeting. Outcomes of this meeting included plans to refine recommendations related to New Bedford CSOs and some Fairhaven pump stations for the final report, as well as plans to refine the methodological overview and discussion sections by providing context about other modeling efforts and historical storms.

Data visualization tools

The team created two data visualization tools to communicate the impacts of the inundation scenarios.

Online Mapping Tool

The interactive mapping tool found at http://seaplan.buzzardsbay.org/contains a tabbed viewer which allows the user to view hurricane inundation scenarios for each baseline water level. The viewer contains inundation polygons, as well as the following features:

- Water infrastructure (pump stations and treatment plants)
- Coastal protection structures
- Designated port areas
- Environmental justice communities
- Government buildings
- State-owned buildings
- Publically-owned buildings
- Built public parcels
- Outfalls (CSOs and stormwater pipes)
- Selected catch basins (in Category 3 hurricane floodplain)
- Town boundaries

Users can click on data features to access additional data about each location (Figure 29).

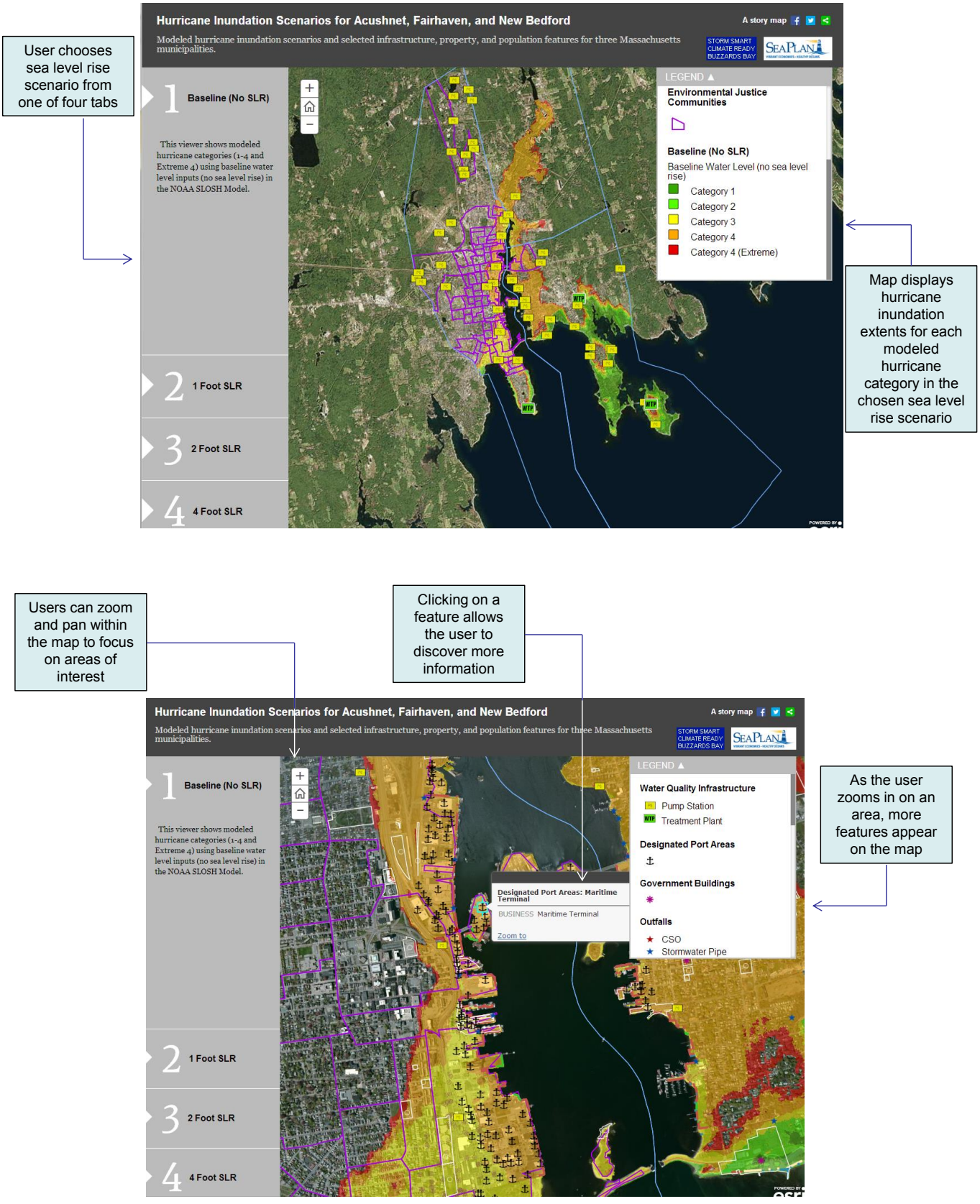

Figure 29. Online mapping tool available at [seaplan.buzzardsbay.org.](seaplan.buzzardsbay.org)

Risk Visualization Tool

The interactive risk visualization tool found at http://seaplan.buzzardsbay.org/risk.html allows users to choose hurricane parameters of interest and simultaneously view economic damage summary data from the Hazus model, flood inundation extents, storm surge elevation and its sensitivity to model inputs, and water level return period estimates. Each website component is dynamic and updated on-the-fly as users change the selected hurricane parameters (Figure 30). Unlike the building exposure values reflected in this report, the values displayed in the tool reflect estimates of economic loss, but do not include replacement costs.

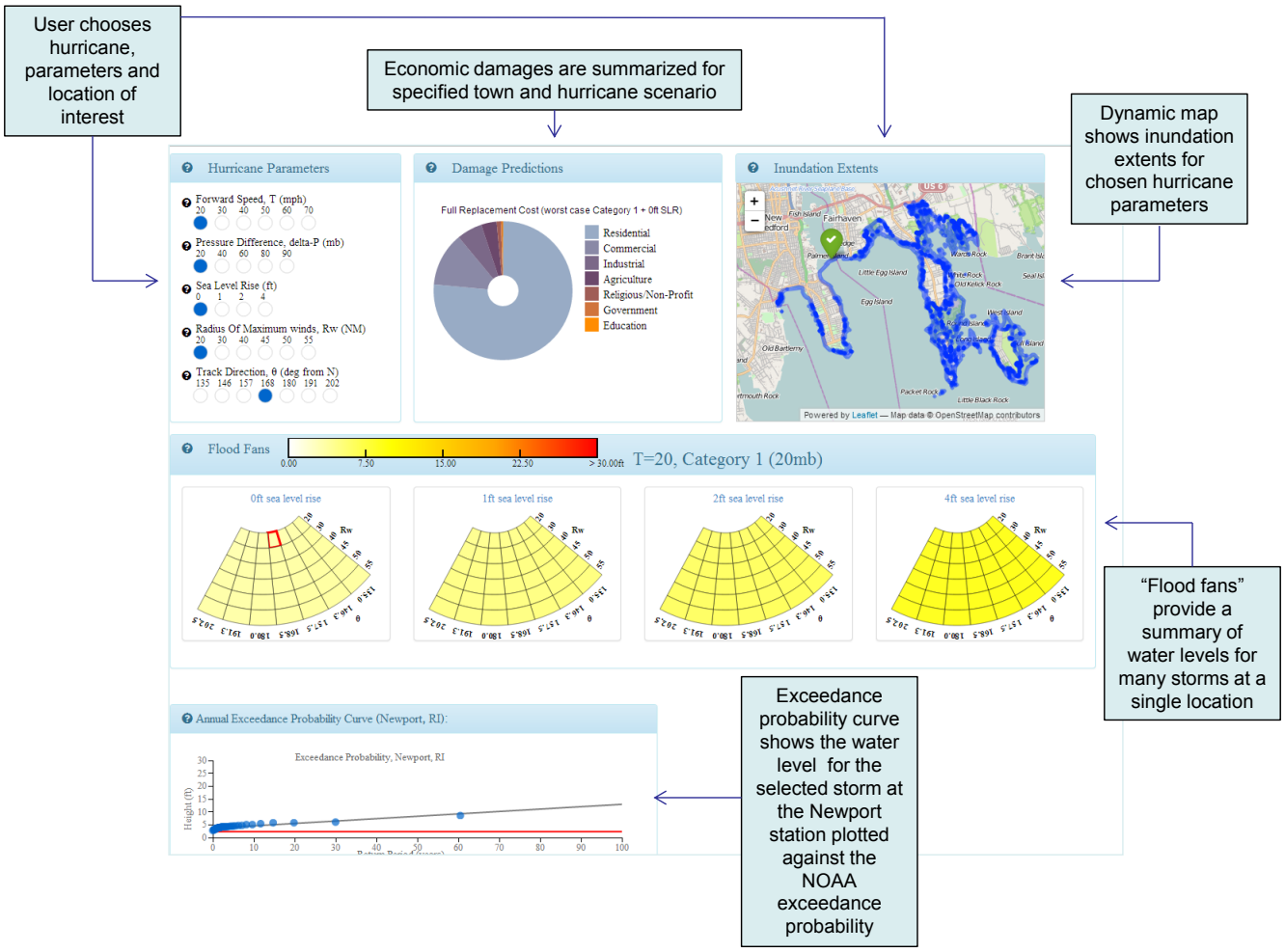

Figure 30. Online risk visualization tool available at http://seaplan.buzzardsbay.org/risk.html

Discussion

The 2014 National Climate Assessment stresses the climate change is already affecting the United States, and the Northeast will become increasingly impacted by SLR, coastal flooding, and intense precipitation events that will compromise existing infrastructure (Melillo et al. 2014). While federal, state, and local governments recognize these risks, there is much work to be done to implement adaptation measures. In order to prioritize adaptation strategies, governments need science-based predictive tools to support decision making which will lessen the impacts of climate change.

This study provided data, interpretive data products, and interactive tools which will help local governments prioritize adaptations actions for reducing the adverse impacts of climate change in these Buzzards Bay communities. The project team anticipates that in general, Category 3 storms and higher will have substantial impacts on the region that will be exacerbated with SLR as flooding will occur over and around the hurricane barriers. Although historically it has been rare for Category 3 storms to make landfall in the region, the intensity and frequency of North Atlantic hurricanes have been increasing since the 1980s, and are expected to continue to increase with rising global temperatures (Melillo et al. 2014). Given extreme SLR scenarios, even less severe storms might begin to damage facilities otherwise protected by the hurricane barrier. A Category 3 storm with 4-foot SLR has the potential to affect 26 pump stations and one wastewater treatment facilities in the region. The New Bedford wastewater treatment facility could potentially face substantial damages to its underground infrastructure if vulnerabilities are not addressed. SLR will also exacerbate existing vulnerabilities within the CSO system. Modeling the hydraulics of New Bedford's CSO system will be a necessary first step in identifying short-term adaptations to CSOs; however, it is recommended that the City of New Bedford pursue future studies of the CSO system to understand how to ready the system for sustained rising water levels and to identify alternative solutions that do not include CSOs. Without detailed, site-specific data at wastewater treatment facilities and pump stations, it is not possible to thoroughly evaluate the vulnerabilities of each structure; rather, this report identifies general geographic areas that are particularly vulnerable to flooding during a range of hurricane conditions. Municipal officials can use the data generated in this study to compare elevations of critical components of water quality infrastructure to projected inundation depths to further identify vulnerabilities and adaptive measures. By identifying vulnerable areas geographically, it is possible to prioritize which structures require further evaluation to determine flood preparedness.

In addition to wastewater infrastructure, a number of public properties, businesses, government buildings, and communities are at risk during the inundation scenarios. Federal, state, and municipal officials can use the data presented in the vulnerability analysis and in the interactive online tools to evaluate which of these areas are in need of further evaluation for flood management strategies.

The intent of this study was to provide a coarse overview of vulnerabilities to a variety of public property and infrastructure, focusing on water quality infrastructure, under a wide range of scenarios; however, these summary results are not intended to provide a definitive view of all possible impacts of climate change and SLR, nor can it provide insight on the likelihood of occurrence for any modeled inundation scenario. Inundation scenarios do not account for wave height, flood duration, or the potential for wave action to damage hurricane barriers. Modeling changes in precipitation and impacts associated with anticipated changes in watershed conditions that might also impact regional water quality infrastructure was also beyond the scope of this project. If more fine-scale modeling is required for future predictions and analyses, one potential approach would be to use the Finite-Volume Coastal Ocean Model (FVCOM) that is being developed by the University of Massachusetts Dartmouth. It would be possible to leverage the results of this project to model a reduced version of our matrix using parameters informed by our model outcomes, which would help to reduce the computational costs associated with this model.

Furthermore, the project team anticipates that the tools can be adapted to answer different questions about vulnerability and adaptation strategies in the same study area. For example, while analyzing indirect economic losses from flooding was beyond the scope of our study, it is possible to use to the SLOSH output results within the Hazus modeling environment to estimate job loss and other indirect costs under various inundation scenarios. Planners might also use the results to analyze risk to specific populations by looking at the data in conjunction with other datasets, including Census data, locations of emergency shelters, and evacuation routes, to identify vulnerable populations, and evaluate emergency preparedness strategies.

Climate change and its related effects pose an immense challenge to our region. It is imperative that communities continue to evaluate risk, and identify and assess adaptation actions to lessen impacts on critical infrastructure, and by extension, populations and the environment. This project is a critical first step for New Bedford Harbor municipalities to protect their communities from the impacts of climate change.

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Appendices

Appendix A: Depth Grid Maps

The following section contains maps of inundation extents and depths for each modeled scenario. The depths ranges reflect inundation elevations above sea level, and do not include inundation depths in areas with negative elevations (elevations below sea level), such as those in the Tilcon Quarry in Acushnet. Although a hurricane exceeding a Category 3 has never been recorded in New England, modeling results using Category 4 and Extreme Category 4 parameters have been included for informational purposes.

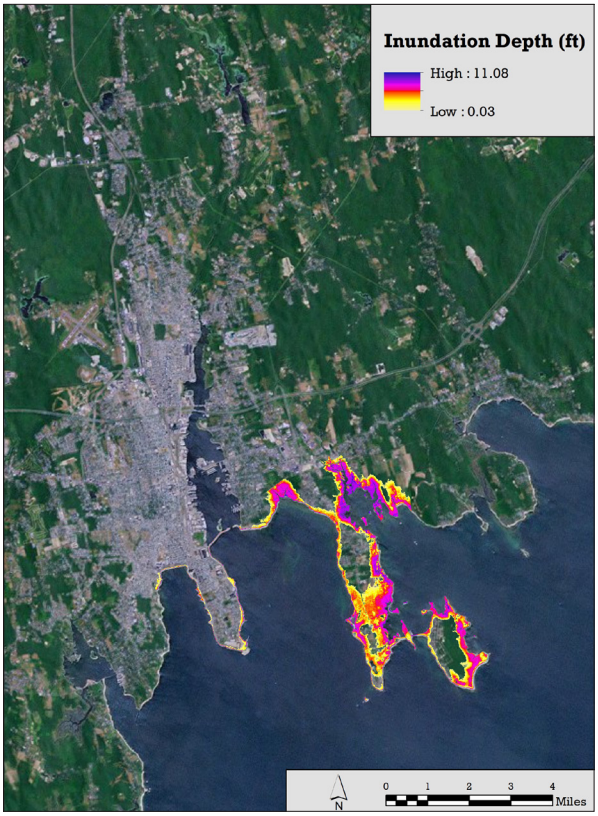

Figure A-1: Summary depth grid depicting inundation for a Category 1 Storm with no SLR

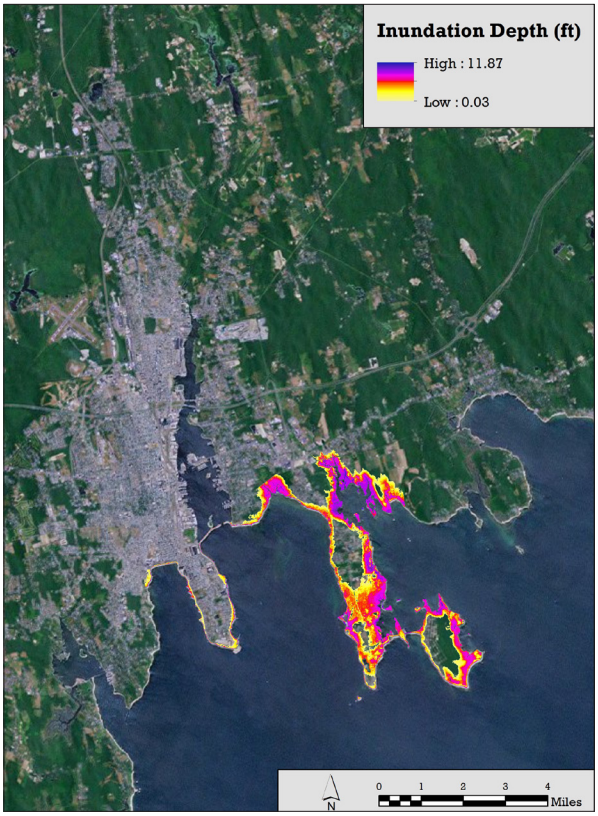

Figure A-2: Summary depth grid depicting inundation for a Category 1 storm with 1-foot SLR

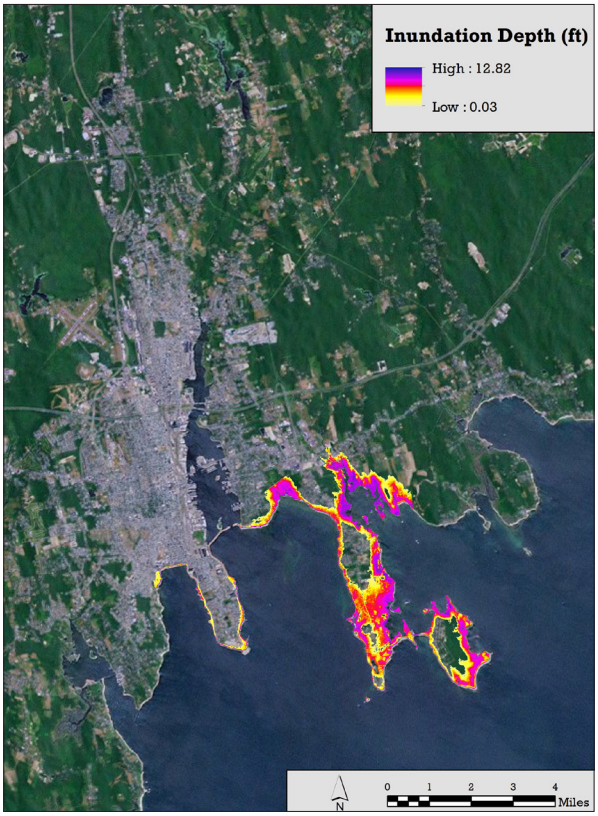

Figure A-3: Summary depth grid depicting inundation for a Category 1 storm with 2-foot SLR

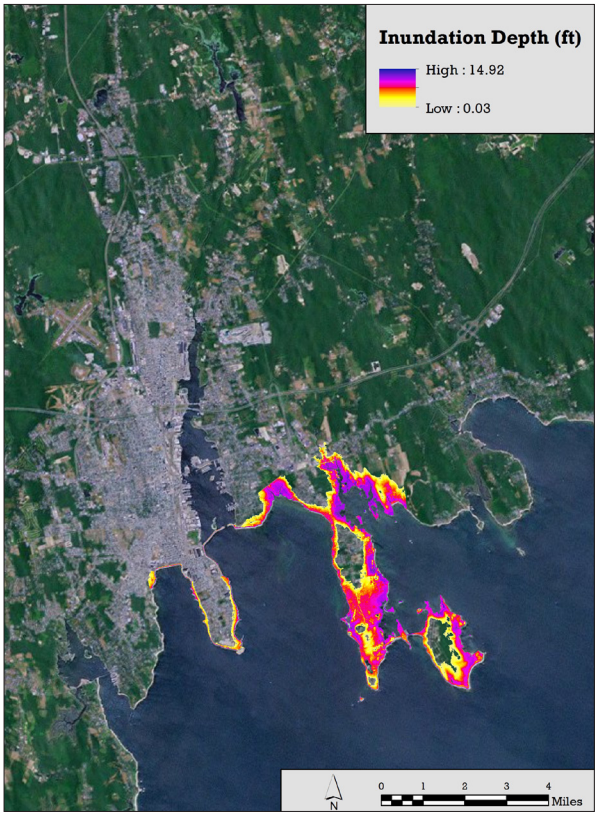

Figure A-4: Summary depth grid depicting inundation for a Category 1 storm with 4-foot SLR

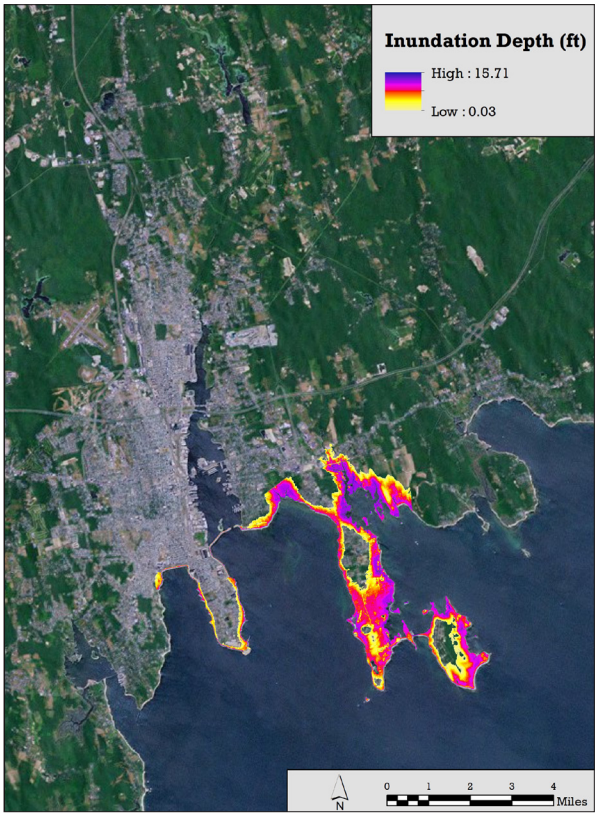

Figure A-5: Summary depth grid depicting inundation for a Category 2 storm with no SLR

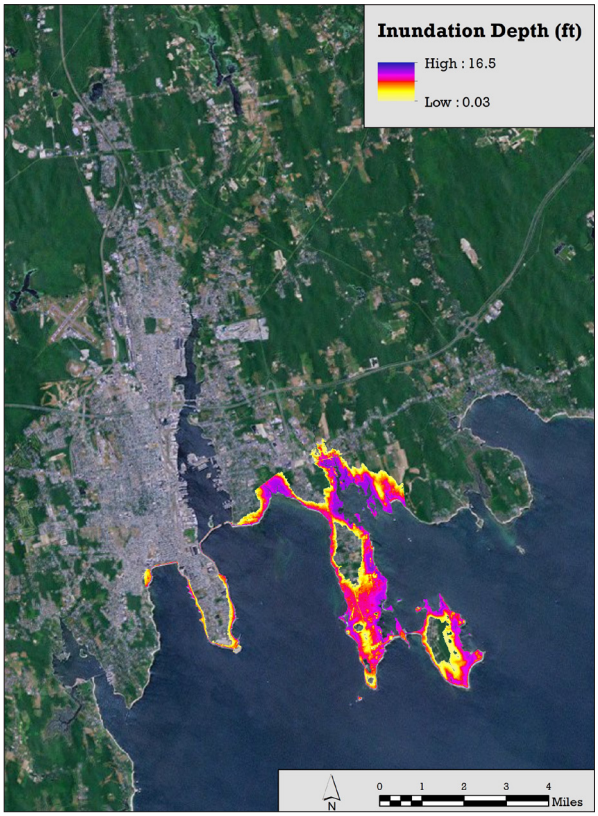

Figure A-6: Summary depth grid depicting inundation for a Category 2 storm with 1-foot SLR

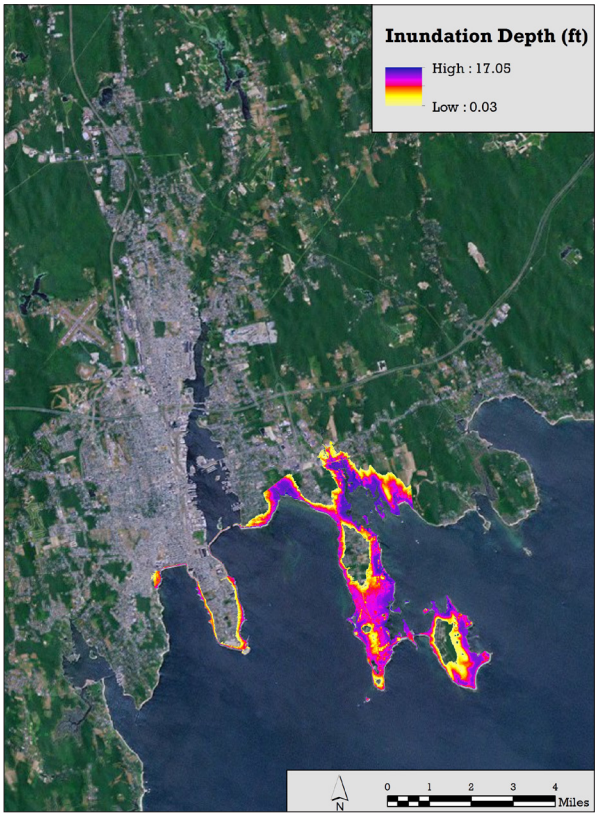

Figure A-7: Summary depth grid depicting inundation for a Category 2 storm with 2-foot SLR

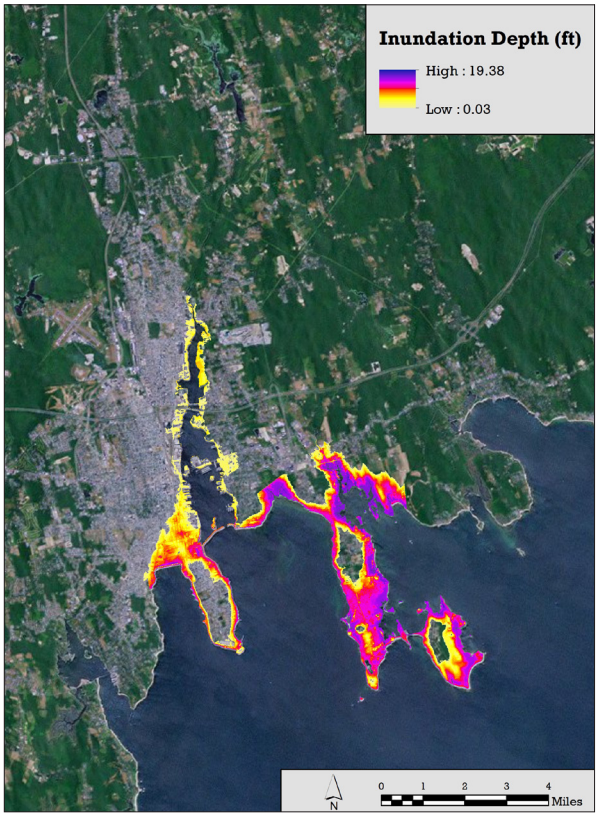

Figure A-8: Summary depth grid depicting inundation for a Category 2 storm with 4-foot SLR

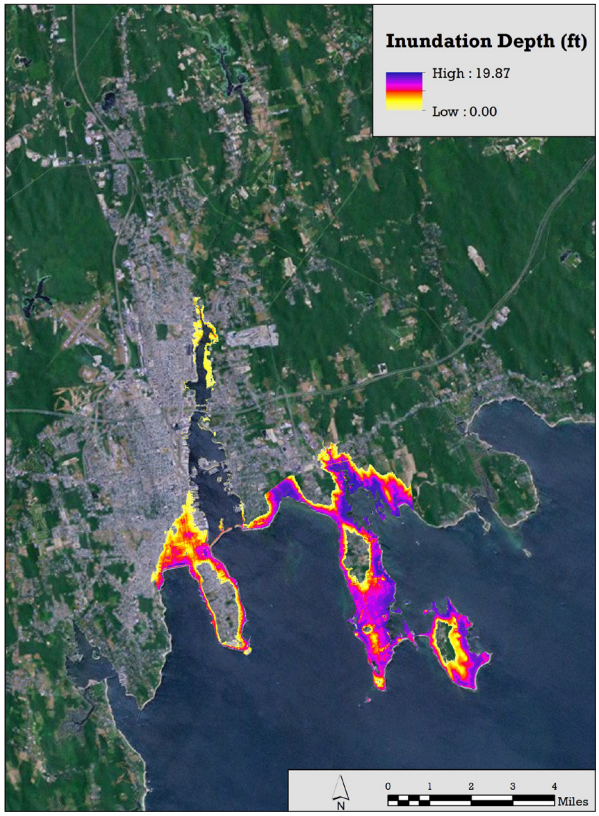

Figure A-9: Summary depth grid depicting inundation for a Category 3 storm with no SLR

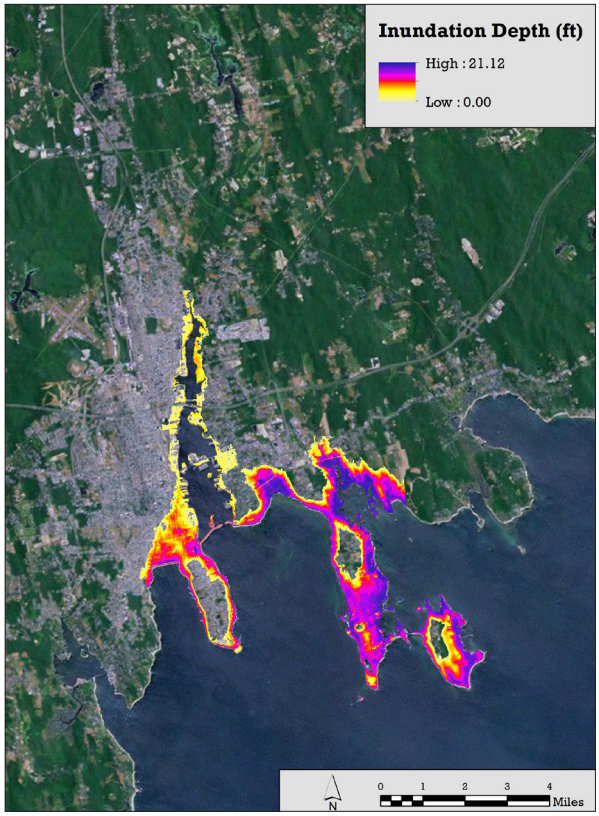

Figure A-10: Summary depth grid depicting inundation for a Category 3 storm with 1-foot SLR

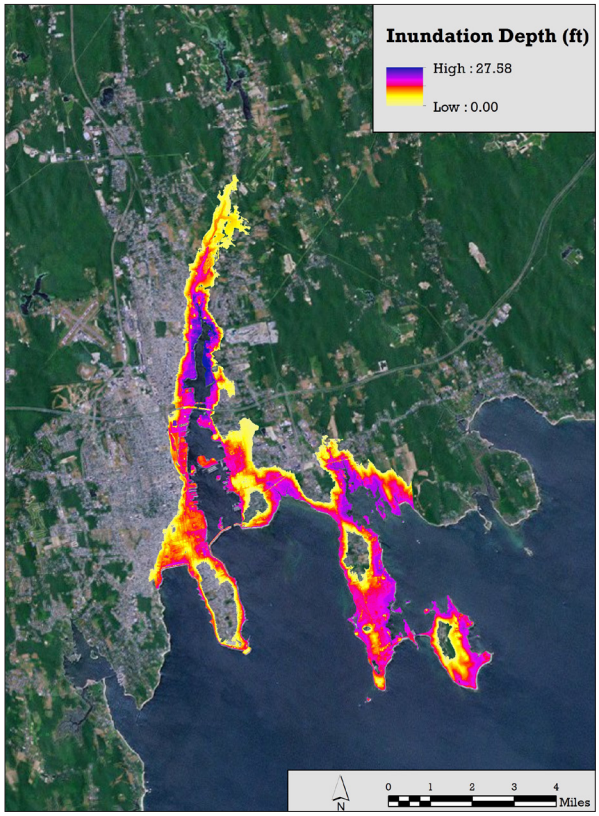

Figure A-11: Summary depth grid depicting inundation for a Category 3 storm with 2-foot SLR

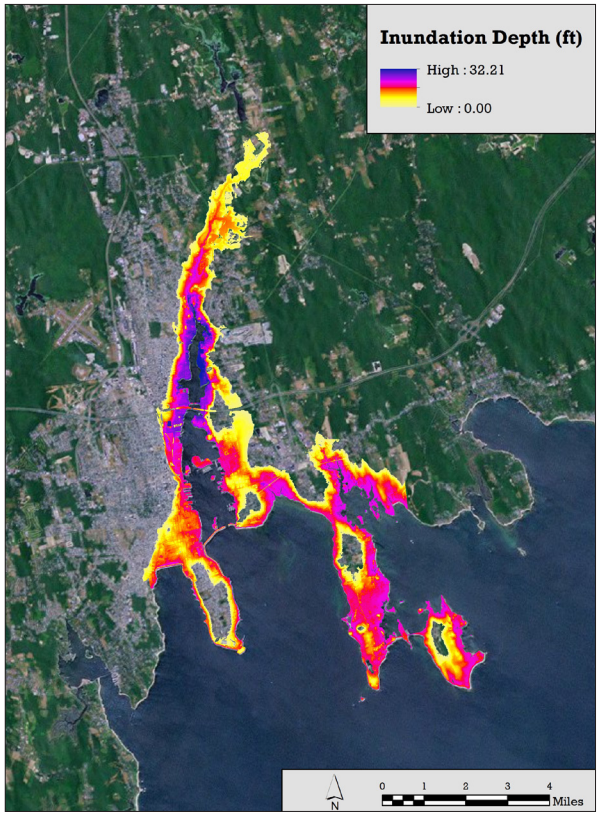

Figure A-12: Summary depth grid depicting inundation for a Category 3 storm with 4-foot SLR

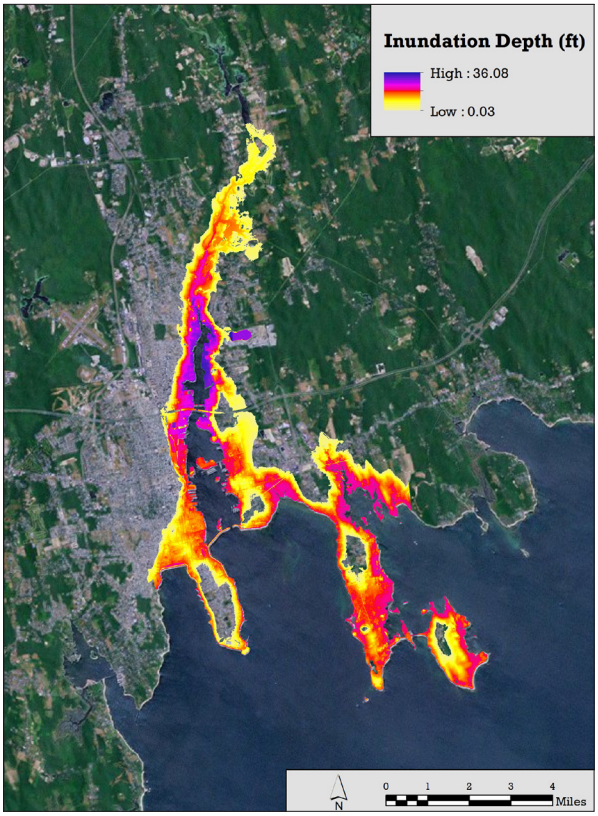

Figure A-13: Summary depth grid depicting inundation for a Category 4 storm with no SLR

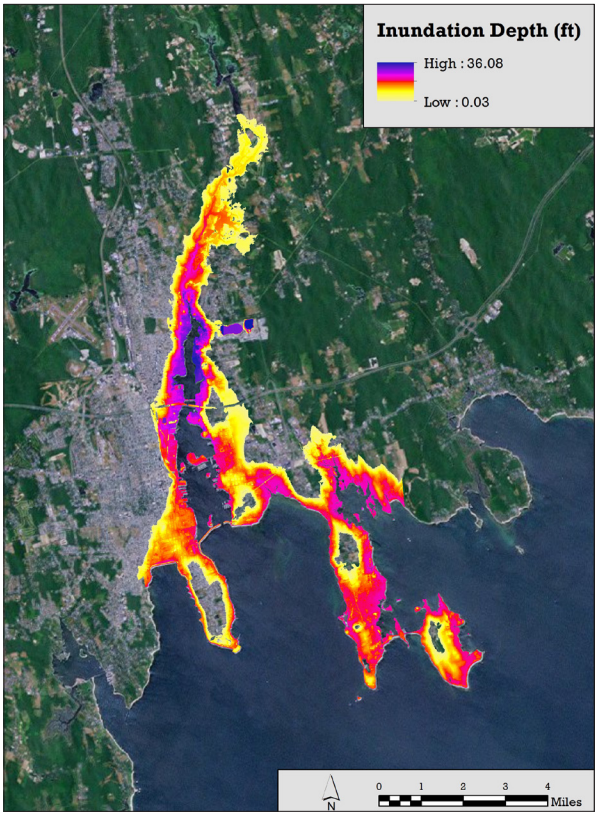

Figure A-14: Summary depth grid depicting inundation for a Category 4 storm with 1-foot SLR

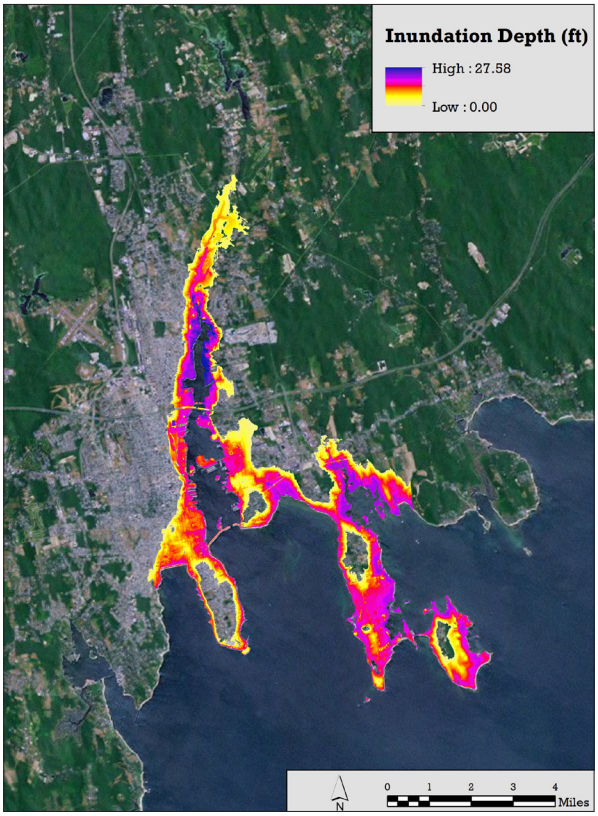

Figure A-15: Summary depth grid depicting inundation for a Category 4 storm with 2-foot SLR

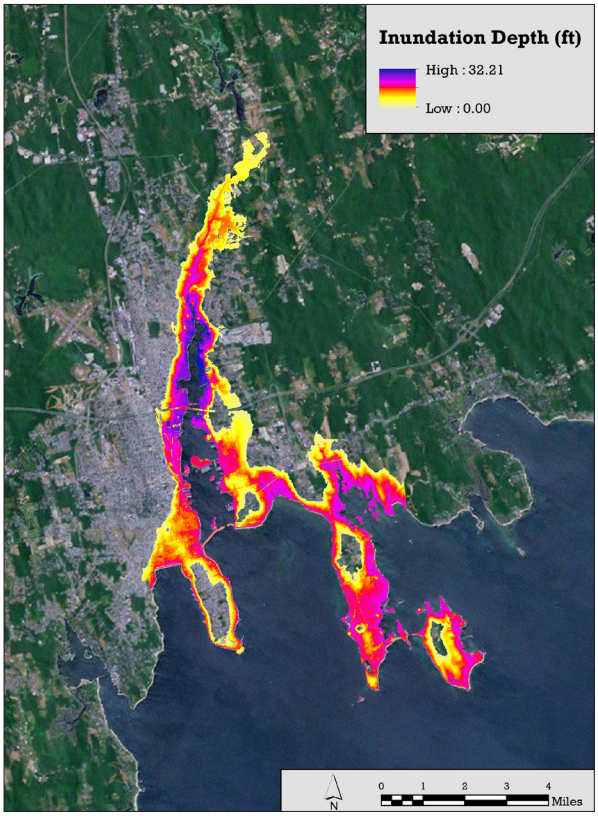

Figure A-16: Summary depth grid depicting inundation for a Category 4 storm with 4-foot SLR

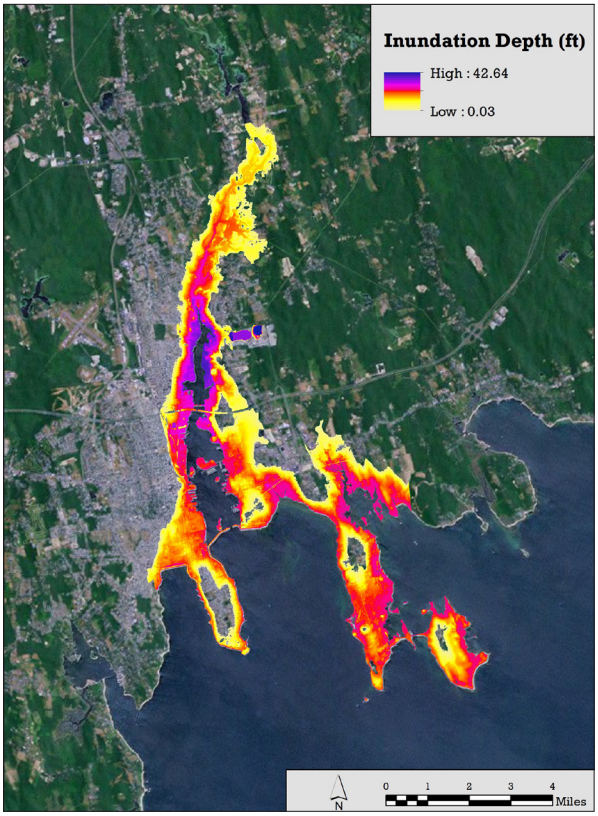

Figure A-17: Summary depth grid depicting inundation for an Extreme Category 4 storm with no SLR

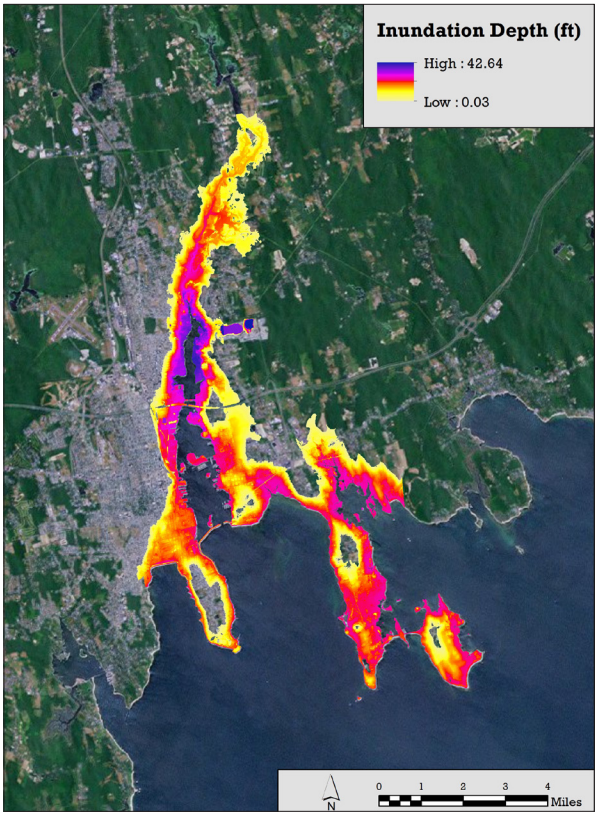

Figure A-18: Summary depth grid depicting inundation for an Extreme Category 4 storm with 1-foot SLR

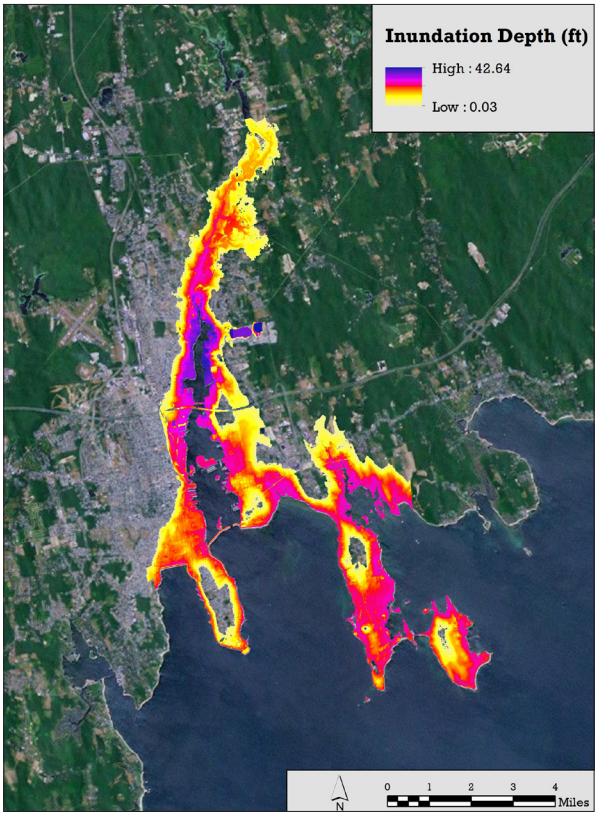

Figure A-19: Summary depth grid depicting inundation for an Extreme Category 4 storm with 2-foot SLR

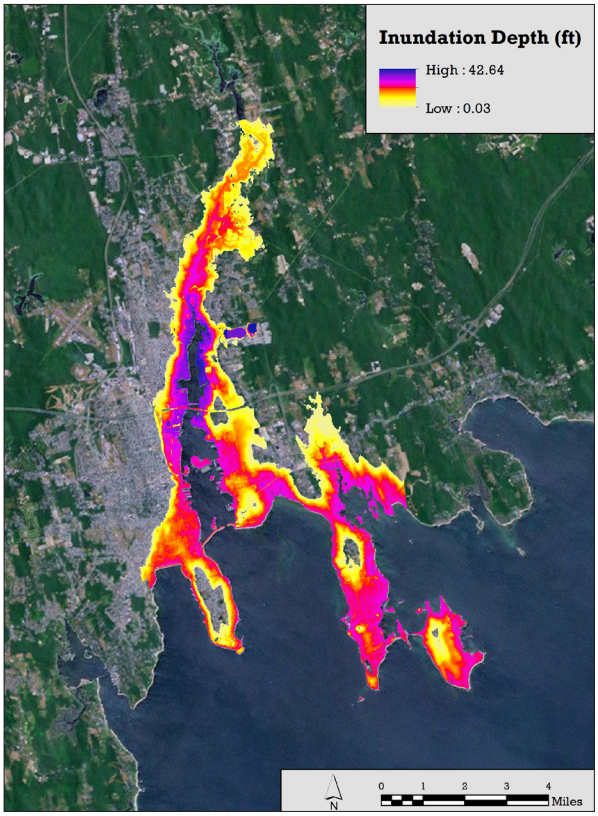

Figure A-20: Summary depth grid depicting inundation for an Extreme Category 4 storm with 4-foot SLR

Appendix B: Meeting Agendas and Summaries

AGENDA

SEAPLAN
VIBRANT ECONOMIES • HEALTHY OCEANS

Climate Change Vulnerability and Adaptation Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet Kick-off Meeting

Agenda

Date: 12-16-13

Time: 1:30 – 4:30 PM

Location: New Bedford Wastewater Treatment Facility

Meeting Objectives:

- Present study scope to municipal and state planning agencies
- Present interim data inventory to meeting participants
- Hold a listening session to obtain feedback and input on project scope and data inventory
- Strategize for filling any data gaps

Agenda:

I. Welcoming Remarks *(1:30 – 1:40 PM)*

II. Climate Change Vulnerability and Adaptation Planning Study Overview *(1:40 – 2:10 PM)*

III. Discussion and Listening Session *(2:15 – 3:15 PM)*

Break *(3:15 – 3:25)*

IV. Data Inventory Presentation and Discussion *(3:25 – 4:10 PM)*

- Presentation of interim data inventory *(3:25 – 3:35)*
- Participant discussion/Q&A *(3:35 – 4:10)*

V. Next Steps and Closing Remarks *(4:10 – 4:30)*

Climate Change Vulnerability Study: Next Steps and Action Items from Kick-off Meeting

December 16, 2013

1. **Project overview**

   Joe Costa (Buzzards Bay National Estuary Program) provided project background and goals. Kate Longley (SeaPlan) presented an overview of the projected phases, timelines, and deliverables. Kelly Knee (ASA) presented an overview of the Sea, Lake and Overland Surges from Hurricanes (SLOSH) and Hazus models. Dean Audet (Fuss & O'Neill) presented an overview of the waste and stormwater components of the project.

   Combined sewer overflows (CSOs) were identified as New Bedford's biggest concern, due to the undersized nature of the system and limited separation. It was suggested that it would be helpful to be able to predict where CSOs are likely to occur more often, and to identify specific CSOs where modifications or alterations would reduce overflows or discharge volumes. It was suggested that because much of Fairhaven isn't protected by the hurricane barrier that this municipality may be more interested in the SLOSH model results than Acushnet and New Bedford, which are protected by the barrier. That said, the barrier can be overtopped during some events and all communities should be interested in coastal flooding. The meeting participants suggested that it would be helpful if these models could identify low points along the barrier where failure would occur first and where the risk of failure could be mitigated.

2. **Discussion and Listening Session**

   The consulting team posed a number of questions to the meeting participants, hereafter referred to as the project advisory group, to guide discussion and to obtain specific feedback on current adaptation measures and priorities and critical vulnerabilities. Meeting participants identified "King tide" monitoring and CSO monitoring as two areas of focus in New Bedford. Participants from New Bedford identified tidal inflow through wastewater infrastructure as a significant concern. Salinity changes are regularly observed at the wastewater treatment facility and it is estimated that half of the CSOs have limited capacity due to inflow issues; however, there is not enough information to characterize the extent of the problem. Several interceptors and pump stations were also identified as areas of concern. Although there is a lot of information about CSOs, bridge crossings, pump stations, and other infrastructure components, the data are not aggregated and pulling the totality of this information together could require significant time for the City of New Bedford. The project team will need to prioritize data needs and target areas. The project advisory group suggested that the Acushnet River and Harbor CSOs represent the bulk of the problem and might be a good candidate to focus attention. The project advisory group requested that erosion prone areas are also identified on vulnerability maps (Rebecca Haney from the Massachusetts Office of Coastal Zone Management (CZM) can help with this). The consulting team also posed the following questions to help the modelers develop assumptions and focus model results:

   - We will be running SLOSH using base water levels that incorporate SLR. On what should we base the matrix of storm parameters that we use for these simulations? [options were explained]
   - How should we define the base water level elevation for SLOSH? What combinations of tide level and and SLR are of interest?
   - Once we have SLOSH results, how do we define the worst case storm(s)? Is National Oceanic and Atmospheric Administration Maximum of the Maximum (NOAA MOM) approach applicable?
   - What do you see as the most useful outputs of Hazus for the project area?

   The project advisory group reached the following decision points with respect to the Hazus and SLOSH data models:

   - Project team should incorporate seaport-related infrastructure (provided by meeting participants) into Hazus model and consider including fueling facilities and hazardous waste sites.
   - The matrix of storm parameters used in SLOSH should be based on the same matrix developed by NOAA for generation of the MOM as well as consider incorporating an increase in intensity due to climate change (e.g., changing central pressures, forward speeds)) Historical storms should also be included in the matrix as a reference. Reference storms can include hurricanes of 1938, 1954, Donna, and Sandy (if possible). Reference storms should be run with and without sea level rise.
   - Consulting team will use best professional judgment to come up with a draft matrix of SLOSH projections vet it with the project advisory group before it is finalized.
   - Mean, mean high, and MHHW (with and without sea level rise) will be the base water elevations used for SLOSH. Depending on the number of scenarios in the final matrix, the number of water levels may need to be reduced.
   - Consulting team will use best professional judgment to develop model assumptions, and followed by project advisory group review to define what constitutes worst case inundation for the region. This will likely include a NOAA MOM-type approach as well as consideration of worst case scenarios at particularly vulnerable locations, including the hurricane barrier and Clark Cove dike

3. **Data Inventory Review**

   The consulting team presented an interim list of spatial datasets and technical reports that will be used to inform the project and which will be used to create geospatial data products. Meeting participants provided feedback on additional or updated datasets and technical reports. The project advisory group also reached agreement that, given the scope of the project, policy analysis will be dependent on information provided by the planning team. Action items related to data exchange are summarized at the end of the document.

4. **Next Steps**

   The team briefly re-visited the project timeline, focusing on the meetings. The project advisory group reached a decision that the next workshop planning meeting should be held the first week in February. Currently, the proposed project end date is April 30, but there is some flexibility to extend the timeline with a hard deadline falling at the end of the fiscal year in June.

The following action items were developed during the course of the meeting :

Buzzards Bay NEP:

- Look at the Vulnerability and Consequences Adaptation Planning Scenarios (VCAPS) report and comment on status of state hazard mitigation sites
- Direct SeaPlan to New Bedford hurricane barrier recertification documents
- Send the following data (spatial data or reports) to SeaPlan:
  - Seaport infrastructure/parcels with assessed values (completed on 12/18)
  - DTS census files
  - Designated port area coverage
  - Structure and pump stations with assessed value

SeaPlan:

- Send questionnaire to group so that remaining questions in listening session can be answered. Distribute questionnaire by January 2, 2014.
- Follow up with town officials regarding water quality site visits.
- Continue implementing Task 1. Develop materials in preparation for next planning meeting to be scheduled for the first week in February

Municipal Representatives:

- Provide a list of flooded streets, (include dates and photos if possible) to SeaPlan; List should be in excel table format; photos should be in zipped folder. Email to klongley@seaplan.org by January 8, 2014.
- Dave Fredette will introduce project team to CDM project manager to acquire New Bedford Wastewater Treatment Facility design report from 1996.
- Provide water infrastructure geodatabase to SeaPlan (email to klongley@seaplan.org) with the understanding that it may be incomplete

MEMA:

- Provide database of all state facilities/infrastructure in floodplain (send to klongley@seaplan.org)

AGENDA

SEAPLAN
VIBRANT ECONOMIES • HEALTHY OCEANS

Climate Change Vulnerability and Adaptation Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet Kick-off Meeting

Date: 2-4-14

Time: 1:30 – 3:50 PM

Location: Fairhaven Wastewater Treatment Facility

Meeting Purpose:

- Present project update, identifying lingering data gaps and next steps
- Plan interactive half-day workshop to be held in March

Agenda:

I. Welcoming Remarks *(1:30 – 1:40 PM)*

II. Project Update *(1:40 – 2:10 PM)*

III. Workshop Agenda Development *(2:10 – 3:00 PM)*

Break *(3:00 – 3:10)*

IV. Workshop Logistics *(3:10 – 3:40 PM)*

V. Next Steps and Closing Remarks *(3:40 – 3:50)*

Climate Change Vulnerability Assessment and Adaptation Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet: Meeting Summary and Action Items from Agenda Development Meeting

February 4, 2014

Attendees:

Andy Lipsky (SeaPlan), Kate Longley (SeaPlan), Kelly Knee (RPS ASA), Joe Costa (Buzzards Bay NEP), Vinnie Furtado (Town of Fairhaven), Dave Fredette (Town of New Bedford), Merilee Kelly (Town of Acushnet), Dave Janik (MA CZM)

On phone: Julia Knisel (MA CZM), Ann Rodney (EPA)

1. **Project update**

Kate Longley (SeaPlan) presented a project update, including pending data requests and a proposed organizational structure for inundation maps. Kelly Knee presented the draft matrix that will be used for SLOSH modeling, discussed the assumptions used to derive the matrix, and presented the next steps for matrix refinement. Next steps for the project will take place once the SLOSH model results are finalized. SLOSH model results will be used to create inundation maps, the online visualization tool, and Hazus model outputs.

The project advisory group reached the following decisions with respect to next steps and the SLOSH matrix:

- SLOSH results will include MHHW results only, at 0, 1, 2, and 4 ft SLR scenarios
- The datum conversion methodology using the Newport reference station is acceptable
- A 70 mph storm speed variable will be added to the matrix runs
- The assumptions used to create the SLOSH matrix should be clearly presented at the workshop
- A probability analysis of each matrix run is outside the scope of the project; however, the team can create of frequency distribution of the parameters that produced the worst case scenarios in the model runs; by using a range of storm categories, we are not biasing the results to unlikely scenarios.
- The team will rely largely on the default data included in Hazus for that aspect of the analysis, which does not include CSOs; however, CSOs and other water quality infrastructure will be part of the inundation maps. Local knowledge will result in a qualitative analysis of the water infrastructure (especially CSOs and pump stations) are likely to be affected in flooding scenarios. Municipalities would provide the team with information on the relative risk/importance of pump stations that overlay in the inundation zones.

2. **Workshop agenda**

The project advisory group reached the following decisions with respect to the workshop agenda:

- Draft maps and draft data viewer will be available prior to the workshop
- Buzzards Bay NEP will print draft inundation maps that will be presented at the workshop. Workshop participants can use sticky notes to provide comments on the map.
- We will present as much of the findings as possible during the meeting
- Depending on budget and time availability, the team will look into including cable stations in the analysis, as this is a key issue for Acushnet
- The project team will schedule a webinar meeting with a smaller group (key municipal officials) prior to the workshop to discuss preliminary results
- The team will investigate creating a few 3-D inundation visualizations for landmark buildings, provided that this information is available through Google Earth. If not, town officials may be able to supply photos and estimates of inundation depths

3. **Workshop logistics**

The team confirmed that there will be one workshop held, that will be attended by all three towns. The project team reached the following decisions with regard to workshop logistics:

Venue

The team will decide on a meeting venue as soon as possible. The following venues were identified as potential workshop locations:

- Coalition for Buzzards Bay – large space, parking may be limited to Elm Street garage
- Acushnet Council on Aging
- Agnes Braz Center in New Bedford
- Howland Green Library

Date and time

- The meeting will be held during the day to prioritize attendance by municipal officials
- The meeting will take place from 9 – 12, including breaks. Breakfast will be included.
- The meeting will be held on **April 16th or 17th**, avoiding school vacation week and Patriot's Day.

Audience and outreach

- Target audience in municipal officials, but other members of the public will be welcome, particularly waterfront users (e.g., business owners, marinas) and other stakeholders
- We expect a maximum of 30 attendees
- Joe will distribute the invitation, to be developed jointly by Team and BBNEP
- A general notice will be sent out a month before hand, followed by reminders two, and one week prior to the workshop
- A registration page will be used to track attendees

- We will incorporate some initial findings into our outreach strategy to improve interest and participation. For example, by stating that a certain amount of the DPA is threatened under projected inundation scenarios.

The following action items were developed over the course of the meeting:

Municipal Representatives

- Vinnie Furtado will send digitized map data of water infrastructure to Joe Costa, who will then forward it to Kate Longley at SeaPlan
- Municipal representatives have the option of sending a list of street's prone to flooding to SeaPlan to be included in the report's appendix

SeaPlan/ASA

- Finalize data inventory
- Complete SLOSH model
- Begin inundation mapping, Hazus modeling, and online data visualization using SLOSH results
- Put together an annotated list of potential second tier studies that might be candidates for resiliency grants offered by MA CZM
- If there is interest from municipal representatives, schedule scoping call for the week of February 10 with Buzzards Bay NEP and municipal leads to discuss possible resiliency grants/studies

AGENDA

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Climate Change Vulnerability and Adaptation Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet - Workshop

Date: 4-17-14

Time: 9:00 am – 12:00 pm

Location: Acushnet Council on Aging

Workshop Participants:

- Municipal Representatives from New Bedford, Fairhaven, and Acushnet
- MA CZM/Buzzards Bay National Estuary Program Staff
- SeaPlan Team
- Other interested partners

Meeting Purpose:

- Provide a project overview
- Present major findings of vulnerability assessment, the Hazus damage assessment, and preliminary recommendations
- Present draft versions of data visualization tools, including the web viewer and the risk visualization tool
- Receive feedback from workshop participants on refining results, recommendations, and tools

Agenda:

I. Welcoming Remarks *(9:00 – 9:15 AM)*

II. Project Overview *(9:15 – 9:25)*

III. Modeling Analysis/Results *(9:25 – 10:20 AM)*

IV. Preliminary Recommendations *(10:20 – 10:30 AM)*

V. Breakout Sessions *(10:30-11:30)*

AGENDA

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The following breakout sessions will occur concurrently:

1. Data Visualization Tools
2. Analysis and Results
3. Recommendations

VI. Next Steps and Closing Remarks *(11:30 AM – 11:50 PM)*

Climate Change Vulnerability Assessment and Adaptation Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet: Meeting Summary and Action Items from Workshop

April 17, 2014

Acushnet Council on Aging

Attendees:

Andy Lipsky (SeaPlan), Kate Longley (SeaPlan), Kelly Knee (RPS ASA), Joe Costa (Buzzards Bay NEP), Dean Audet (Fuss & O'Neill), Vinnie Furtado (Town of Fairhaven), Dave Fredette (Town of New Bedford), Merilee Kelly (Town of Acushnet), Gary Golas (Fairhaven Shipyard), Bill Ruth (Town of Fairhaven), Rebecca Haney (MA CZM), Mark Mahoney (New Bedford EMA), Michele Paul (New Bedford Office of Environmental Stewardship), Mel Cote (EPA Region 1), Dave Janik (MA CZM), Ryan McCoy (Pare Corporation), Ed Washburn (New Bedford Harbor Development Commission), Mark Rasmussen (Buzzards Bay Coalition), Kathy Baskin (MA Executive Office of Energy and Environmental Affairs)

1. Project Overview

Joe Costa (Buzzards Bay NEP) provided a background and overview of the project by introducing the overall goals of the project and of the workshop, by introducing the project team, and by providing the impetus for the project in terms of climate change and hurricane vulnerability. He also introduced key terminology and existing planning tools and projects that have been used to assess vulnerability in Buzzards Bay communities thus far.

2. Modeling Analysis/Results

SLOSH modeling

Kelly Knee (ASA) presented an overview of the SLOSH (Sea, Lake and Overland Surge from Hurricanes) models used to create the 20 different inundation used in this study. She described the data inputs, data processing, and caveats specific to the study, and summarized both the hurricane parameters that produced the worst case scenarios and the impacts of each hurricane scenario to the hurricane barrier and dikes in the study area.

Vulnerability Analysis

Kate Longley (SeaPlan) presented results of the vulnerability analysis, including maps of the inundation scenarios and graphical representations of inundation scenario depths at locations of interest. She also outlined the priority datasets that were used in the analysis, and provided example maps and tabular data generated during the analysis.

Hazus Analysis

Kate Longley presented an overview of FEMA's Hazus modeling tool, which quantifies damages costs associated with flooding. She described the data inputs, data processing steps, and caveats specific to this study. One major caveat is that the default data included in the model and used in the analysis is on a coarse scale, and from the 2000 Census. Results should be interpreted with caution and used as a tool for estimating overall scale and variations in damage with different scenarios, rather specific cost estimates. She presented examples of results from the Hazus analysis, including tabular data, summary reports generated by the tool, damage maps, and other graphical representations of damages at various scenarios.

Data Visualization Tools

Kate Longley presented a screen shot of the draft interactive online data viewer and described the layout, content, features, and anticipated updates to the site. A live version of the viewer was available during the breakout sessions. Kelly Knee presented screen shots which described the risk visualization tool, which will be populated with data from the Hazus analysis. A live version will be developed using feedback from the breakout sessions.

3. Preliminary Recommendations

Dean Audet (Fuss & O'Neill) presented assumptions, considerations, and methodology for identifying and recommending adaptation actions for selected CSOs, pump stations, and wastewater treatment facilities.

4. Break-out Sessions

Break-out sessions were a chance for meeting participants to get a more in-depth look at the information presented during the first meeting sessions. Participants were encouraged to visit three break-out stations to ask questions and provide feedback. They were also encouraged to make comments directly on the draft wall maps that were available to display inundation scenarios and select infrastructure and property features. The following are summaries of discussions, questions, and comments from each break-out session, as well as general comments from the post-presentation Q & A:

Data Visualization Tools

During this breakout session, participants could use a draft version of the interactive online mapping tool and review the mock-up of the risk analysis tool. Workshop participants had the following suggestions for improving the interactive online mapping tool:

- Filter road cuts from outfalls layers and symbolize conventional CSOs differently from other outfalls
- Highlight the accordion that is active
- Eliminate unbuilt public properties from the point layers (i.e. those that have no building/other value) – for example, points on empty plots and along the bike path should go away

- Show public parcel outlines; visualize building as dots and parcels as polygons
- Change the name of "Martha's Vineyard Ferry Terminal" to "Steamship Authority Maintenance Facility" in Fairhaven
- Use a town boundaries layer with no coast

Analysis and Results

During this breakout session, workshop participants could view inundation maps, see the range of inundation depths at specific features, and view Hazus results in greater detail. Participants were particularly interested in the potential for flooding at the site of the planned police station at 60 Middle St in Acushnet, as well as in municipal areas that are being targeted for development projects. Participants were also interested in how the data could be used in evacuation planning, including outreach to environmental justice communities and mapping evacuation routes, critical supplies, and areas of safe refuge. Participants were also interested in the ability of Hazus to estimate the damages to the local economy, particularly in terms of lost wages, and other indirect economic costs. Although in-depth analyses of these topics are beyond the scope of this project, we anticipate that our results will be leveraged in future studies to address these questions.

Recommendations

This breakout session was focused on obtaining more in-depth information on pump stations to be used in the next steps of the project. Representatives from Fairhaven and New Bedford will provide data on points of entry for water at specific stations and whether there are generators present at each site.

Other/General Comments and Questions

- Joe Costa pointed out that the inundation scenarios don't account for wave height or for the fact that extreme hurricanes may damage the hurricane barrier, or result in its possible failure (the barriers are earth filled dikes, covered with stone).
- One participant pointed out that the names of the dikes/hurricane barriers used in the presentation are not the same as the names used by locals
- There were questions as to how long flooding would take place in each scenario; although the SLOSH model does not account for duration, it is estimated that inundation could last 5-6 hours.
- One participant noted that given the IPCC's recent report, a 4 foot maximum SLR scenario might not be sufficient to estimate potential impacts of climate change
- One participant asked about the impacts on drinking water. It was noted that this study does not focus on drinking water since the focal communities do not rely on well water.

The following action items were developed over the course of the meeting:

Municipal Representatives

- Representatives from DPW in New Bedford and Fairhaven will help fill in data gaps on pump stations

SeaPlan/ASA/Fuss & O'Neill

- Finalize online data viewer and risk evaluation tool
- Finalize recommendations and begin prioritization matrix for adaptation recommendations
- Finalize vulnerability analysis and Hazus data products
- Begin first draft of technical report
- Create final wall maps
- Schedule final in-person meeting to review draft technical report and results

AGENDA

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Climate Change Vulnerability and Adaptation Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet – Presentation of Results

Date: 6-12-14

Time: 10:00 am – 12:00 pm

Location: New Bedford Wastewater Treatment Facility

Workshop Participants:

- Municipal Representatives from New Bedford, Fairhaven, and Acushnet
- MA CZM/Buzzards Bay National Estuary Program Staff
- SeaPlan Team
- Other interested partners

Meeting Purpose:

- Present major findings of project
- Present summary of recommendations for water quality infrastructure
- Present final versions of data visualization tools, including the web map viewer and the risk visualization tool
- Obtain any final feedback to be incorporated into final report or other deliverables

Agenda:

I. Welcoming Remarks (*10:00 – 10:15 AM)*

II. Present Major Findings *(10:15 – 10:35)*

III. Recommendation Summary *(10:35– 10:50)*

IV. Data Viewer Presentations (*10:50 – 11:10 AM)*

Break *(11:10 – 11:25)*

V. Questions and Feedback (*11:25 – 11:45)*

VI. Next Steps and Closing Remarks (*11:45 – 12:00)*

Climate Change Vulnerability Assessment and Adaptation Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet: Meeting Summary and Action Items Final Meeting

June 12, 2014

New Bedford Wastewater Treatment Facility

Attendees:

Andy Lipsky (SeaPlan), Kate Longley (SeaPlan), Supriya Khadke (SeaPlan), Kelly Knee (RPS ASA), Joe Costa (Buzzards Bay NEP) Vinnie Furtado (Town of Fairhaven), Dave Fredette (City of New Bedford), Merilee Kelly (Town of Acushnet), Rebecca Haney (MA CZM), Mark Mahoney (New Bedford EMA), Dave Janik (MA CZM), Jason Turgeon (U.S. EPA), Jeffrey Osuch (Town of Fairhaven)

1. **Introduction**

Joe Costa and Andy Lipsky welcomed participants and provided summary of the project, its status, and an overview of meeting objectives.

2. **Modeling Analysis/Results**

Kate Longley provided a brief overview of the project methodology and summarized the major findings, which included modeled storm scenarios that will inundate over or around the hurricane barrier, low points on the barrier, predicted maximum inundation depths by scenario, inundation depths at wastewater treatment plants, and damage estimates from the Hazus model. Joe Costa pointed out that the hurricane barrier might fail in even less severe storms since we didn't model for waves, and since wave action can result in erosive forces negatively impacting the structurally integrity of the hurricane barrier. He further emphasized that the hurricane barrier certification elevation is several feet lower than where it currently is. Discussion during this session revolved around how to present the range of impacts from the least to the most severe storms in a way that is both informative to municipal planners but will not be misinterpreted by those who don't read the complete report.

Meeting participants provided feedback and input as to how to enhance the summary results, vulnerability analysis and damage quantification sections of the report. This input included the following recommendations:

- Provide context for results by providing a list of New England storms which include intensities, landfall locations, and damages, if possible.
- Modify charts by eliminating zeroes on y-axes, and de-emphasizing the results of the higher intensity storms (4 and Extreme 4), possibly by making those results gray or otherwise muting the color. The caption should note that the extreme scenarios were studied, but that those scenarios have never occurred before, but could hypothetically occur in the future.

- Leave out the Hazus quantifications that deal with the wastewater treatment plant, as they are likely underestimates and don't account for the complexities of predicting damages to the underground structures.
- Leave results from extreme scenarios (4 and Extreme 4) out of the Executive Summary, but note that the town should plan for Category 3 hurricanes at baseline water levels.
- The Executive Summary should clearly layout next steps for the municipalities
- Provide a discussion of the differences between NOAA SLOSH models and FEMA FIRMs.

3. Recommendation Summary

Andy Lipsky and Kate Longley presented a summary of the recommendations for the towns based on the engineering analysis. Andy and Kate presented the methodology and criteria for recommendation development, identified high-risk wastewater infrastructure, with an emphasis on pump stations, and presented specific recommendations, as well as future work that the municipalities should pursue to further understand and address vulnerabilities. One discussion revolved around whether it made sense to take adaptive measures on individual CSOs in the face of sea level rise, when more costly, system-wide changes would be a more likely solution. The team agreed on language that will characterize these uncertainties in the report. Officials from the Town of Fairhaven also clarified characteristics of individual pump stations that will affect some of the project team's recommendations.

4. Data Visualization Tools

Kate Longley demonstrated the interactive mapping tool currently available at seaplan.buzzardsbay.org. This tool allows users to visualize hurricane extents under each sea-rise-scenario, and identify vulnerable infrastructure, public property, and populations. Kelly Knee demonstrated the risk visualization tool, which allows users to view estimates economic losses from various storm scenarios, and observe the flooding sensitivity of locations within the study area to different hurricane parameters and water levels.

The following action items were developed over the course of the meeting:

All Participants

- Anyone wishing to submit feedback on the draft report or data products should do so by Wednesday, June 18th. The hard deadline for submitting feedback is June 20th. Feedback should be submitted to Kate Longley (klongley@seaplan.org)

Municipal Representatives

- Representatives from each municipality will provide any final data that will help refine engineering recommendations. Data that will require any additional analysis should be submitted by June 18th for inclusion in the report.

SeaPlan/ASA/Fuss & O'Neill

- SeaPlan will incorporate comments and feedback into report
- SeaPlan will provide ASA will explanatory language on Hazus data to include in the risk visualization tool
- SeaPlan will coordinate with Buzzards Bay NEP to post risk visualization tool on website
- SeaPlan will submit all project deliverables, including technical report, geodatabase, and final wall map pdfs to Buzzards Bay NEP by June 30, 2014.

Appendix C: Depth Tables

Water Quality Infrastructure

Street	Municipality	Type	Comments	Cat.1 Hurricane				Cat.2 Hurricane				Cat.3 Hurricane				Cat.4 Hurricane				Cat.4 Extreme Hurricane			
Water Level Rise				0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft
Taber Street	Fairhaven	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.49	0.00	1.35	15.11	20.73	22.89	24.00	24.99	26.61	26.47	27.07	27.53	31.09
Pilgrim Avenue	Fairhaven	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.71	0.00	3.53	16.26	20.65	25.14	26.28	27.24	28.55	28.31	28.96	29.38	31.75
Arsene Street	Fairhaven	Treatment Plant		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50
Bridge Street	Fairhaven	Pump Station	Odor Control Only	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.57	0.00	2.90	15.59	18.05	19.51	20.82	21.78	24.44	23.52	24.31	26.26	27.84
Arsene Street	Fairhaven	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50
Middle Street	Fairhaven	Pump Station	Storm Drain Station	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.54	0.00	3.96	16.52	18.82	20.84	22.18	22.42	24.59	24.15	24.98	26.70	28.42
South Street	Fairhaven	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.44	11.74	12.98	14.28	15.18	17.26	16.97	17.68	18.41	20.55
Abbey Street	Fairhaven	Pump Station		3.26	4.23	5.23	7.56	8.16	8.93	9.86	11.93	12.50	13.66	14.35	16.75	18.04	19.27	20.11	21.95	21.88	22.65	23.38	25.13
Manhattan Avenue	Fairhaven	Pump Station		0.00	0.36	1.22	3.52	4.19	4.89	5.70	7.89	8.71	9.79	10.48	12.49	13.53	14.72	15.60	17.39	17.08	17.91	18.89	20.58
Bernese Street	Fairhaven	Pump Station		0.00	0.48	1.43	3.72	4.38	5.08	5.88	8.08	8.73	9.98	10.68	12.59	13.49	14.68	15.69	17.58	17.09	18.08	18.99	20.78
Seaview Avenue	Fairhaven	Pump Station		3.72	4.62	5.57	7.65	8.35	9.04	9.76	12.02	12.81	13.91	14.64	16.59	17.50	18.63	19.60	21.49	20.96	22.00	22.97	24.67
Waybridge Road	Fairhaven	Pump Station		3.27	4.20	5.18	7.50	8.20	8.90	9.70	11.91	12.59	13.80	14.49	16.40	17.28	18.49	19.50	21.38	20.89	21.89	22.80	24.59
Shore Drive	Fairhaven	Pump Station		3.10	4.00	4.96	7.06	7.76	8.40	9.17	11.40	12.18	13.29	14.05	15.98	16.81	17.97	18.98	20.88	20.31	21.38	22.32	24.02
Camel Street	Fairhaven	Pump Station		0.00	0.00	0.87	2.86	3.52	4.32	5.14	7.18	8.04	9.06	9.77	11.66	12.64	13.66	14.67	16.83	15.97	17.07	18.06	19.76
Rocky Point Road	Fairhaven	Pump Station		0.00	0.00	0.47	2.77	3.21	3.87	4.81	6.80	7.44	8.63	9.52	11.25	12.05	13.05	14.05	15.93	15.36	16.45	17.42	19.04
Rivard Street	Fairhaven	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Causeway Road	Fairhaven	Pump Station		0.00	0.00	0.00	0.00	0.00	0.19	1.10	3.14	3.93	5.06	5.90	7.66	8.46	9.56	10.60	12.43	11.83	13.04	13.86	15.54
Marguerite Street	Fairhaven	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pine Grove Road	Fairhaven	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Boulder Park	Fairhaven	Pump Station		3.93	4.73	5.73	8.23	8.89	9.61	10.46	12.51	13.20	14.37	14.87	17.33	18.35	19.59	20.54	22.30	22.19	23.03	23.80	25.46
Blueberry Drive	Acushnet	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Allen Street	Acushnet	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.74	7.23	8.16	8.96	10.37	11.59	12.72	13.38	14.20
Slocum Street	Acushnet	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.85	0.89	19.38	23.84	26.52	27.64	28.55	30.09	31.76	32.88	33.50	33.94
Belleville Avenue	New Bedford	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.07	17.73	20.32	21.72	22.91	24.16	25.97	27.04	27.71	28.19
East Rodney French Boulevard	New Bedford	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.80	11.39	12.70	13.52	15.74	16.34	17.62	18.79	20.23	20.33	21.24	22.07	23.79
South Rodney French Boulevard	New Bedford	Treatment Plant		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.98	1.38	2.88	3.71	5.40	5.96	7.27	8.55	10.22	9.75	10.78	11.70	13.63
Cove Road	New Bedford	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.90	11.89	12.51	13.41	15.12	16.01	17.11	18.11	19.68	19.59	20.49	21.31	23.09
South Water Street	New Bedford	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.07	6.82	8.70	13.31	15.11	15.90	17.30	18.50	20.03	20.13	21.03	21.72	23.72
MacArthur Drive	New Bedford	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.23	13.27	12.82	14.20	15.15	17.48	17.04	17.94	18.50	21.03
Wamsutta Street	New Bedford	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.04	0.00	2.13	15.99	23.53	24.73	25.75	26.69	27.83	27.42	28.04	28.65	32.81
Rowe Street	New Bedford	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coggeshall Street	New Bedford	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.37	16.66	18.06	19.14	20.08	21.02	20.83	21.46	22.08	26.04
Peckham Road	New Bedford	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sassaquin Avenue	New Bedford	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pequot Street	New Bedford	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phillips Road	New Bedford	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Marlborough Street	New Bedford	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forbes Street	New Bedford	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hanover Street	New Bedford	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Welby Road	New Bedford	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Church Street	New Bedford	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Joyce Street	New Bedford	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aviation Way	New Bedford	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Shawmut Avenue	New Bedford	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Howard Avenue	New Bedford	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.53	19.03	23.44	26.28	27.59	28.40	30.06	31.88	32.98	33.59	33.87
Valley View Drive	New Bedford	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Joy Street	New Bedford	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hathaway Road	New Bedford	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Apple Tree Lane	New Bedford	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Merrimac Street	New Bedford	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Popes Island	New Bedford	Pump Station		0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.42	14.10	16.69	17.81	19.19	20.31	23.35	22.08	23.06	24.78	26.72
West Island	Fairhaven	Treatment Plant	Groundwater Discharge to the NW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.41

Outfalls

Municipality	Comments	Category 1				Category 2				Category 3				Category 4				Category 4 Extreme			
Water Level Rise		0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft
New Bedford	non-CSO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
New Bedford	non-CSO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.27	14.08	13.53	14.89	15.94	18.53	18.04	18.94	19.59	22.17
New Bedford	non-CSO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.25	0.00	2.35	20.96	25.60	28.42	29.82	30.81	32.70	33.94	35.01	35.67	36.12
New Bedford	non-CSO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.73	21.25	23.40	23.87	24.63	26.06	26.74	27.93	28.61	29.72
New Bedford	non-CSO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.91	19.48	21.56	22.05	22.70	24.11	24.68	25.87	26.56	27.75
New Bedford	non-CSO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.45	20.01	21.74	22.60	23.25	24.31	25.24	26.43	27.12	28.30
New Bedford	non-CSO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.15	19.68	21.53	22.32	22.98	24.40	25.03	26.21	26.90	28.05
New Bedford	non-CSO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.74	5.37	2.63	21.11	25.61	29.66	31.28	29.24	32.47	31.54	32.71	33.39	34.38
New Bedford	non-CSO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.92	1.58	1.58	20.05	24.61	26.79	27.37	28.05	29.47	30.19	31.37	32.06	33.15
New Bedford	non-CSO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
New Bedford	non-CSO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.79	12.49	13.39	14.73	16.56	17.50	18.75	19.66	21.29	21.19	22.09	22.89	24.66
New Bedford	CSO	0.00	0.58	1.57	3.95	4.38	5.02	5.83	8.14	8.86	9.88	10.76	13.06	13.76	14.72	15.75	17.48	17.12	18.12	19.03	20.77
New Bedford	CSO	0.20	1.22	2.22	4.53	4.95	5.66	6.43	8.69	9.37	10.42	11.29	13.49	14.21	15.31	16.29	18.09	17.64	18.65	19.57	21.32
New Bedford	CSO	0.29	1.30	2.30	4.61	5.02	5.82	6.40	8.85	9.45	10.47	11.35	13.54	14.28	15.37	16.35	18.12	17.68	18.69	19.62	21.38
New Bedford	CSO	0.00	0.00	0.00	1.89	2.30	3.38	4.12	6.40	6.98	7.74	8.62	10.78	11.53	12.63	13.62	15.40	14.94	15.96	16.89	18.65
New Bedford	CSO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.62	2.29	3.32	4.22	6.22	6.90	8.14	9.05	10.89	10.32	11.34	12.31	14.12
New Bedford	CSO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.77	3.52	4.74	6.69	7.58	7.12	9.79	11.43	11.33	12.23	13.03	14.79
New Bedford	CSO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.01	0.00	3.82	15.62	19.93	19.74	20.92	21.91	24.38	23.91	24.81	25.41	27.96
New Bedford	CSO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
New Bedford	CSO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.20	18.70	23.11	26.17	27.41	28.11	29.69	31.61	32.71	33.32	33.58
New Bedford	CSO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.28	6.96	6.96	25.45	29.92	32.41	33.30	34.08	35.57	36.83	37.98	38.63	39.34
New Bedford	CSO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.10	1.75	1.69	20.16	24.73	26.91	27.44	28.03	29.51	30.06	31.25	31.94	33.10
New Bedford	CSO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.39	0.00	4.49	18.32	25.85	27.06	28.09	29.03	30.19	29.77	30.40	31.01	35.17
Acushnet	BBAC 2003 summer interns	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.33	2.50	3.20	3.34
Acushnet	BBAC 2003 summer interns	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19	5.67	9.06	10.74	11.85	12.52	15.05	16.24	16.94	16.96
Acushnet	BBAC 2003 summer interns	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.95	4.63	5.74	6.75	8.93	10.12	10.82	10.85
Acushnet	BBAC 2003 summer interns	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.35	4.97	6.43	6.88	8.65	10.06	11.20	11.86	12.16
Acushnet	BBAC 2003 summer interns	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	3.02	4.02	4.84	6.25	7.56	8.69	9.35	10.10
Acushnet	BBAC 2003 summer interns	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.03	8.74	11.75	12.30	12.10	14.38	14.14	15.32	16.01	17.17
Acushnet	BBAC 2003 summer interns	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	5.50	7.06	8.09	10.04	11.40	12.50	13.58	14.24	15.36
Acushnet	BBAC 2003 interns; assumed pipe location	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.92	6.84	9.36	10.28	11.05	12.42	13.56	14.69	15.36	16.28
Acushnet	BBAC 2003 interns; assumed pipe location	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.49	7.01	7.89	8.68	10.07	11.19	12.32	12.99	13.92
Acushnet	BBAC 2003 interns; assumed pipe location	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.22	7.17	9.67	10.59	11.39	13.05	13.89	15.02	15.68	16.63
Acushnet	BBAC 2003 interns; assumed pipe location	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.58	7.49	8.58	9.45	11.59	12.97	14.04	15.18	15.84	16.81
Acushnet	BBAC 2003 summer interns	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.09	5.99	8.46	8.81	10.16	11.53	12.65	13.78	14.45	15.38
Acushnet	BBAC 2003 summer interns	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.76	8.65	11.12	12.02	12.81	14.19	15.30	16.43	17.10	18.03
Acushnet	BBAC 2003 summer interns	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acushnet	BBAC 2003 summer interns	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.21	19.75	22.19	23.04	23.81	25.28	26.45	27.60	28.25	29.04
Acushnet	BBAC 2003 summer interns	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.13	10.34	13.51	15.04	16.08	16.93	19.28	20.43	21.11	21.32
Acushnet	BBAC 2003 summer interns	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.06	13.48	16.84	18.49	19.59	20.63	22.80	23.99	24.68	24.72
Acushnet	BBAC 2003 summer interns	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.15	4.83	3.64	22.13	26.61	30.32	31.24	30.82	33.51	33.61	34.76	35.40	36.10
Acushnet	BBAC 2003 summer interns	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acushnet		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.65	6.44	7.27	8.11	9.63	10.67	11.77	12.43	13.40
Acushnet		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.42	11.33	13.78	14.63	15.41	16.79	17.84	18.98	19.65	20.62
Acushnet	2005 Aug BBAC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	4.78	7.28	8.22	9.03	10.43	11.67	12.80	13.46	14.27
Fairhaven	16"; DMF survey	6.54	7.70	8.65	10.49	11.19	12.10	12.86	14.84	15.88	16.73	17.48	19.42	20.53	21.42	22.42	24.32	23.77	24.82	25.77	27.47
Fairhaven		3.27	4.17	5.12	7.22	7.92	8.57	9.32	11.58	11.79	13.45	14.19	16.12	16.97	18.12	19.13	21.03	20.47	21.53	22.49	24.19
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.29	6.02	6.65	7.94	8.95	11.48	10.82	11.52	13.72	15.06
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.06	4.98	5.29	6.71	7.58	10.21	9.43	10.13	12.28	13.65
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.32	6.18	6.58	7.87	8.87	11.39	10.73	11.43	13.61	14.97
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.73	5.42	5.39	6.64	7.62	9.72	9.23	9.92	11.56	13.17
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.38	7.57	8.67	9.87	10.83	12.53	12.15	12.80	14.02	15.92
Fairhaven	12" PVC; Fair DPW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.04	0.81	5.22	18.61	23.97	26.64	27.78	28.79	30.42	30.18	30.84	31.25	34.04
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.92	7.35	8.51	9.70	10.64	12.09	11.86	12.51	13.54	15.52
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.58	3.30	4.43	5.33	6.37	6.36	6.97	7.46	10.06

Outfalls

Municipality	Comments	Category 1				Category 2				Category 3				Category 4				Category 4 Extreme			
Water Level Rise		0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.55	1.62	2.53	3.57	3.52	4.12	4.64	7.13
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	1.22	2.15	3.31	3.24	3.86	4.50	6.86
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.03	3.19	4.36	5.28	6.48	6.45	7.08	7.79	10.17
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.73	1.99	1.90	2.54	3.30	5.55
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56	1.52	1.48	2.07	2.50	5.08
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.29
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.79
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.49	0.00	0.00	0.00	0.00	0.00	31.50	0.00	0.00	0.00	0.00	0.00	0.00
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.18	0.00	1.61	17.80	23.90	25.29	25.19	26.93	27.42	27.68	27.92	28.32	34.34
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.81	21.90	22.23	23.15	24.90	24.37	25.64	25.89	26.28	32.13
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.61	2.40	5.70	21.92	28.01	29.39	30.30	31.03	31.50	31.77	32.00	32.40	38.42
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.24	16.31	17.57	18.52	19.28	19.82	20.02	20.33	20.70	26.07
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00	21.11	22.32	23.23	24.13	24.42	24.86	25.09	25.50	31.58
Fairhaven	in culvert; E side	3.77	4.57	5.57	7.67	8.57	8.26	10.26	10.97	12.97	14.27	15.06	16.87	17.87	18.86	20.16	21.57	21.08	22.37	23.17	24.77
Fairhaven		0.00	0.00	0.00	1.61	2.50	3.79	4.60	6.11	7.83	8.20	8.99	10.80	12.72	13.73	14.09	15.52	15.04	16.30	17.11	18.71
Fairhaven	W side of River; S side of Rte 6	0.00	0.00	0.00	0.00	0.00	0.00	0.52	2.45	3.24	4.53	5.32	7.14	8.14	9.60	10.43	11.86	11.41	12.64	13.45	15.06
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.27	2.12	2.39	3.03	5.31	7.18	7.68	8.63	11.12	10.35	11.12	11.89	13.63
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.54	0.00	3.94	16.68	19.20	21.90	24.38	23.57	26.81	25.20	26.03	27.72	29.52
Fairhaven	Route 6 plans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.43	2.10
Fairhaven	North of Rte 6; E side of River; pipe visible	0.00	0.00	3.88	5.98	6.87	8.34	8.57	11.05	11.27	12.57	13.37	15.17	16.17	17.17	18.47	19.88	19.39	20.67	21.48	23.08
Fairhaven	size unknown; buried in sand	5.85	6.76	7.68	9.98	10.46	11.15	11.99	14.16	14.76	16.03	16.83	18.56	19.26	20.54	21.55	23.35	22.75	23.93	24.85	26.55
Fairhaven	size unknown; buried in sand	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fairhaven	12" RCP	5.70	6.76	7.76	9.97	10.66	11.36	13.04	14.39	15.17	16.26	16.95	18.86	19.74	20.95	21.96	23.97	23.35	24.35	25.26	27.05
Fairhaven	DMF suryev; 24"; infiltration	7.89	8.40	9.34	11.79	12.49	12.83	13.54	15.84	16.59	18.09	18.79	20.78	21.39	22.39	23.79	25.30	25.19	26.19	27.18	28.89
Fairhaven	DMF; 12" RCP; app. 1-5gpm	5.63	6.32	7.55	9.94	10.62	11.36	12.21	14.34	14.96	16.17	16.71	18.98	20.01	21.22	22.16	23.94	23.78	24.60	25.44	27.08
Fairhaven	12"; immeasureable flow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fairhaven	DMF survey; 18" cement	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.03	0.00	7.72	19.17	21.49	22.59	0.00	24.89	26.77	26.67	27.39	28.00	30.16
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fairhaven	regularly sampled by DMF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fairhaven	DMF Survey; app 40gpm	4.93	5.83	6.98	9.12	9.78	10.65	11.45	13.65	14.35	15.39	16.08	18.09	19.15	20.35	21.19	23.15	22.68	23.50	24.49	26.19
Fairhaven		4.96	5.50	6.86	9.26	9.95	10.64	11.55	13.28	14.23	15.44	15.99	18.39	19.51	20.72	21.62	23.42	23.34	24.13	24.92	26.55
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	2.01	1.55	2.69	3.57	5.20
Fairhaven		1.28	2.08	3.08	5.18	6.05	6.91	7.70	9.67	10.46	11.74	12.52	14.35	15.34	16.36	17.62	19.10	18.61	19.84	20.68	22.29
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71
Fairhaven		3.97	4.87	5.87	8.25	8.94	9.66	10.54	13.05	13.28	14.49	15.03	17.31	18.38	19.58	20.52	22.29	22.16	22.97	23.79	25.44
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.04	2.17	3.18	4.32	5.76	5.31	6.54	7.35	8.96
Fairhaven	12" PVC	6.75	7.55	8.37	10.59	11.43	11.99	12.78	15.08	15.83	17.06	17.79	19.71	20.53	21.77	22.87	24.63	24.14	25.16	26.14	27.76
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.96	3.05	4.19	5.11	6.23	6.07	6.69	7.28	9.54
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.41	2.01	6.04	18.79	21.45	22.92	25.26	26.30	28.67	27.84	28.65	30.15	32.04
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.02	1.33	6.58	19.38	22.65	25.36	26.57	28.66	29.35	29.90	30.63	31.59	33.69
Fairhaven	24" clay	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.30	1.85	6.34	19.50	24.73	27.35	28.68	29.71	31.26	31.18	31.86	32.30	35.01
Fairhaven	16" clay	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fairhaven		3.88	4.78	5.78	8.18	8.78	9.48	10.39	12.50	13.13	14.27	14.99	17.39	18.90	20.14	20.74	22.55	22.52	23.28	24.01	25.76
Fairhaven	Assumed location	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.60	17.32	19.72	21.10	22.39	23.30	23.25	25.19	25.90	26.51	28.49
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.77	19.03	21.39	22.71	23.98	24.89	26.73	26.73	27.46	28.20	30.06
Fairhaven	assumed location	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.59	16.81	19.21	20.62	21.89	22.80	24.64	24.69	25.39	26.03	28.01
Fairhaven	DPW data; 12" RCP	0.00	0.71	1.95	4.25	4.81	5.50	6.31	8.59	9.20	10.45	11.15	13.05	13.86	15.10	16.11	17.96	17.42	18.46	19.45	21.21
Fairhaven	assumed drainage location	6.60	7.50	8.49	10.64	11.30	11.91	12.74	14.95	15.63	16.83	17.54	19.44	20.24	21.44	22.44	24.34	23.74	24.84	25.82	27.53
Fairhaven		7.83	8.75	9.70	12.00	12.44	13.13	14.00	16.14	16.74	17.97	18.77	20.54	21.23	22.51	23.53	25.33	24.73	25.86	26.83	28.53
Fairhaven	assumed to exist	2.75	3.64	4.64	6.95	7.35	8.04	8.95	11.05	11.65	12.85	13.65	15.45	16.36	17.66	18.45	20.25	19.65	20.75	21.75	23.45
Fairhaven	assumed to exist	3.74	4.68	5.68	7.95	8.34	9.07	9.97	12.05	12.67	13.84	14.65	16.44	17.14	18.43	19.44	21.27	20.64	21.74	22.74	24.44
Fairhaven	assumed to exist	5.52	5.30	6.26	9.74	10.11	10.09	10.99	13.47	13.23	15.61	16.42	18.21	18.48	18.92	21.15	21.79	22.35	23.44	24.44	26.16
Fairhaven		0.00	0.00	0.00	0.00	0.30	1.00	1.90	3.89	4.63	5.79	6.64	8.40	9.19	10.23	11.23	13.12	12.53	13.63	14.58	16.20
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.24	1.85	3.01	3.86	5.62	6.42	7.46	8.46	10.36	9.77	10.86	11.79	13.42
Fairhaven	assumed drainage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80	2.58	3.84	4.89	5.41	7.78	6.73	7.81	8.73	10.36
Fairhaven	DPW; 12" RCP	5.41	6.45	7.35	9.56	10.10	10.89	11.79	13.85	14.59	15.66	16.50	18.25	18.91	20.25	21.20	23.10	22.41	23.65	24.46	26.16
Fairhaven	24" RCP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fairhaven	4'x9' culvert	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.55	2.29	5.98	23.37	29.15	31.40	32.67	33.58	33.69	35.40	36.07	36.62	39.91
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.56	14.08	17.29	18.90	19.93	20.94	22.87	23.97	24.64	25.21

Outfalls

Municipality	Comments	Category 1				Category 2				Category 3				Category 4				Category 4 Extreme			
Water Level Rise		0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.84	2.02	3.18	4.10	5.24	5.26	5.88	6.53	9.05
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.43	3.79	4.93	5.84	6.90	6.97	7.58	8.12	10.83
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.79	3.29	4.41	5.33	6.39	6.43	7.03	7.57	10.21
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.73	11.24	14.50	16.15	17.24	18.22	20.28	21.43	22.11
Fairhaven	16" corrugated	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.43	0.00	2.83	19.16	25.25	26.67	27.57	28.29	28.70	29.02	29.23	29.64	35.84
Fairhaven	24" RCP	5.45	6.11	7.09	9.32	10.18	10.97	11.63	13.81	14.45	15.84	16.61	18.47	19.31	20.50	21.70	23.15	22.79	23.95	24.84	26.45
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.25	16.10	18.48	19.75	21.01	21.92	23.74	23.73	24.47	25.21	27.02
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.44	2.43	3.17	4.27	4.83	7.10	8.22	9.54	10.39	12.15	12.08	12.86	13.63	15.35
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.38	6.73	7.01	8.22	9.31	10.91	10.67	11.34	12.58	14.41
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.40	6.75	7.18	8.39	9.35	11.08	10.71	11.38	12.62	14.45
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.95	2.02	3.05	4.21	5.80	5.23	6.44	7.29	8.90
Fairhaven	assumed discharge	0.00	0.00	0.00	0.00	0.00	0.00	1.01	2.95	3.73	5.04	5.83	7.65	8.62	9.63	10.93	12.37	11.90	13.14	13.96	15.56
Fairhaven	assumed discharge	0.00	0.00	0.00	0.00	0.00	0.00	0.69	2.73	3.52	4.81	5.61	7.42	8.42	9.43	10.71	12.14	11.67	12.92	13.73	15.34
Fairhaven	assumed discharge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.33	2.12	3.41	4.20	6.02	7.02	8.03	9.30	10.75	10.30	11.52	12.34	13.94
Fairhaven	assumed discharge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.72	2.55	3.55	4.56	5.83	7.29	6.84	8.05	8.88	10.48
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41	1.13	3.53	2.77	3.57	4.34	6.06
Fairhaven		0.00	0.00	0.00	0.00	0.32	0.87	1.74	4.03	4.50	5.88	6.45	8.67	9.70	10.89	11.86	13.62	13.45	14.27	15.12	16.77
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.51
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fairhaven	Assumed BT	0.00	0.00	0.00	0.00	0.00	0.00	0.35	2.52	2.81	4.19	5.14	7.70	8.66	9.95	10.93	12.66	12.57	13.44	14.14	15.88
Fairhaven		0.54	1.62	2.53	4.45	5.15	5.83	6.56	8.84	9.77	10.72	11.42	13.39	14.45	15.58	16.40	18.48	17.78	18.80	19.79	21.49
Fairhaven	plans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.03	0.00	2.45	15.01	17.30	18.52	19.82	20.87	23.50	22.59	23.43	25.07	26.85
Fairhaven	plans	5.00	7.03	7.97	8.94	9.64	11.43	11.31	13.30	15.20	15.19	15.92	17.87	19.86	20.36	20.88	23.27	22.23	23.28	24.24	25.94
Fairhaven	plans	2.96	3.86	4.80	6.90	7.60	8.26	9.01	11.27	12.04	13.15	13.88	15.84	16.69	18.13	18.84	20.74	20.19	21.24	22.21	23.90
Fairhaven	plans	4.00	4.90	5.84	7.94	8.63	9.30	10.04	12.30	13.07	14.19	14.92	16.87	17.73	18.87	19.87	21.77	21.23	22.27	23.24	24.94
Fairhaven	plans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.29	4.74	7.16	8.53	9.82	10.73	12.53	12.61	13.32	13.94	15.91
Fairhaven	plan 31-C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	1.88
Fairhaven	plan 30-A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	1.79	1.53	2.55	3.36	4.99
Fairhaven	plan 29 B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.78	1.76	3.48
Fairhaven	plan 29 EE	3.49	4.41	5.39	7.70	8.15	8.81	9.69	11.85	12.16	13.64	14.44	16.23	16.96	18.23	19.26	21.06	20.46	21.58	22.56	24.28
Fairhaven	plan 28 D	7.42	8.24	9.15	11.27	11.99	12.66	13.46	15.69	16.39	17.60	18.30	20.28	21.18	22.37	23.38	25.23	24.81	25.70	26.71	28.39
Fairhaven	plan 22-A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.91	5.74	6.89	7.79	8.70	9.06	9.67	10.14	13.14
Fairhaven	plan 24-A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.51	7.68	8.09	9.36	10.36	12.74	12.13	12.82	14.85	16.29
Fairhaven	plan 25-A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.52

Designated Port Areas

Area	Category 1				Category 2				Category 3				Category 4				Category 4 Extreme			
Water Level Rise	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft
Harbor Hydraulics	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	1.25	13.76	16.04	16.87	18.21	19.57	21.91	21.27	22.12	23.57	25.46
Frhvn Shipyard	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.44	0.00	1.93	14.38	16.65	17.76	19.10	20.14	22.17	21.86	22.69	23.93	25.90
Union Wharf-Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.69	0.00	2.20	14.64	16.92	18.02	19.35	20.39	22.70	22.11	22.92	24.05	26.07
Union Wharf-Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.59	0.00	2.09	14.54	16.82	18.22	19.49	20.29	22.63	22.01	22.83	23.99	26.00
Union Wharf-Town	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.33	0.00	2.80	15.28	17.55	18.64	19.98	21.03	23.42	22.74	23.57	24.79	26.78
Frhvn Shipyard	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.05	0.00	2.56	15.00	17.28	18.37	19.70	20.74	23.01	22.47	23.27	24.35	26.38
Union Wharf-Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.91	1.65	5.64	18.16	20.42	21.43	22.78	23.90	26.31	25.60	26.46	27.76	29.73
Reidars	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.00	0.84	13.22	15.51	16.62	17.94	18.96	21.11	20.72	21.49	22.42	24.50
Atlantic Fisheries	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.55	0.00	3.10	15.50	17.79	19.43	20.75	21.23	23.91	22.99	23.75	24.67	26.75
Steamship Authority Maintenance Facility	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.27	14.56	15.67	16.97	17.99	20.06	19.76	20.51	21.33	23.45
North Coast Seafoods	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.38	3.76	5.72	10.24	12.06	13.07	14.43	15.30	16.95	16.84	17.74	18.50	20.27
Field/Club	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.58	6.44	7.11	8.47	10.04	10.97	12.30	13.18	14.79	14.69	15.59	16.39	18.16
South Shore Dry Dock Marine, SK Marine Electronics, Creative Canvas Works, Bayline Boatyard and Transport	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.17	11.04	11.82	13.10	14.68	15.49	16.80	17.80	19.31	19.31	20.21	21.00	22.79
Residential	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.53	4.93	5.95	8.37	10.01	10.99	12.33	13.25	14.86	14.77	15.67	16.45	18.20
Residential	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.17	5.42	6.46	8.80	10.44	11.57	12.72	13.68	15.42	15.19	16.09	16.88	18.63
Residential	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.62	5.05	6.05	8.37	10.01	10.98	12.33	13.24	14.85	14.76	15.66	16.44	18.19
Residential	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.14	5.63	6.58	8.79	10.41	11.39	12.74	13.64	15.25	15.16	16.06	16.84	18.60
Residential	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.93	5.28	6.26	8.53	10.16	11.14	12.58	13.38	15.10	14.90	15.80	16.59	18.34
Residential	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.64	5.30	6.16	8.24	9.86	10.82	12.16	13.07	14.61	14.58	15.48	16.27	18.03
Residential	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.24	6.72	7.69	9.89	11.52	12.48	13.82	14.73	16.33	16.24	17.14	17.93	19.69
Residential	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.33	5.67	6.57	8.61	10.22	11.40	12.74	13.43	15.25	14.94	15.84	16.63	18.39
Residential	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.26	6.89	7.78	9.80	11.41	12.32	13.60	14.62	16.16	16.13	17.03	17.82	19.58
Residential	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.71	7.32	8.18	10.12	11.73	12.68	14.02	14.93	16.53	16.44	17.34	18.13	19.89
Finicky Pet Food Inc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.45	7.97	8.99	11.08	12.70	13.61	14.94	15.88	17.44	17.40	18.30	19.09	20.86
Finicky Pet Food Inc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.33	8.41	9.77	12.79	14.49	15.46	16.72	17.68	19.31	19.21	20.11	20.88	22.66
Field/Club	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.01	7.23	8.51	10.89	12.56	13.03	14.35	15.71	17.32	17.23	18.13	18.92	20.70
SK Marine Electronics	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.02	9.96	11.62	14.73	16.46	17.16	18.48	19.62	21.23	21.15	22.05	22.83	24.62
Sea Gold Seafood Prods	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.65	6.10	8.04	12.42	14.25	15.19	16.54	17.45	19.05	18.99	19.89	20.65	22.44
Fleet Fisheries Inc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.63	5.84	7.94	12.65	14.56	15.55	16.89	17.75	19.47	19.30	20.20	20.96	22.75
Vacant-South Terminal Expansion	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.52	4.89	7.78	14.24	16.29	17.31	18.67	19.51	20.94	21.08	21.97	22.72	24.51
Vacant-South Terminal Expansion	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.20	3.68	7.47	15.02	17.10	18.07	19.44	20.35	21.96	21.92	22.82	23.56	25.35
South Shore Dry Dock Marine, SK Marine Electronics, Creative Canvas Works, Bayline Boatyard and Transport	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.36	10.59	11.96	14.58	16.29	17.21	18.52	19.43	21.04	20.95	21.85	22.64	24.43
Field/Club	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.08	8.90	9.60	11.36	12.97	13.90	15.21	16.12	17.72	17.63	18.53	19.32	21.10
Field/Club	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.02	6.76	7.43	9.06	10.64	11.69	13.01	13.82	15.44	15.32	16.22	17.02	18.79
Field/Club	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.36	7.81	8.80	10.91	12.55	13.53	14.85	15.71	17.37	17.23	18.13	18.92	20.69
Field/Club	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.88	7.52	8.38	10.13	11.73	12.70	14.00	14.90	16.51	16.41	17.31	18.10	19.87
Field/Club	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.60	8.20	9.08	11.02	12.63	13.58	15.06	15.81	17.42	17.32	18.22	19.01	20.78
South Shore Dry Dock Marine, SK Marine Electronics, Creative Canvas Works, Bayline Boatyard and Transport	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.04	11.27	12.59	15.08	16.90	17.81	19.12	20.03	21.66	21.57	22.47	23.25	25.03
Seatrade International Corp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.97	8.20	9.34	12.51	14.21	15.21	16.71	17.49	19.10	19.01	19.91	20.69	22.44
Carlos Seafood Inc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.04	8.70	10.39	13.81	15.52	16.52	17.63	18.81	20.42	20.34	21.24	22.01	23.76
WBSM Radio Tower Site	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.23	6.51	8.57	13.41	15.24	16.19	17.56	18.52	20.11	20.06	20.96	21.72	23.49
Carlos Seafood Inc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.69	9.16	10.65	14.35	16.09	17.47	18.73	19.37	21.37	20.91	21.81	22.57	24.33
Quality Custom Packing, Inc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.24	0.00	2.44	10.98	13.09	14.09	15.47	16.38	17.99	17.96	18.86	19.58	21.37
Bergie's Seafood, Inc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.00	1.89	13.24	15.54	16.54	17.83	18.84	20.44	20.44	21.34	22.04	23.84
Northern Wind	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.60	0.00	2.78	13.70	15.99	16.98	18.37	19.28	20.88	20.88	21.78	22.48	24.28
Eastern Fisheries	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.59	0.00	2.69	13.11	15.37	16.40	17.75	18.66	20.27	20.25	21.15	21.86	23.66
Shuster Corp-South Terminal Expansion	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.54	11.76	12.75	14.14	15.04	16.72	16.63	17.53	18.25	20.04
CP Brodeur Inc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.67	2.94	5.21	10.48	12.34	13.27	14.65	15.63	16.96	17.18	18.08	18.83	20.61
Tomtronics	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.78	0.97	4.01	11.16	13.16	14.20	15.58	16.45	18.11	18.02	18.92	19.65	21.44
Top Quality Seafood & Shellfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	9.59	11.75	12.75	14.14	15.05	16.66	16.63	17.53	18.25	20.05
Oceans Alive Scallop Corp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69	10.86	13.08	14.08	15.47	16.37	17.98	17.97	18.87	19.58	21.38
MF Foley Co. Inc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.04	1.66	4.30	10.58	12.51	13.51	14.90	15.80	17.44	17.37	18.27	19.01	20.80
IMP Fishing Gear Inc.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68	7.33	9.28	10.29	11.68	12.58	14.14	14.15	15.05	15.79	17.59
Mariner Seafood LCC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.00	1.45	9.65	11.72	12.77	14.15	15.02	16.69	16.60	17.50	18.23	20.03
Seatrade International Corp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.14	11.53	13.69	14.69	16.08	16.98	18.61	18.57	19.47	20.19	21.99
Parking Lot for Northern Wind	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	11.07	13.32	14.32	15.71	16.61	18.22	18.21	19.11	19.82	21.62
Vacant-South Terminal Expansion	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.20	0.48	4.40	13.43	15.61	16.59	17.97	18.88	20.96	20.47	21.37	22.09	23.88
C&P Bait	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.07	0.00	2.25	10.70	12.79	13.79	15.18	16.09	17.71	17.67	18.57	19.29	21.09
Marine Enterprises and Servcies	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.69	1.13	4.08	10.78	12.75	13.70	15.09	16.14	17.86	17.80	18.70	19.36	21.42
Skips Marine Supply	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.60	1.33	4.02	10.75	12.72	13.58	14.98	16.09	17.82	17.73	18.63	19.31	21.30
Bay Fuel Home Heating & Skips Marine Supply	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.49	0.87	3.72	10.41	12.37	13.43	14.79	15.74	17.52	17.36	18.26	18.95	20.92

Designated Port Areas

Area	Category 1				Category 2				Category 3				Category 4				Category 4 Extreme			
Water Level Rise	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft
Advanced Marine Technologies	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53	9.91	12.07	13.11	14.50	15.44	17.24	17.08	17.99	18.65	20.65
Continental Plastics & Packaging	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.03	10.32	12.47	13.49	14.91	15.82	17.55	17.45	18.35	19.03	20.98
Bruce's Splicing & Rigging Co	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.80	0.95	4.02	11.31	13.31	14.15	15.54	16.62	18.09	18.20	19.10	19.83	21.64
Trio Algarvio Inc(Rope/netting storage)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.81	0.00	1.93	12.41	14.64	15.69	17.08	17.99	19.72	19.62	20.52	21.20	23.14
Access to Mass Fab & Welding 42-260	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.24	0.00	2.37	12.52	14.73	15.84	16.91	18.09	19.66	19.74	20.64	21.31	23.30
Seaway Co.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.69	0.00	2.79	14.19	16.49	17.49	18.88	19.79	21.42	21.40	22.30	23.00	24.82
Tempist Fisheries Inc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.79	0.00	1.89	13.34	15.64	16.64	18.03	18.94	20.54	20.54	21.44	22.14	23.94
Whaling City Seafood Display Auction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.00	1.74	13.17	15.47	16.47	17.86	18.77	20.39	20.37	21.28	21.98	23.79
Pier Fish Co.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	9.84	12.00	12.86	14.25	15.33	16.82	16.93	17.83	18.54	20.39
New Bedford Shellfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	10.74	12.99	14.01	15.41	16.29	17.93	17.89	18.79	19.49	21.31
Pauls Truck Repair	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.93	0.00	2.12	10.67	12.77	13.78	15.17	16.08	17.74	17.66	18.56	19.28	21.10
Saraiva Enterprises, Inc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.11	10.00	12.12	13.10	14.49	15.45	17.12	17.06	17.96	18.66	20.55
Hygrade Ocean Products	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.88	0.00	3.10	10.56	12.57	13.58	14.97	15.90	17.57	17.49	18.39	19.11	20.96
Parking-Very Small	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.26	2.02	4.52	10.53	12.42	13.19	14.58	15.76	17.33	17.34	18.24	18.97	20.82
Marder Trawling Inc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.21	12.44	13.46	14.85	15.76	17.19	17.37	18.27	18.97	20.81
Northern Wind Inc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.76	0.00	1.86	13.30	15.60	16.60	18.00	18.90	20.52	20.50	21.40	22.10	23.91
Advanced Marine Technologies	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.20	9.77	11.88	12.99	14.38	15.26	17.12	16.92	17.82	18.48	20.53
Sprague Oil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	2.13	10.72	12.91	13.99	15.39	16.28	18.36	18.03	18.93	19.50	21.81
NSTAR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.25	0.63	4.41	13.36	15.49	16.60	17.99	18.90	20.81	20.59	21.49	22.12	24.24
Mass Fabricating & Welding	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.34	0.00	2.47	12.80	15.03	16.10	17.49	18.40	20.23	20.07	20.97	21.62	23.66
Trio Algarvio Inc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.65	0.00	2.78	13.51	15.77	16.79	18.18	19.11	20.82	20.74	21.64	22.32	24.25
Luzo Fishing Gear, Inc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.89	0.59	3.13	9.30	11.22	12.30	13.69	14.65	16.53	16.33	17.23	17.87	20.00
NSTAR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.36	0.86	3.58	10.22	12.19	13.37	14.76	15.67	17.71	17.40	18.30	18.89	21.17
NSTAR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.60	2.62	5.73	13.54	15.79	16.77	18.17	19.06	21.21	20.83	21.73	22.27	24.68
NSTAR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.93	1.64	5.08	13.56	15.81	16.79	18.18	19.12	21.19	20.89	21.79	22.33	24.71
parking	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.08	2.41	6.10	15.63	18.29	18.92	20.32	21.22	23.43	23.02	23.92	24.43	26.92
Homers Wharf	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.63	0.00	3.60	13.59	16.08	16.98	18.38	19.25	21.61	21.05	21.95	22.45	24.95
NSTAR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.80	1.37	4.90	13.54	15.85	16.71	18.10	19.12	21.24	20.89	21.79	22.33	24.74
DEM State Pier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.99	12.91	13.25	14.69	15.60	17.76	17.40	18.30	18.81	21.31
parking	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.06	2.44	6.10	15.51	18.13	18.85	20.22	21.11	23.35	22.91	23.81	24.32	26.81
Leonards Wharf	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.53	0.00	3.55	13.59	15.98	16.94	18.33	19.26	21.42	21.05	21.95	22.46	24.93
Waterfront Grille	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.54	0.00	3.63	13.24	15.68	16.52	17.98	18.89	21.02	20.69	21.59	22.09	24.59
parking	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.60	3.31	6.86	15.87	18.32	19.20	20.37	21.47	23.59	23.26	24.17	24.67	27.16
Bourne Counting House	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.41	1.00	4.64	13.85	16.43	17.11	18.50	19.44	21.61	21.24	22.14	22.65	25.14
Ocean C-Star Inc, International Seafood Inc, Liberty Lobster	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.83	1.11	4.86	14.46	17.01	17.78	19.18	20.08	22.28	21.88	22.78	23.29	25.78
greenspace	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.10	0.52	4.27	14.03	16.84	17.31	18.71	19.62	21.82	21.42	22.32	22.82	25.32
Moses Smith & Markey Attorneys	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.15	0.50	4.25	13.66	16.12	16.93	18.33	19.28	21.43	21.08	21.98	22.48	24.98
Sprague Oil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.70	0.96	4.75	14.25	16.60	17.58	18.98	19.88	22.03	21.66	22.56	23.09	25.51
Crystal Ice	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.00	1.65	13.20	17.18	16.86	18.24	19.19	21.55	21.12	22.02	22.58	25.11
Fishermans Wharf	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.64	0.00	2.37	13.76	17.19	17.25	18.66	19.41	21.79	21.23	22.13	22.65	25.15
DEM State Pier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.38	13.38	13.74	15.13	16.04	18.25	17.84	18.74	19.26	21.75
Crystal Ice	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.00	1.39	13.03	17.17	16.78	18.16	19.13	21.53	21.08	21.98	22.55	25.09
NB Seafood Coalition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.51	0.00	3.45	14.74	18.40	18.12	19.51	20.43	22.69	22.28	23.18	23.70	26.21
NB Harbor Dev Commission	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.03	0.00	2.96	14.00	17.42	17.27	18.66	19.57	21.78	21.37	22.27	22.78	25.28
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.19	0.00	4.13	14.98	18.32	18.24	19.45	20.55	22.56	22.35	23.25	23.76	26.25
Harbormaster Building	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.66	0.00	2.58	13.82	17.39	17.13	18.52	19.44	21.67	21.26	22.16	22.67	25.17
Access to Crystal Ice	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.88	0.00	2.63	14.35	18.67	18.23	19.60	20.55	23.01	22.53	23.43	24.01	26.57
Global Fuel Coop & Sea Fuels Marine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.59	0.00	2.53	13.96	17.77	17.48	18.86	19.80	22.12	21.68	22.58	23.13	25.65
Maritime Terminal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	1.51	13.29	17.65	17.25	18.61	19.55	22.06	21.54	22.44	23.03	25.58
Maritime Terminal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	12.04	16.71	16.38	17.74	18.40	21.19	20.39	21.28	21.89	24.48
Maritime Terminal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.00	1.48	13.22	17.68	17.03	18.39	19.44	21.80	21.41	22.30	22.89	25.47
Infrastructure	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.68	15.07	20.25	19.91	21.23	22.13	24.68	24.18	25.06	25.69	28.44
Infrastructure	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.90	0.00	2.94	15.28	20.34	19.64	21.07	22.10	24.64	24.15	25.03	25.66	28.34
Infrastructure	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.94	16.72	16.57	17.92	18.42	21.42	20.43	21.32	21.94	24.54
Infrastructure	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.79	0.00	2.91	14.96	19.68	18.96	20.32	21.41	23.91	23.43	24.32	24.94	27.53
Maritime Terminal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	12.16	16.96	16.21	17.57	18.74	21.18	20.80	21.69	22.33	24.92
Maritime Terminal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	1.10	13.35	18.25	17.63	18.98	20.04	22.59	22.12	23.01	23.65	26.27
NB Seafoods	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.17	17.26	17.11	18.44	19.51	22.22	21.70	22.58	23.24	25.96
Maritime Terminal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.46	16.45	15.60	16.95	17.96	20.39	19.93	20.81	21.42	24.08
Infrastructure	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.72	0.00	4.43	16.86	22.17	21.90	23.20	24.25	26.80	26.30	27.16	27.81	30.63

Designated Port Areas

Area	Category 1				Category 2				Category 3				Category 4				Category 4 Extreme			
Water Level Rise	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft
Maritime Terminal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.60	0.00	2.59	14.72	19.28	19.44	20.79	21.88	24.80	24.15	25.05	25.81	28.37
Niemic Marine, Sequin Enterprises, Ocean Marine Fabricating, & Commercial Strip Mall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.68	14.62	15.90	17.24	18.43	21.69	20.83	21.76	22.87	25.28
Vacant	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.96	15.91	17.27	18.60	19.80	23.10	22.21	23.14	24.29	26.69
Fish Island Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.27	9.37	9.40	10.77	11.79	14.37	13.85	14.76	15.41	17.95
Niemic Yatch Sales, Niemic Marine, DG Marine Services, Fathoms Bar & Grille, CMS Fishing Tackle	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.70	13.54	14.70	16.04	17.20	20.37	19.51	20.44	21.56	23.94
RA Mitchell and Ricks Outboards	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.86	14.18	15.44	16.79	17.96	21.17	20.06	21.01	22.42	24.62
Fairhaven True Value Hardware	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.28	11.45	12.71	14.06	15.37	18.44	17.36	18.30	19.76	21.90
Dunkin Donuts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.72	14.83	16.14	17.49	18.64	21.79	20.63	21.58	23.08	25.20
Fishing Boat Docking & Access	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53	12.54	16.70	17.03	18.30	19.35	22.15	21.51	22.42	23.13	25.66
Temptations	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.80	14.30	15.53	16.88	18.05	21.23	20.23	21.18	22.49	24.75
Maritime Terminal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	12.36	16.71	16.68	18.04	19.07	21.74	21.20	22.10	22.79	25.33
Maritime Terminal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.40	14.73	15.55	16.90	17.35	20.13	19.55	20.46	21.19	23.73
AGM Marine Contractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68	12.64	16.71	16.90	18.26	19.29	21.93	21.40	22.30	22.98	25.51
Sea Watch International	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	12.30	17.79	19.03	20.28	21.50	24.65	24.08	24.94	25.64	28.63
Eastern Fisheries	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.15	17.45	18.52	19.81	21.01	24.23	23.66	24.53	25.23	28.11
NB Seafoods	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.06	0.00	3.15	15.43	20.68	20.95	22.25	23.36	26.19	25.66	26.53	27.20	30.03
Eastern Fisheries	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.30	15.87	16.91	18.40	19.61	22.48	22.15	23.00	23.69	26.73
Big G Seafood & Marder Trawler Inc. Freezer Plant	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.04	17.53	18.27	19.54	20.76	23.64	23.15	24.00	24.69	27.66
Sea Watch International	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.35	18.12	19.11	20.34	21.44	24.25	23.66	24.49	25.17	28.31
Eastern Fisheries	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.02	15.58	16.95	18.20	19.39	22.56	21.97	22.81	23.51	26.55
Eastern Fisheries	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.00	17.78	18.96	20.19	21.36	24.21	23.67	24.49	25.18	28.34
Packaging Products Corp	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	13.21	19.21	21.36	21.56	22.70	25.32	24.80	25.60	26.28	29.56
Sea Watch International	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	12.77	18.71	19.73	21.05	22.07	24.70	24.17	24.97	25.65	28.89
Atlantic Red Crab & M&B Sea Products	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.13	17.70	18.25	19.51	20.70	23.47	22.94	23.78	24.46	27.47
J.C. Fish Inc & LWS Inc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.82	18.27	18.73	20.00	21.27	23.99	23.59	24.44	25.13	28.07
Sea Watch International	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.04	17.75	18.82	20.05	21.22	24.10	23.55	24.38	25.07	28.18
Bulk Material Barge Loading Sand & Gravel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.72	12.80	17.99	18.82	20.12	21.35	24.44	23.96	24.84	25.54	28.36
Eastern Fisheries	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	12.61	18.25	19.61	20.85	22.06	25.13	24.57	25.41	26.10	29.19
Eastern Fisheries	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.26	13.71	19.50	20.92	22.14	23.20	26.22	25.55	26.38	27.06	30.23
Marine Hydraulics Inc. w/boatyard in back	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.90	16.26	17.59	18.71	19.86	22.23	21.73	22.49	23.15	26.65
Wharf Tavern and BJ Temp Services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.77	19.13	20.26	21.42	22.50	24.76	24.27	25.03	25.69	29.18
US EPA Dredge Dewatering Facility	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.35	18.28	19.33	20.54	21.97	24.53	24.23	25.03	25.71	28.96
New Bedford Welding Supply	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.44	17.19	18.43	19.45	20.60	22.56	22.09	22.81	23.45	27.16
Small Marine Related Business (5) including NB Welding Supply	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.76	17.48	18.76	19.86	20.92	22.91	22.44	23.16	23.81	27.50
Bulk Material Barge Loading Area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47	14.05	21.27	22.58	23.64	24.57	26.12	25.61	26.27	26.90	30.88
No Active Use too small	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.70	19.15	20.43	21.53	22.62	25.23	24.37	25.12	25.78	29.32
No Active Use-for sale	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.71	17.59	18.84	19.94	20.97	22.79	22.33	23.03	23.67	27.46
Ever Green Sheet Metal Inc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.76	14.20	21.23	22.28	23.41	24.57	26.04	25.79	26.48	27.11	30.98
No Active Use	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.17	0.00	5.29	18.64	25.55	26.56	26.03	28.93	28.86	30.27	30.96	31.60	35.41

Public Structures

Object	Location	Municipality	Category 1				Category 2				Category 3				Category 4				Category 4 Extreme			
Water Level Rise			0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft
1	RIVERSIDE AVE	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.81	0.00	0.87	19.83	24.84	27.44	29.11	30.23	31.51	32.30	33.31	34.10	35.08
2	144 COFFIN AVE	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.30	21.35	23.72	25.65	26.69	27.78	28.67	29.66	30.45	31.55
3	COFFIN AVE	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.49	0.00	0.59	19.55	24.57	27.18	28.86	29.95	31.26	31.94	32.93	33.73	34.77
4	26 MADEIRA AVE	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.47	3.96	5.58	6.75	7.95	8.81	9.81	10.58	11.67
5	56 NASH RD	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.47	13.44	15.82	17.41	18.72	19.76	20.95	21.96	22.72	23.68
6	215 W RODNEY FRENCH BLVD	New Bedford	1.59	2.93	3.71	5.98	6.47	7.45	8.38	10.59	11.25	12.09	12.95	15.15	16.26	17.08	17.79	19.70	19.17	20.16	21.05	22.79
7	603 BROCK AVE	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	618 BELLEVILLE AVE	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.07	17.73	20.32	21.72	22.91	24.16	25.97	27.04	27.71	28.19
9	ACUSHNET AVE	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	BELLEVILLE AVE	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.40	4.10	4.10	22.60	27.01	29.90	31.18	32.09	33.63	35.67	36.77	37.37	37.58
11	1997 ACUSHNET AVE	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	246 RIVER RD	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.15	2.82	2.83	21.32	25.80	28.12	28.84	29.56	31.02	31.98	33.15	33.82	34.74
13	119 FREDERICK ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.68	2.34	3.54	4.54	6.23	5.95	6.94	7.83	9.54
14	E RODNEY FRENCH BLVD	New Bedford	1.18	2.13	3.04	5.58	6.08	6.52	7.54	10.00	10.43	11.59	12.14	14.33	15.30	16.39	17.45	19.03	18.86	19.79	20.68	22.45
15	E RODNEY FRENCH BLVD	New Bedford	1.20	2.19	3.37	5.59	6.09	6.79	7.60	10.17	10.76	11.60	12.12	14.32	15.46	16.73	17.47	19.36	18.86	19.79	20.68	22.47
16	E RODNEY FRENCH BLVD	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.71	5.32	6.15	6.83	8.99	9.95	11.18	11.98	13.90	13.40	14.37	15.25	16.98
17	620 BROCK AVE	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	TARKILN HILL RD	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	2203 ACUSHNET AVE	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	99 RUTH ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.03	0.92	1.82	2.63	4.42
21	48 W RODNEY FRENCH BLVD	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.27	2.50	3.01	3.82	5.33	6.10	7.38	8.42	9.89	9.92	10.82	11.63	13.42
22	1699 E RODNEY FRENCH BLVD	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.80	11.39	12.70	13.52	15.74	16.34	17.62	18.79	20.23	20.33	21.24	22.07	23.79
23	18 CLEVELAND ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.85	6.68	7.45	8.49	10.17	11.06	12.35	13.26	14.88	14.77	15.68	16.48	18.26
24	1000 S RODNEY FRENCH BLVD	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.98	1.38	2.88	3.71	5.40	5.96	7.27	8.55	10.22	9.75	10.78	11.70	13.63
25	960 S RODNEY FRENCH BLVD	New Bedford	1.55	2.55	3.45	5.85	6.24	6.85	7.64	9.94	10.35	11.65	12.45	14.15	14.77	16.15	17.25	19.15	18.45	19.46	20.36	22.35
26	S RODNEY FRENCH BLVD	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.95	1.33	2.77	3.57	5.27	5.76	7.15	8.37	9.94	9.57	10.57	11.48	13.47
27	170 COVE ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.39	8.44	8.96	9.87	11.43	12.36	13.67	14.53	16.13	16.03	16.93	17.73	19.51
28	3 W RODNEY FRENCH BLVD	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.61	4.72	5.20	6.06	7.59	8.55	9.83	10.69	12.29	12.19	13.09	13.89	15.68
29	1095 COVE RD	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.90	11.89	12.51	13.41	15.12	16.01	17.11	18.11	19.68	19.59	20.49	21.31	23.09
30	45 COVE ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.24	15.91	16.73	18.08	19.75	20.41	21.71	22.86	24.57	24.38	25.28	26.07	27.86
31	RIVET ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.80	2.95	3.93	4.80	6.41	6.27	7.18	8.00	9.72
32	KATHARINE ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.01	3.99	4.55	5.63	7.51	8.57	9.56	10.52	12.12	11.99	12.89	13.72	15.43
33	S FIRST ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.99	7.72	8.40	9.89	11.45	12.43	13.69	14.71	16.31	16.21	17.11	17.91	19.63
34	S FIRST ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.91	8.08	8.57	9.83	11.37	12.13	13.71	14.62	16.00	16.12	17.02	17.82	19.54
35	S FIRST ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.18	6.25	6.73	7.96	9.50	10.48	11.83	12.74	14.34	14.24	15.14	15.94	17.67
36	S FIRST ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.55	5.59	6.08	7.29	8.84	9.73	11.08	12.07	13.59	13.57	14.47	15.27	17.00
37	BLACKMER ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.08	8.90	9.60	11.36	12.97	13.90	15.21	16.12	17.72	17.63	18.53	19.32	21.10
38	GIFFORD ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.04	11.27	12.59	15.08	16.90	17.81	19.12	20.03	21.66	21.57	22.47	23.25	25.03
39	160 THOMPSON ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	838 S RODNEY FRENCH BLVD	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.43	2.27	1.64	2.71	3.63	5.47
41	PURCHASE ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.89	6.00	6.29	7.29	8.79	9.81	11.20	12.09	13.71	13.59	14.49	15.29	17.00
42	137 PURCHASE ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.74	5.84	6.04	7.04	8.55	9.63	11.04	11.85	13.54	13.35	14.25	15.05	16.75
43	THOMPSON ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.31	4.37	4.72	5.77	7.30	8.30	9.66	10.58	12.17	12.08	12.98	13.78	15.48
44	S SECOND ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.49	6.37	6.88	8.34	9.88	10.88	12.28	13.18	14.80	14.69	15.59	16.38	18.11
45	PALMERS ISLAND	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.91	2.13	6.15	15.83	18.14	18.99	20.35	21.43	23.14	23.07	23.93	24.65	26.52
46	458 S WATER ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.07	6.82	8.70	13.31	15.11	15.90	17.30	18.50	20.03	20.13	21.03	21.72	23.72
47	458 S WATER ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.81	5.98	8.12	12.67	14.46	15.55	16.94	17.85	19.39	19.48	20.38	21.06	23.06
48	JOHN F KENNEDY HWY	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.38	5.67	7.32	11.45	13.22	14.69	15.70	16.61	18.83	18.23	19.13	19.82	21.83
49	MACARTHUR DR	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.40	4.58	6.37	11.45	13.28	14.66	16.05	16.67	19.05	18.30	19.20	19.89	21.89
50	286 S SECOND ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.04	5.80	6.42	8.15	9.71	10.73	12.12	13.03	14.66	14.55	15.45	16.23	17.97
51	E RODNEY FRENCH BLVD	New Bedford	0.00	0.00	0.00	0.72	1.12	1.74	2.53	4.82	5.35	6.53	7.32	9.09	10.25	11.40	12.33	14.15	13.53	14.61	15.51	17.35
52	E RODNEY FRENCH BLVD	New Bedford	0.00	0.00	0.00	0.31	0.72	1.34	2.14	4.42	4.98	6.14	6.91	8.70	9.84	11.06	11.96	13.76	13.16	14.26	15.16	16.96
53	E RODNEY FRENCH BLVD	New Bedford	0.00	0.00	0.00	0.44	0.86	1.47	2.29	4.56	5.03	6.29	7.04	8.85	9.94	11.05	12.06	13.87	13.26	14.36	15.26	17.07
54	918 E RODNEY FRENCH BLVD	New Bedford	0.00	0.54	1.49	3.89	4.32	4.94	5.76	8.03	8.51	9.76	10.49	12.33	13.33	14.47	15.48	17.30	16.69	17.78	18.68	20.50
55	950 S RODNEY FRENCH BLVD	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.25	2.54	2.97	4.24	5.04	6.79	7.75	8.96	10.00	11.84	11.20	12.26	13.17	15.04
56	PURCHASE ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	1.21	2.58	3.49	5.28	5.09	5.99	6.70	8.65
57	CANNON ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.02	4.80	5.98	7.38	8.26	10.29	9.97	10.87	11.49	13.70
58	ACUSHNET AVE	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.43	1.48	2.87	3.77	5.82	5.49	6.39	6.99	9.25
59	MACARTHUR DR	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.08	2.41	6.10	15.63	18.29	18.92	20.32	21.22	23.43	23.02	23.92	24.43	26.92
60	HOMERS WHF	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.63	0.00	3.60	13.59	16.08	16.98	18.38	19.25	21.61	21.05	21.95	22.45	24.95

Public Structures

Object	Location	Municipality	Category 1				Category 2				Category 3				Category 4				Category 4 Extreme			
Water Level Rise			0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft
61	MACARTHUR DR	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.06	2.44	6.10	15.51	18.13	18.85	20.22	21.11	23.35	22.91	23.81	24.32	26.81
62	LEONARDS WHARF	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.53	0.00	3.55	13.59	15.98	16.94	18.33	19.26	21.42	21.05	21.95	22.46	24.93
63	MACARTHUR DR	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.60	3.31	6.86	15.87	18.32	19.20	20.37	21.47	23.59	23.26	24.17	24.67	27.16
64	MACARTHUR DR	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.10	0.52	4.27	14.03	16.84	17.31	18.71	19.62	21.82	21.42	22.32	22.82	25.32
65	680 PURCHASE ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
66	51 MACARTHUR DR	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.64	0.00	2.37	13.76	17.19	17.25	18.66	19.41	21.79	21.23	22.13	22.65	25.15
67	51 ELM ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
68	MACARTHUR DR	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.03	0.00	2.96	14.00	17.42	17.27	18.66	19.57	21.78	21.37	22.27	22.78	25.28
69	MACARTHUR DR	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.19	0.00	4.13	14.98	18.32	18.24	19.45	20.55	22.56	22.35	23.25	23.76	26.25
70	MACARTHUR DR	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.66	0.00	2.58	13.82	17.39	17.13	18.52	19.44	21.67	21.26	22.16	22.67	25.17
71	249 MACARTHUR DR	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.23	13.27	12.82	14.20	15.15	17.48	17.04	17.94	18.50	21.03
72	1150 PURCHASE ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
73	E RODNEY FRENCH BLVD	New Bedford	3.71	4.70	5.67	8.08	8.54	9.16	10.01	11.86	12.94	14.01	14.67	16.61	17.09	18.23	19.64	21.06	20.86	21.95	22.85	24.66
74	BROCK AVE	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
75	71 PORTLAND ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
76	86 POPES ISLAND	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.42	14.10	16.69	17.81	19.19	20.31	23.35	22.08	23.06	24.78	26.72
77	E OF O C R R TRACK	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68	13.19	18.78	19.18	20.45	21.52	24.16	23.65	24.48	25.15	28.17
78	PEARL ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.63	20.07	20.88	22.04	23.08	25.11	24.66	25.40	26.03	29.57
79	532 ACUSHNET AVE	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.36	16.25	16.80	18.02	19.03	21.46	20.98	21.77	22.41	25.64
80	1204 PURCHASE ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69
81	519 W RODNEY FRENCH BLVD	New Bedford	0.00	0.66	1.66	3.96	4.36	5.27	5.99	8.28	8.79	9.78	10.67	12.79	13.37	14.57	15.57	17.41	16.86	17.88	18.84	20.63
82	BROCK AVE	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
83	235 BROCK AVE	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
84	190 POPE ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
85	38 WAMSUTTA ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.04	0.00	2.13	15.99	23.53	24.73	25.75	26.69	27.83	27.42	28.04	28.65	32.81
86	WAMSUTTA ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.54	0.00	3.61	17.45	25.00	26.38	27.22	28.16	29.30	28.89	29.51	30.13	34.29
87	352 HERMAN MELVILLE BLVD	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47	14.05	21.27	22.58	23.64	24.57	26.12	25.61	26.27	26.90	30.88
88	LOGAN ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.15	10.89	12.09	13.09	14.01	14.96	14.56	15.16	15.76	20.03
89	PURCHASE ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.18	2.11	3.10	2.81	3.43	4.04	8.17
90	PURCHASE ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
91	COGGESHALL ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.63	3.99	5.07	6.03	7.01	6.80	7.44	8.06	11.98
92	360 COGGESHALL ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.11	0.76	1.38	5.24
93	COGGESHALL ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.82	4.13	5.21	6.24	7.23	7.02	7.67	8.29	12.18
94	COGGESHALL ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.37	16.66	18.06	19.14	20.08	21.02	20.83	21.46	22.08	26.04
95	BELLEVILLE AVE	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.88	0.00	2.90	17.24	24.82	26.11	27.14	28.05	28.97	28.66	29.27	29.88	34.04
96	597 BROCK AVE	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
97	SAWYER ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.79	2.44	3.66	4.66	5.69	5.73	6.45	7.11	10.37
98	SAWYER ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	2.27	3.49	4.49	5.52	5.55	6.27	6.92	10.21
99	BEETLE ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.16	3.72	5.01	5.91	6.73	6.90	7.60	8.25	11.68
100	BELLEVILLE AVE	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.87	16.17	18.52	20.11	21.28	22.44	23.12	24.06	24.83	26.30
101	MAIN STREET	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
102	MILL ROAD	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	2.29	3.29	4.30	5.57	6.68	6.58	7.79	8.62	10.22
103	TABER STREET	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.49	0.00	1.35	15.11	20.73	22.89	24.00	24.99	26.61	26.47	27.07	27.53	31.09
104	MAIN STREET	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.06	1.97	2.80	2.70	3.30	3.52	5.83
105	MAIN STREET	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	1.22	2.10	2.98	2.84	3.44	3.67	5.98
106	NORTH STREET	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.69	5.21	6.31	7.23	8.74	7.97	8.58	8.85	11.13
107	SCHOOL STREET	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	2.72	2.13	2.83	4.82	6.26
108	CHERRY STREET	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.85	11.64	15.51	16.64	17.60	18.83	18.62	19.26	19.64	22.02
109	HUTTLESTON AVENUE	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36
110	PILGRIM AVENUE	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.71	0.00	3.53	16.26	20.65	25.14	26.28	27.24	28.55	28.31	28.96	29.38	31.75
111	ASH STREET	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.89	4.74	5.17	6.46	7.46	9.96	9.31	10.01	12.15	13.53
112	HUTTLESTON AVENUE	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.63	15.35	16.72	18.00	19.16	21.55	20.89	21.60	23.59	25.07
113	BRIDGE STREET	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.20	13.84	14.77	15.98	16.99	19.58	18.89	19.59	21.87	23.18
114	GREEN STREET	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.63	12.93	15.24	16.56	17.87	18.88	21.42	20.72	21.45	23.50	24.96
115	HUTTLESTON AVENUE	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
116	BRIDGE STREET	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.57	0.00	2.90	15.59	18.05	19.51	20.82	21.78	24.44	23.52	24.31	26.26	27.84
117	MCGANN TERRACE	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.73	0.57	1.27	2.32	4.13
118	BRYANT LANE	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.88
119	MCGANN TERRACE	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.28	3.67	4.96	5.87	7.73	7.77	8.47	9.20	11.14

Public Structures

Object	Location	Municipality	Category 1				Category 2				Category 3				Category 4				Category 4 Extreme			
Water Level Rise			0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft
120	WASHINGTON STREET	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.95	2.35	3.64	4.56	6.40	6.45	7.15	7.86	9.81
121	ARSENE STREET	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50
122	RAILROAD WAY	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.41	2.27	3.11	4.41	5.21	7.02	7.97	8.97	10.31	11.72	11.21	12.51	13.32	14.92
123	SPRING STREET	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.05	0.00	2.66	15.04	17.35	18.48	19.79	20.95	23.38	22.73	23.50	25.13	26.83
124	MIDDLE STREET	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.54	0.00	3.96	16.52	18.82	20.84	22.18	22.42	24.59	24.15	24.98	26.70	28.42
125	WASHINGTON STREET	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.24	13.55	14.91	16.44	17.11	19.57	18.90	19.65	21.09	22.89
126	SCONTICUT NECK ROAD	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
127	PLEASANT STREET	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.85	5.19	6.53	7.83	8.74	10.59	10.63	11.33	12.03	14.00
128	CENTER STREET	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.86	4.15	5.37	6.67	7.67	9.74	9.47	10.20	11.15	13.16
129	WILLIAM STREET	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.76	7.06	8.26	9.56	10.56	12.62	12.36	13.08	14.00	16.03
130	UNION WHARF	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.33	0.00	2.80	15.28	17.55	18.64	19.98	21.03	23.42	22.74	23.57	24.79	26.78
131	MAIN STREET	WOOD`S HOLE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.27	14.56	15.67	16.97	17.99	20.06	19.76	20.51	21.33	23.45
132	SOUTH STREET	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.44	11.74	12.98	14.28	15.18	17.26	16.97	17.68	18.41	20.55
133	ABBEY STREET	Fairhaven	3.26	4.23	5.23	7.56	8.16	8.93	9.86	11.93	12.50	13.66	14.35	16.75	18.04	19.27	20.11	21.95	21.88	22.65	23.38	25.13
134	MANHATTAN AVENUE	Fairhaven	0.00	0.36	1.22	3.52	4.19	4.89	5.70	7.89	8.71	9.79	10.48	12.49	13.53	14.72	15.60	17.39	17.08	17.91	18.89	20.58
135	BERNESE STREET	Fairhaven	0.00	0.48	1.43	3.72	4.38	5.08	5.88	8.08	8.73	9.98	10.68	12.59	13.49	14.68	15.69	17.58	17.09	18.08	18.99	20.78
136	DIAMOND STREET	Fairhaven	0.00	0.00	0.00	1.45	2.11	2.73	3.56	5.73	6.81	7.66	8.37	10.27	11.41	12.60	13.27	15.51	14.57	15.67	16.66	18.36
137	CAUSEWAY ROAD	Fairhaven	4.73	5.67	6.67	8.87	9.43	10.49	11.38	13.07	14.65	14.98	15.82	17.57	18.93	20.03	20.52	22.34	21.74	22.97	23.78	25.47
138	GOULART MEMORIAL DRIVE	Fairhaven	1.81	2.72	3.64	5.93	6.43	7.11	7.93	10.12	10.72	12.02	12.83	14.54	15.22	16.49	17.53	19.31	18.73	19.93	20.83	22.53
139	FIR STREET	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41
140	ARSENE WAY	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	2.10	1.65	2.87	3.69	5.29
141	ARSENE WAY	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	2.10	1.65	2.87	3.69	5.29
142	ARSENE WAY	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	2.10	1.65	2.87	3.69	5.29
143	ARSENE WAY	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	2.10	1.65	2.87	3.69	5.29
144	ARSENE WAY	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	2.10	1.65	2.87	3.69	5.29
145	ARSENE WAY	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	2.10	1.65	2.87	3.69	5.29
146	ARSENE WAY	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	2.10	1.65	2.87	3.69	5.29
147	ARSENE WAY	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	2.10	1.65	2.87	3.69	5.29
148	ARSENE WAY	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	2.10	1.65	2.87	3.69	5.29
149	ARSENE WAY	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	2.10	1.65	2.87	3.69	5.29
150	ARSENE WAY	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	2.10	1.65	2.87	3.69	5.29
151	ARSENE WAY	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	2.10	1.65	2.87	3.69	5.29
152	ARSENE WAY	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	2.10	1.65	2.87	3.69	5.29
153	ARSENE WAY	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	2.10	1.65	2.87	3.69	5.29
154	ARSENE WAY	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	2.10	1.65	2.87	3.69	5.29
155	ARSENE WAY	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	2.10	1.65	2.87	3.69	5.29
156	ARSENE WAY	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	2.10	1.65	2.87	3.69	5.29
157	ARSENE WAY	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	2.10	1.65	2.87	3.69	5.29
158	ARSENE WAY	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	2.10	1.65	2.87	3.69	5.29
159	ARSENE WAY	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	2.10	1.65	2.87	3.69	5.29
160	ARSENE WAY	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	2.10	1.65	2.87	3.69	5.29
161	ARSENE WAY	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	2.10	1.65	2.87	3.69	5.29
162	ARSENE WAY	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	2.10	1.65	2.87	3.69	5.29
163	ARSENE WAY	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	2.10	1.65	2.87	3.69	5.29
164	ARSENE WAY	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	2.10	1.65	2.87	3.69	5.29
165	ARSENE WAY	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	2.10	1.65	2.87	3.69	5.29
166	ARSENE WAY	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	2.10	1.65	2.87	3.69	5.29
167	ARSENE WAY	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	2.10	1.65	2.87	3.69	5.29
168		Acushnet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
169		Acushnet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.96	2.91	3.78	5.21	6.35	7.44	8.09	9.11
170		Acushnet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.81	8.52	10.66	11.19	11.86	13.26	13.89	15.07	15.76	16.92
171		Acushnet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.98	18.55	20.77	21.40	22.09	23.58	24.31	25.49	26.16	27.21
172		Acushnet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.11	12.70	15.21	16.14	16.94	18.40	19.70	20.84	21.49	22.21
173		Acushnet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.17	1.87	1.88
174		Acushnet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.20	1.90	1.92
175		Acushnet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

State Owned Structures

Object ID	Structure Name	Municipality	Category 1				Category 2				Category 3				Category 4				Category 4 Extreme			
Water Level Rise			0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft
1	FT12-Fire Sighting Tower	Acushnet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Telecommunication Building	Acushnet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	West Island State Reservation	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Pavilion	Fairhaven	0.00	0.07	0.88	2.25	2.91	4.32	4.59	6.78	7.27	8.56	8.97	11.42	12.32	14.42	14.62	16.47	16.22	17.12	17.82	19.52
5	Maintenance / Concession Stand	Fairhaven	0.97	2.83	3.97	5.27	5.79	7.27	7.45	9.66	10.25	11.29	11.67	14.38	15.20	17.38	17.58	19.20	19.17	20.07	20.78	22.48
6	Bathhouse	Fairhaven	0.97	2.83	3.97	5.27	5.79	7.27	7.45	9.66	10.25	11.29	11.67	14.38	15.20	17.38	17.58	19.20	19.17	20.07	20.78	22.48
7	Contact Station	Fairhaven	0.00	0.00	0.00	0.00	0.00	0.63	0.86	3.16	3.41	4.59	5.02	7.91	8.52	10.91	10.82	12.81	12.71	13.61	14.31	16.01
8	Skating Rink	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	Sign	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	Career Center (New Bedford)	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	LGR Region V (Brockton)	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	Shed	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.44	0.26	12.03	14.21	15.38	17.48	17.59	19.83	19.47	20.37	20.89	23.33
13	Salt/Sand Storage #6-285	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	Snow/Ice Trailer	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	Armory/Garage	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	Probate Court	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	West Purchase Street Bldg	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	East Purchase Street Bldg	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	Marine Science Lab (CMAST)	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	1.41	2.28	4.17	4.83	6.79	7.09	8.94	8.34	9.39	10.34	12.16
20	Pump House	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	Pier Building 1	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.01	12.38	13.47	15.67	15.78	17.97	17.56	18.46	18.98	21.47
22	Pier Building 2	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.45	13.75	14.84	17.04	17.15	19.37	18.96	19.86	20.36	22.86
23		New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.85	1.24	2.32	3.23	5.06
24	Basketball Court	Fairhaven	0.00	0.00	0.00	0.16	0.73	2.17	2.37	4.57	5.16	6.24	6.69	9.29	10.16	12.26	12.49	14.16	14.06	14.96	15.70	17.40
25	Tennis Court(s)	Fairhaven	0.00	0.00	0.00	0.34	0.91	2.36	2.57	4.77	5.28	6.40	6.91	9.51	10.32	12.51	12.71	14.32	14.22	15.12	15.91	17.62
26	Asphalt Paving	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	Asphalt Paving	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	Fence	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	Asphalt Paving	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	Jail	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	Asphalt Paving	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.85	8.06	8.37	9.31	10.84	11.75	13.84	13.95	15.55	15.57	16.35	17.15	18.94
32	Asphalt Paving	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.58	8.70	9.17	9.97	11.48	12.46	14.48	14.59	16.19	16.16	17.06	17.79	19.58
33	Asphalt Paving	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.52	0.00	2.28	14.55	16.82	17.98	20.18	20.31	22.72	22.51	23.14	23.67	26.19

Coastal Protection Structures

Municipality	Location	Primary Type	Property Type	Category 1				Category 2				Category 3				Category 4				Category 4 Extreme			
Water Level Rise				0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft
Fairhaven	Goulart Memorial Drive	Bulkhead/ Seawall	Public	5.88	6.81	7.76	10.03	10.52	11.74	12.59	14.21	15.37	16.11	16.93	18.66	19.89	21.08	21.63	23.92	22.83	24.04	24.91	26.61
Fairhaven	Goulart Memorial Drive	Bulkhead/ Seawall	Public	7.19	8.12	9.07	11.35	11.83	12.56	13.48	15.53	16.19	17.43	18.24	19.97	20.70	21.90	22.94	24.74	24.14	25.35	26.23	27.93
Fairhaven	Goulart Memorial Drive	Revetment	Public	3.30	4.20	5.11	7.41	7.91	9.00	9.41	11.61	12.60	13.50	14.30	16.01	16.71	18.00	19.01	20.81	20.21	21.41	22.31	24.01
Fairhaven	Goulart Memorial Drive	Revetment	Public	2.24	3.14	4.04	6.34	6.84	7.68	8.35	10.54	11.28	12.44	13.24	14.95	15.65	16.94	17.94	19.74	19.14	20.34	21.24	22.94
Fairhaven	Shore Drive	Groin/ Jetty	Public	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fairhaven	Shore Drive	Revetment	Public	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fairhaven	Little Bay/Nashetucket River	Groin/ Jetty	Public	7.57	8.57	9.48	11.39	12.20	13.02	13.74	16.00	16.79	17.81	18.52	20.50	21.60	22.77	23.62	25.66	24.96	25.91	26.97	28.58
New Bedford	Fort Rodman	Revetment	Public	0.00	0.00	0.00	0.00	0.00	0.04	0.00	2.83	3.54	3.88	4.68	6.38	6.98	9.03	9.48	12.34	10.68	11.68	12.58	14.58
New Bedford	West Rodney French Boulevard	Bulkhead/ Seawall	Public	1.50	1.19	2.19	5.82	6.24	5.63	6.42	10.00	9.35	11.73	12.61	14.88	14.33	15.30	17.60	18.02	18.95	19.96	20.88	22.62
New Bedford	South Pier	Bulkhead/ Seawall	Public	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
New Bedford	Fisherman's Wharf	Bulkhead/ Seawall	Public	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.56	7.71	19.01	22.33	22.31	23.70	24.61	0.00	26.41	27.31	27.83	30.32
New Bedford	State Pier	Bulkhead/ Seawall	Public	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.98	0.00	2.88	13.73	16.64	17.07	18.47	19.37	21.57	21.18	22.08	22.59	25.08
New Bedford	Coal Pocket Pier	Bulkhead/ Seawall	Public	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.68	4.04	7.96	17.65	20.30	22.71	22.19	23.26	27.21	25.06	25.96	26.47	28.97
New Bedford	Homer's Wharf	Bulkhead/ Seawall	Public	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
New Bedford	Between Leonard's Wharf and Homer's Wharf	Bulkhead/ Seawall	Public	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.61	1.44	5.27	14.98	17.41	22.70	24.10	20.63	27.20	22.43	23.33	23.83	26.32
New Bedford	Leonard's Wharf	Bulkhead/ Seawall	Public	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
New Bedford	North Terminal Bulkhead	Bulkhead/ Seawall	Public	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
New Bedford	North Terminal Bulkhead	Bulkhead/ Seawall	Public	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.58	0.00	7.75	19.83	25.22	0.00	27.86	29.10	32.42	31.84	32.71	33.41	36.35
New Bedford	North Terminal Bulkhead	Bulkhead/ Seawall	Public	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
New Bedford	Gifford Street	Revetment	Public	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.97	10.50	12.45	16.29	18.29	19.22	20.54	21.45	23.09	23.01	23.91	24.68	26.45
New Bedford	West Rodney French Boulevard	Bulkhead/ Seawall	Public	0.00	0.89	1.90	4.17	4.66	5.44	6.38	8.59	9.46	10.30	11.16	13.30	14.09	15.02	15.97	17.66	17.36	18.34	19.23	20.97
New Bedford	East Rodney French Boulevard	Groin/ Jetty	Public	8.04	9.02	9.98	12.42	12.91	13.52	14.40	16.62	16.89	18.40	19.00	21.03	21.83	22.98	24.01	25.49	25.27	26.34	27.24	29.04
New Bedford	West Rodney French Boulevard	Groin/ Jetty	Public	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
New Bedford	West Rodney French Boulevard	Groin/ Jetty	Public	5.43	7.71	8.71	9.86	10.37	12.27	13.25	14.34	15.58	16.05	16.90	18.99	21.02	21.86	21.67	23.35	23.07	24.04	24.92	26.67
New Bedford	West Rodney French Boulevard	Groin/ Jetty	Public	0.00	0.00	0.00	0.00	0.00	0.00	9.60	11.84	12.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
New Bedford	East Rodney French Boulevard	Revetment	Public	4.25	5.52	6.44	8.65	9.15	10.12	10.94	12.96	14.09	14.66	15.21	17.40	18.26	19.78	20.53	22.43	21.93	22.86	23.76	25.53
New Bedford	East Rodney French Boulevard	Bulkhead/ Seawall	Public	2.17	3.17	0.49	6.57	7.07	7.75	8.57	10.85	11.37	12.57	13.10	15.25	16.02	17.25	18.33	20.01	19.69	20.65	21.55	23.34
New Bedford	West Rodney French Boulevard	Bulkhead/ Seawall	Public	7.05	8.17	8.53	11.45	11.93	12.05	12.99	15.19	16.46	17.56	18.42	20.61	21.23	21.68	23.25	24.30	24.63	25.62	26.51	28.26
New Bedford	West Rodney French Boulevard	Bulkhead/ Seawall	Public	1.52	2.65	3.65	5.92	6.41	7.18	8.12	10.33	11.22	12.05	12.91	15.07	15.90	16.78	17.72	19.42	19.11	20.09	20.98	22.72
New Bedford	West Rodney French Boulevard	Bulkhead/ Seawall	Public	5.77	6.98	7.98	10.23	10.76	11.57	12.60	14.80	15.76	16.48	17.33	19.30	20.17	21.12	22.05	23.72	23.47	24.43	25.30	27.05
New Bedford	West Rodney French Boulevard	Bulkhead/ Seawall	Public	0.86	1.78	2.86	5.16	5.56	6.19	6.91	9.20	9.81	10.98	11.88	14.00	14.59	15.70	16.77	19.76	18.07	19.09	20.05	21.84
New Bedford	East Rodney French Boulevard	Groin/ Jetty	Public	4.34	4.06	6.26	8.66	9.06	8.40	10.48	12.77	11.93	14.48	15.26	17.01	18.02	19.21	20.24	22.07	21.44	22.52	23.42	25.27
New Bedford	East Rodney French Boulevard	Groin/ Jetty	Public	3.63	4.84	5.57	7.98	8.43	9.03	9.39	12.13	12.87	13.88	14.57	16.44	17.31	18.50	19.53	20.88	20.75	21.83	22.73	24.57
New Bedford	West Rodney French Boulevard	Bulkhead/ Seawall	Public	6.03	7.03	8.45	10.34	10.74	11.44	12.17	14.45	14.59	16.16	17.06	19.19	19.80	20.97	21.97	23.80	23.27	24.28	25.24	27.03
New Bedford	West Rodney French Boulevard	Revetment	Public	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
New Bedford	East Rodney French Boulevard	Bulkhead/ Seawall	Public	1.94	3.13	3.89	6.29	6.74	7.54	8.18	10.44	11.14	12.18	12.89	14.76	15.69	16.84	17.86	19.69	19.08	20.16	21.06	22.89
New Bedford	East Rodney French Boulevard	Bulkhead/ Seawall	Public	0.00	0.13	1.06	3.61	4.03	4.49	5.49	7.58	8.00	9.45	10.21	12.00	12.92	14.04	15.24	16.90	16.44	17.53	18.43	20.25
New Bedford	West Rodney French Boulevard	Revetment	Public	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
New Bedford	Fort Rodman	Revetment	Public	4.68	5.68	6.58	8.98	9.38	9.98	10.78	13.08	13.49	14.78	15.59	17.29	17.89	19.28	20.39	22.29	21.59	22.59	23.49	25.49
New Bedford	Fort Rodman	Groin/ Jetty	Public	8.01	9.00	9.91	12.31	12.71	13.30	14.11	16.41	16.81	18.11	18.91	20.61	21.21	22.61	23.71	25.61	24.91	25.91	26.81	28.81
New Bedford	Merchant Mariner Memorial Walkway	Groin/ Jetty	Public	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
New Bedford	Fort Rodman	Groin/ Jetty	Public	6.14	7.48	8.04	10.44	10.84	11.44	12.24	14.54	15.29	16.24	17.04	18.75	20.13	21.46	21.89	23.78	23.10	24.12	25.02	26.98
New Bedford	West Rodney French Boulevard	Revetment	Public	0.37	1.37	1.97	4.68	5.07	5.77	6.48	8.38	8.88	10.48	11.37	13.44	13.98	15.21	16.22	18.09	17.50	18.52	19.49	21.30
Fairhaven	Fort Phoenix Beach	Coastal Beach	Public	3.87	4.79	5.98	8.17	8.74	9.74	10.34	12.55	13.32	14.24	14.73	17.30	18.21	19.70	20.49	22.21	22.10	22.99	23.70	25.41
Fairhaven	Fort Phoenix	Groin/ Jetty	Public	8.24	8.86	9.86	12.54	13.13	0.00	14.70	16.61	0.00	18.60	19.12	21.67	22.59	23.88	24.87	26.59	26.47	27.36	28.09	29.80
Fairhaven	Fort Phoenix Beach	Bulkhead/ Seawall	Public	0.63	1.25	2.37	4.93	5.49	6.31	7.11	8.99	9.61	11.01	11.47	14.07	14.68	16.09	17.27	18.68	18.87	19.77	20.47	22.17
Fairhaven	Steamship Authority Warehouses	Bulkhead/ Seawall	Public	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.30	0.00	1.87	14.25	16.55	17.82	19.12	19.98	22.19	21.75	22.49	23.29	25.42
Fairhaven	Union Wharf	Bulkhead/ Seawall	Public	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fairhaven	Main Street/Church Street	Bulkhead/ Seawall	Public	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.20	0.00	2.80	15.16	17.46	18.57	19.86	20.87	22.78	22.67	23.37	23.99	26.18
Fairhaven	Pease Park	Bulkhead/ Seawall	Public	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.48	0.92	6.23	18.88	21.17	20.80	22.33	24.76	25.93	26.46	27.33	29.17	30.88
Fairhaven	Route 6	Bulkhead/ Seawall	Public	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.12	0.00	3.52	16.26	18.78	20.73	22.04	23.16	25.70	24.78	25.62	27.30	29.10
Fairhaven	Pilgrim Avenue	Bulkhead/ Seawall	Public	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.14	0.54	4.79	17.49	21.99	26.50	27.45	28.42	29.96	29.52	30.18	30.61	32.99
Fairhaven	Hedge Street	Bulkhead/ Seawall	Public	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.58	0.07	5.50	19.08	24.62	27.01	28.14	29.14	30.76	30.55	31.19	31.61	34.75
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	2.41	3.08	4.01	6.64	6.98	7.70	8.60	10.71	11.28	12.48	13.31	15.07	15.65	16.56	17.98	19.81	19.18	20.25	21.25	22.98
FAIRHAVEN		Groin/Jetty	Private	5.90	6.94	7.86	10.12	10.47	11.19	12.09	14.24	14.77	15.97	16.80	18.56	19.19	20.42	21.47	23.34	22.67	23.74	24.74	26.47
FAIRHAVEN		Groin/Jetty	Private	5.91	6.99	7.93	10.14	10.47	11.20	12.10	14.30	14.77	15.97	16.80	18.56	19.23	0.00	21.47	23.39	22.67	23.74	24.73	26.47
FAIRHAVEN		Revetment	Private	0.00	0.49	1.44	3.74	4.06	5.07	5.70	7.80	8.63	9.56	10.40	12.15	12.72	13.96	15.06	16.90	16.26	17.32	18.31	20.06
FAIRHAVEN		Revetment	Private	0.55	1.31	2.27	4.80	5.10	5.57	6.48	8.79	9.13	10.59	11.45	13.19	13.52	14.77	16.09	17.89	17.29	18.34	19.34	21.10
FAIRHAVEN		Bulkhead/Seawall	Private	3.28	4.27	5.22	7.53	7.83	8.79	9.69	11.58	12.34	13.33	14.18	15.92	16.49	17.73	18.83	20.68	20.03	21.08	22.08	23.83
FAIRHAVEN		Revetment	Private	1.81	2.66	3.62	6.06	6.36	6.96	7.86	10.02	10.51	11.85	12.71	14.44	14.86	16.11	17.35	19.12	18.55	19.60	20.59	22.35
FAIRHAVEN		Revetment	Private	2.74	3.72	4.70	7.00	7.28	8.03	8.93	11.04	11.57	12.77	13.64	15.36	15.91	17.18	18.27	20.14	19.47	20.50	21.50	23.28

Coastal Protection Structures

Municipality	Location	Primary Type	Property Type	Category 1				Category 2				Category 3				Category 4				Category 4 Extreme			
Water Level Rise				0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft
FAIRHAVEN		Revetment	Private	4.07	4.90	5.89	8.35	8.61	9.21	10.11	12.37	12.74	14.10	14.97	16.70	17.08	18.36	19.61	21.48	20.81	21.84	22.84	24.61
FAIRHAVEN		Bulkhead/Seawall	Private	0.60	1.36	2.35	4.87	5.13	5.68	6.79	8.90	10.14	10.63	11.50	13.22	14.59	15.76	16.14	18.83	17.34	18.37	19.37	21.15
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	5.75	0.00	0.00	10.02	10.28	0.00	0.00	14.05	14.70	15.78	16.65	18.38	0.00	20.32	21.30	23.17	22.50	23.53	24.52	26.30
FAIRHAVEN		Groin/Jetty	Private	5.96	6.94	7.92	10.23	10.49	11.25	12.15	14.26	14.79	15.98	16.86	18.58	19.14	20.42	21.50	23.38	22.70	23.73	24.73	26.50
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	5.64	0.00	0.00	9.92	10.17	0.00	11.84	13.94	14.47	15.67	16.54	18.27	18.81	0.00	21.18	23.06	22.38	23.41	24.41	26.19
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.56	2.52	2.79	3.55	4.45	6.90	7.43	8.29	9.15	10.88	11.79	13.07	13.80	16.02	15.00	16.04	17.04	18.81
FAIRHAVEN		Bulkhead/Seawall	Private	1.42	0.00	0.36	5.68	5.97	6.72	7.61	6.71	7.25	11.46	12.32	14.06	11.62	12.90	16.99	15.84	18.19	19.23	20.23	21.99
FAIRHAVEN		Bulkhead/Seawall	Private	1.21	2.16	3.15	5.46	5.78	8.33	7.41	9.51	10.07	11.27	12.11	13.87	14.47	15.76	16.82	18.66	18.02	19.07	20.07	21.82
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	7.18	7.67	8.66	11.42	11.75	12.45	13.37	15.02	15.59	17.24	18.08	19.84	19.99	21.28	22.79	24.18	23.99	25.05	26.05	27.80
FAIRHAVEN		Groin/Jetty	Private	7.04	7.99	8.97	11.28	11.60	12.34	13.23	15.34	15.90	17.10	17.94	19.70	20.30	21.59	22.65	24.49	23.85	24.90	25.90	27.66
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.05	2.57	6.65	19.01	21.31	22.42	23.72	24.73	26.66	26.52	27.23	27.89	30.06
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.28	2.78	6.82	19.23	21.51	22.61	23.93	24.96	27.14	26.71	27.49	28.45	30.52
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.85	16.34	18.61	20.85	22.19	22.10	24.54	23.80	24.65	25.92	27.89
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.84	3.24	7.29	19.82	22.08	23.16	24.45	25.57	28.09	27.26	28.13	29.50	31.44
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.42	1.86	5.80	18.44	20.68	21.75	23.12	24.19	26.95	25.85	26.77	28.39	30.27
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Revetment	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.31	0.00	5.38	17.95	20.25	22.81	24.14	23.85	0.00	25.58	26.40	28.12	29.84
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.56	0.00	2.26	14.86	17.14	19.02	20.36	20.72	24.07	22.42	23.28	25.00	26.76
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.00	0.97	13.61	15.87	17.33	18.36	19.43	22.47	21.11	22.01	23.72	25.51
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.83	1.22	6.23	18.79	21.06	22.18	23.53	24.59	27.18	26.28	27.15	28.69	30.55
FAIRHAVEN		Revetment	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.64	0.00	3.89	16.59	18.87	20.17	21.53	22.49	25.39	24.17	25.06	26.95	28.66
FAIRHAVEN		Revetment	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.22	0.63	4.57	17.31	19.63	20.45	22.32	23.39	26.19	25.04	25.95	27.79	29.55
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.59	19.31	21.60	0.00	0.00	25.26	0.00	26.91	27.83	29.70	31.44
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.30	1.74	5.70	18.45	20.83	22.39	23.74	24.83	27.61	26.44	27.36	29.11	30.95
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.22	2.62	6.59	19.34	21.78	20.28	24.84	25.92	28.64	27.53	28.44	30.14	31.99
NEW BEDFORD		Revetment	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.13	1.51	5.32	18.01	20.57	20.97	22.35	24.20	27.23	25.95	26.93	28.67	30.59
NEW BEDFORD		Revetment	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.78	1.45	5.75	18.18	21.58	21.78	22.73	25.19	28.26	27.29	28.24	29.52	31.76
NEW BEDFORD		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NEW BEDFORD		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.11	0.53	3.74	15.71	19.78	21.29	22.65	22.40	26.36	24.52	25.43	26.12	28.65
NEW BEDFORD		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.64	0.00	2.53	14.36	18.22	18.33	19.70	20.69	23.77	22.70	23.60	24.23	26.75
NEW BEDFORD		Revetment	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.96	2.92	6.88	18.63	22.57	22.51	23.89	24.87	27.77	26.85	27.76	28.36	30.89
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.50	6.76	8.55	12.86	15.35	16.83	17.91	18.61	20.68	20.28	21.12	21.79	23.66
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Revetment	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.58	9.10	12.06	17.80	20.26	22.00	23.30	23.55	25.34	25.24	26.05	26.71	28.64
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.23	6.57	12.00	19.03	21.45	19.78	21.07	24.77	23.89	26.48	27.27	27.92	29.90
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.86	9.43	9.25	15.57	18.02	21.80	23.09	21.32	25.90	23.02	23.82	24.48	26.42
FAIRHAVEN		Revetment	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.67	4.72	7.72	15.69	18.09	19.16	20.38	21.42	23.29	23.15	23.92	24.57	26.58
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.78	4.27	8.80	18.32	20.68	20.57	21.87	24.04	24.72	25.79	26.54	27.17	29.25
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.46	0.00	0.00	0.00	0.00	22.51	23.81	0.00	26.65	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.26	0.93	4.75	16.02	18.34	19.66	20.85	21.73	23.84	23.51	24.23	24.84	26.99
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.38	1.04	3.91	15.83	18.14	20.35	21.65	21.54	25.56	23.33	24.04	24.65	26.83
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.73	1.56	5.42	16.84	19.16	21.12	22.22	22.55	25.30	24.34	25.05	25.67	27.82
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.75	2.41	6.33	18.29	20.60	21.74	23.04	24.00	25.94	25.79	26.50	27.11	29.29
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.40	1.51	5.04	17.03	19.34	20.57	21.86	22.74	24.60	24.53	25.24	25.85	28.03
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.90	0.00	4.08	16.18	18.49	19.03	20.40	21.89	23.23	23.68	24.39	25.00	27.18
FAIRHAVEN		Revetment	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.55	0.00	3.16	15.46	17.76	18.86	20.16	21.16	23.07	22.96	23.66	24.27	26.46
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.07	0.22	4.31	16.66	18.96	19.62	20.91	22.36	23.60	24.16	24.86	25.47	27.66
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.21	0.00	6.81	19.17	21.47	0.00	0.00	24.87	26.77	26.67	27.37	27.98	30.17
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	6.53	7.48	8.47	10.78	11.09	12.28	12.72	14.83	15.84	16.58	17.43	19.18	19.77	21.06	22.12	23.97	23.32	24.37	25.37	27.13
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Coastal Protection Structures

Municipality	Location	Primary Type	Property Type	Category 1				Category 2				Category 3				Category 4				Category 4 Extreme			
Water Level Rise				0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft
FAIRHAVEN		Groin/Jetty	Private	5.81	6.78	7.76	10.07	10.36	11.11	12.00	14.11	14.65	15.85	16.71	18.45	19.02	20.30	21.38	23.24	22.58	23.62	24.62	26.39
FAIRHAVEN		Revetment	Private	3.67	4.37	5.36	7.91	8.25	9.15	10.05	11.98	12.31	13.74	14.58	16.34	16.58	18.02	19.30	20.90	20.50	21.57	22.57	24.31
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	4.86	5.77	6.76	9.07	9.46	10.16	11.05	13.16	13.13	14.95	15.76	17.55	17.83	19.54	20.55	21.74	21.75	22.84	23.84	25.56
FAIRHAVEN		Bulkhead/Seawall	Private	3.10	4.01	5.00	7.31	7.70	8.40	9.29	11.41	11.99	13.19	14.00	15.79	16.48	17.78	18.79	20.60	19.99	21.08	22.08	23.80
FAIRHAVEN		Bulkhead/Seawall	Private	5.02	5.92	6.92	9.23	9.62	10.32	11.21	13.32	13.91	15.11	15.92	17.71	18.40	19.70	20.71	22.52	21.91	23.00	24.00	25.72
FAIRHAVEN		Bulkhead/Seawall	Private	3.61	4.52	5.52	7.82	8.21	8.91	9.81	11.92	12.51	13.71	14.52	16.31	17.00	18.30	19.31	21.12	20.51	21.61	22.61	24.32
FAIRHAVEN		Bulkhead/Seawall	Private	3.73	4.97	5.97	7.93	8.33	9.37	9.92	12.03	12.97	13.82	14.63	16.42	17.12	18.41	19.42	21.57	20.62	21.72	22.72	24.43
FAIRHAVEN		Bulkhead/Seawall	Private	3.82	4.73	5.73	8.03	8.43	9.17	10.02	12.13	12.72	13.92	14.73	16.52	17.22	18.52	19.52	21.33	20.72	21.82	22.82	24.53
FAIRHAVEN		Bulkhead/Seawall	Private	4.34	5.18	6.11	8.55	8.95	9.65	10.47	12.51	13.10	14.44	15.25	17.04	17.60	18.89	20.04	21.71	21.24	22.34	23.34	25.05
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.86	3.00	3.47	4.09	4.91	7.42	6.60	8.89	9.70	11.49	12.26	13.49	14.57	16.38	15.77	16.86	17.86	19.65
FAIRHAVEN		Revetment	Private	0.00	0.00	0.26	2.65	3.12	3.74	8.63	10.91	6.07	8.54	9.34	11.14	10.65	11.87	14.22	16.03	15.42	16.51	17.51	19.31
FAIRHAVEN		Groin/Jetty	Private	8.28	7.82	9.32	12.58	13.05	13.67	14.31	16.59	15.82	18.47	19.27	21.07	21.67	22.89	24.15	25.79	25.35	26.44	27.44	29.24
NEW BED-FORD		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.78	0.00	0.00	0.00	0.00
NEW BED-FORD		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.38	0.00	3.32	14.90	18.82	18.58	19.96	20.92	23.30	22.85	23.75	24.32	26.84
NEW BED-FORD		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NEW BED-FORD		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.75	0.72	4.60	14.68	17.02	18.49	19.62	20.35	22.67	22.12	23.02	23.56	25.96
NEW BED-FORD		Revetment	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.39	1.09	5.46	16.02	18.31	19.37	21.64	21.68	23.63	23.39	24.29	24.90	27.08
NEW BED-FORD		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.22	0.00	4.33	14.86	17.12	18.19	19.06	20.49	22.36	22.17	23.07	23.71	25.79
NEW BED-FORD		Revetment	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.98	0.30	5.08	16.33	18.61	19.63	21.02	21.93	23.58	23.54	24.44	25.14	26.99
NEW BED-FORD		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.76	0.00	3.92	13.97	16.23	17.26	18.64	19.51	21.23	21.10	22.00	22.72	24.51
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	8.45	9.35	10.33	12.62	13.30	13.13	0.00	0.00	16.83	18.90	19.60	21.51	21.95	0.00	24.61	0.00	26.01	27.01	27.91	29.71
FAIRHAVEN		Bulkhead/Seawall	Private	4.81	7.50	8.47	8.96	9.65	10.34	11.15	13.35	15.84	15.25	15.95	17.85	18.75	19.95	20.95	22.85	22.35	23.35	24.25	26.05
FAIRHAVEN		Revetment	Private	3.14	4.03	4.99	7.26	7.94	8.63	9.44	11.64	12.34	13.54	14.24	16.14	17.04	18.45	19.24	21.14	20.64	21.64	22.54	24.34
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Revetment	Private	2.99	3.87	4.83	7.10	7.77	8.43	9.49	11.69	12.13	13.36	14.06	15.97	17.10	18.24	19.07	21.19	20.48	21.47	22.37	24.17
FAIRHAVEN		Groin/Jetty	Private	8.10	8.84	9.80	12.21	12.88	13.58	14.38	16.58	17.13	18.48	19.18	21.09	21.99	23.18	24.19	26.08	25.60	26.58	27.49	29.28
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	11.90	0.00	0.00	16.10	0.00	0.00	0.00	0.00	21.51	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	7.75	8.63	9.59	11.83	12.49	13.19	13.99	16.19	16.89	18.09	18.79	20.70	21.59	22.79	23.80	25.69	25.20	26.19	27.10	28.89
FAIRHAVEN		Bulkhead/Seawall	Private	8.86	9.19	10.69	12.92	13.58	14.27	15.07	16.73	17.97	19.18	19.87	21.78	22.68	23.88	24.88	26.23	26.29	27.28	28.18	29.98
FAIRHAVEN		Groin/Jetty	Private	6.94	7.81	8.76	10.99	11.64	12.33	13.14	15.34	16.04	17.24	17.94	19.85	0.00	21.94	22.95	24.84	24.35	25.34	26.25	28.04
FAIRHAVEN		Bulkhead/Seawall	Private	5.79	6.66	7.61	9.83	10.47	11.17	11.97	14.17	14.82	16.07	16.77	18.68	19.58	20.77	21.78	23.67	23.19	24.17	25.08	26.87
FAIRHAVEN		Groin/Jetty	Private	7.75	8.02	9.56	11.77	12.42	13.43	14.24	15.84	16.82	18.02	18.72	20.63	21.84	23.04	23.73	25.94	25.13	26.12	27.03	28.82
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Revetment	Private	3.54	4.41	5.53	7.56	8.20	9.07	9.70	11.90	12.77	13.80	14.50	16.41	17.31	18.68	19.51	21.40	20.92	21.90	22.81	24.60
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Revetment	Private	3.38	4.79	5.77	7.34	8.02	9.31	9.51	12.32	13.02	13.62	14.32	16.28	17.78	18.37	19.38	21.83	20.83	21.72	22.68	24.42
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	8.12	8.98	9.60	12.12	12.77	13.14	13.94	16.47	16.84	18.37	19.07	20.98	21.88	22.75	24.08	25.97	25.50	26.47	27.39	29.17
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Coastal Protection Structures

Municipality	Location	Primary Type	Property Type	Category 1				Category 2				Category 3				Category 4				Category 4 Extreme			
Water Level Rise				0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Revetment	Private	4.08	4.95	5.91	8.13	8.80	9.34	10.32	12.50	13.20	14.41	15.11	17.10	17.90	19.20	20.21	21.90	21.70	22.51	23.51	25.21
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	13.70	14.50	16.70	17.40	0.00	0.00	0.00	22.20	23.40	0.00	26.20	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	5.71	6.62	8.31	9.93	10.60	11.30	12.80	14.31	15.69	16.20	16.90	18.90	20.50	21.70	22.01	24.50	23.50	24.31	25.31	27.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Revetment	Private	1.77	2.70	3.70	6.05	6.73	7.64	8.28	10.49	11.31	12.32	12.94	15.04	16.18	17.18	18.17	20.15	19.66	20.53	21.45	23.13
FAIRHAVEN		Bulkhead/Seawall	Private	3.47	4.40	5.39	7.75	8.43	10.49	11.34	12.14	12.80	14.01	14.63	16.75	17.70	18.90	19.89	21.66	21.39	22.25	23.16	24.83
FAIRHAVEN		Groin/Jetty	Private	7.70	8.62	9.62	11.98	12.66	13.38	14.24	16.53	17.03	18.24	18.83	20.99	21.88	23.08	24.14	25.91	25.67	26.53	27.42	29.08
FAIRHAVEN		Groin/Jetty	Private	8.37	9.30	10.30	12.68	13.36	13.92	14.80	17.08	17.56	18.92	19.47	21.70	22.70	23.91	24.86	26.64	26.44	27.28	28.15	29.80
FAIRHAVEN		Revetment	Private	2.70	3.16	4.84	7.00	7.71	8.40	10.07	11.63	12.00	13.20	13.71	16.11	17.21	18.40	19.31	21.11	21.01	21.81	22.61	24.22
FAIRHAVEN		Revetment	Private	2.65	3.57	4.56	6.96	7.63	8.34	9.24	11.35	11.94	13.14	13.65	16.06	17.15	18.35	19.26	21.06	20.95	21.76	22.55	24.18
FAIRHAVEN		Bulkhead/Seawall	Private	4.12	6.08	7.02	8.13	8.77	10.56	11.36	13.57	14.26	14.37	15.07	16.98	18.97	20.17	20.08	23.07	21.49	22.47	23.38	25.17
FAIRHAVEN		Revetment	Private	2.26	3.13	4.07	6.27	6.91	7.81	8.41	10.61	11.52	12.51	13.21	15.13	16.02	17.43	18.22	20.11	19.63	20.61	21.53	23.31
FAIRHAVEN		Revetment	Private	4.22	5.08	6.02	8.20	8.87	9.56	10.36	12.57	13.68	14.47	15.17	17.11	18.01	19.20	20.21	22.07	21.64	22.57	23.51	25.27
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	2.11	2.48	3.46	6.40	6.91	6.98	7.78	10.38	10.64	12.51	13.23	15.11	15.31	16.55	18.19	20.01	19.46	20.51	21.51	23.29
FAIRHAVEN		Bulkhead/Seawall	Private	1.27	2.27	3.64	5.57	6.08	6.75	7.56	9.85	10.43	11.68	12.40	14.28	15.08	16.33	17.36	19.18	18.64	19.68	20.68	22.46
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	8.58	9.57	0.00	12.87	13.38	0.00	14.95	17.24	17.71	18.99	19.70	21.59	22.39	23.66	24.67	26.49	25.96	26.99	27.99	29.77
FAIRHAVEN		Bulkhead/Seawall	Private	5.38	6.21	7.58	9.67	10.18	10.86	11.89	14.19	14.37	15.79	16.50	18.39	18.69	19.95	21.47	23.29	22.75	23.79	24.79	26.57
FAIRHAVEN		Bulkhead/Seawall	Private	6.64	7.63	8.62	10.93	11.44	12.13	12.93	15.23	15.79	17.06	17.77	19.66	20.46	21.73	22.74	24.57	24.04	25.07	26.06	27.84
FAIRHAVEN		Bulkhead/Seawall	Private	6.11	8.23	9.37	10.41	10.92	11.60	12.41	14.70	16.54	16.54	17.25	19.14	19.95	21.21	22.22	24.05	23.52	24.55	25.54	27.32
FAIRHAVEN		Revetment	Private	4.06	5.06	6.05	8.36	8.88	9.57	10.38	12.67	13.24	14.51	15.21	17.11	17.91	19.18	20.19	22.01	21.49	22.51	23.51	25.29
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	1.80	2.47	3.46	6.08	6.74	7.16	7.96	10.20	10.83	12.34	13.03	14.95	15.52	16.75	18.04	19.62	19.41	20.41	21.35	23.13
FAIRHAVEN		Revetment	Private	4.44	5.37	6.37	8.71	9.40	10.10	10.90	13.13	13.78	15.00	15.69	17.60	18.48	19.69	20.70	22.58	22.09	23.09	24.00	25.79
FAIRHAVEN		Bulkhead/Seawall	Private	0.44	1.60	2.37	4.70	5.40	6.10	6.90	9.12	9.78	11.00	11.69	13.60	14.48	15.69	16.70	18.58	18.08	19.09	20.00	21.78
FAIRHAVEN		Groin/Jetty	Private	6.21	8.34	9.33	10.47	11.17	13.06	13.87	16.09	16.75	16.77	17.46	19.37	21.44	22.66	22.46	25.54	23.85	24.86	25.77	27.55
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	6.08	6.99	7.39	10.31	11.00	11.11	11.92	14.71	14.81	16.61	17.30	19.21	19.51	20.71	22.31	24.20	23.70	24.70	25.61	27.40
FAIRHAVEN		Bulkhead/Seawall	Private	4.80	0.00	0.00	9.02	9.72	10.41	11.22	13.42	0.00	15.32	16.02	17.92	18.82	20.01	21.02	22.92	22.42	23.42	24.32	26.12
NEW BED-FORD		Bulkhead/Seawall	Private	4.49	5.49	4.89	8.80	9.30	10.00	10.81	11.50	13.91	14.90	15.80	18.58	19.88	19.90	20.90	22.50	22.28	23.20	24.10	25.80
NEW BED-FORD		Revetment	Private	0.00	0.51	1.91	4.35	4.85	5.50	6.82	8.60	8.16	10.34	10.91	13.00	14.25	15.42	15.95	17.72	17.22	18.27	19.17	20.97
NEW BED-FORD		Revetment	Private	1.21	2.26	3.17	5.61	6.11	6.86	7.73	9.73	10.57	11.61	12.13	14.32	15.00	16.50	17.44	18.90	18.83	19.77	20.67	22.45
NEW BED-FORD		Bulkhead/Seawall	Private	3.71	3.96	5.62	8.11	8.61	9.31	10.12	12.41	12.27	14.12	14.63	16.82	17.70	18.97	19.98	21.60	21.37	22.29	23.19	24.98
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.71	3.37	7.36	19.27	21.58	22.68	23.97	24.98	26.87	26.77	27.48	28.09	30.26
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NEW BED-FORD		Revetment	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.12	0.00	0.00	0.00	23.56	24.93	0.00	28.50	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	4.33	5.26	6.25	8.62	9.30	10.01	11.43	13.02	14.22	14.87	15.46	17.63	18.61	19.81	20.78	22.55	22.32	23.17	24.06	25.72
FAIRHAVEN		Bulkhead/Seawall	Private	4.73	5.84	6.65	9.01	9.69	10.40	11.26	13.40	14.24	15.26	15.85	18.02	19.18	20.38	21.17	22.94	22.70	23.55	24.44	26.11
FAIRHAVEN		Revetment	Private	4.87	5.74	6.74	9.14	9.83	10.49	10.71	13.50	13.51	15.40	16.01	18.15	19.07	20.27	21.30	23.07	22.82	23.67	24.57	26.24
FAIRHAVEN		Bulkhead/Seawall	Private	1.79	2.71	3.71	6.06	6.75	7.13	7.99	10.46	10.79	12.33	12.93	15.07	16.03	17.23	18.21	19.98	19.73	20.59	21.49	23.16
FAIRHAVEN		Bulkhead/Seawall	Private	4.28	6.21	6.20	8.55	9.23	8.71	9.56	12.95	13.09	14.82	15.44	17.55	19.50	20.71	20.68	22.45	22.18	23.04	23.96	25.63
FAIRHAVEN		Bulkhead/Seawall	Private	2.72	3.65	4.65	6.98	7.66	8.60	9.43	11.60	12.27	13.26	13.90	15.97	16.90	18.10	19.10	20.87	20.57	21.44	22.38	24.06
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	5.36	6.20	7.14	9.31	10.01	10.70	10.32	13.70	14.40	15.61	16.31	18.29	18.02	19.21	21.39	22.03	22.87	23.71	24.70	26.40
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Coastal Protection Structures

Municipality	Location	Primary Type	Property Type	Category 1				Category 2				Category 3				Category 4				Category 4 Extreme			
Water Level Rise				0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft
FAIRHAVEN		Bulkhead/Seawall	Private	2.66	3.48	4.24	6.62	7.30	7.99	8.59	11.00	11.49	12.90	13.60	15.55	16.45	17.44	18.65	20.50	20.10	21.00	21.96	23.70
FAIRHAVEN		Bulkhead/Seawall	Private	3.41	4.03	4.83	7.38	8.05	9.07	9.18	12.08	12.22	13.65	14.35	16.30	16.97	18.02	19.40	21.58	20.85	21.75	22.71	24.45
FAIRHAVEN		Bulkhead/Seawall	Private	2.77	3.67	4.66	7.03	7.73	8.42	9.16	11.45	12.07	13.32	14.01	15.93	16.80	18.02	19.02	20.84	20.41	21.41	22.33	24.11
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	7.21	0.00	0.00	11.11	11.81	0.00	13.21	15.51	0.00	17.41	18.11	20.11	0.00	0.00	23.11	0.00	24.51	25.51	26.51	28.21
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	6.15	7.04	7.97	10.07	10.77	10.92	12.17	13.93	14.71	16.34	17.06	19.03	19.91	20.51	22.04	23.42	23.41	24.44	25.41	27.11
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	4.74	5.64	6.74	8.69	9.39	10.04	10.79	13.05	13.82	14.94	15.67	17.63	18.48	19.62	20.63	22.53	21.98	23.03	23.99	25.69
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Revetment	Private	2.57	3.57	4.57	6.54	7.24	8.00	8.77	10.98	11.78	12.76	13.53	15.45	16.41	17.58	18.46	20.45	19.79	20.86	21.79	23.49
FAIRHAVEN		Revetment	Private	4.00	4.71	5.88	7.98	8.68	9.10	10.08	12.30	12.89	14.19	14.96	16.88	17.51	18.68	19.88	21.59	21.20	22.28	23.21	24.91
FAIRHAVEN		Revetment	Private	3.41	4.31	5.30	7.41	8.10	8.71	9.43	11.72	12.38	13.59	14.36	16.26	17.07	18.26	19.27	21.16	20.57	21.67	22.60	24.30
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	8.21	9.11	9.22	12.23	12.91	12.62	14.34	16.53	17.29	18.43	19.21	21.08	21.88	23.08	24.09	25.09	25.38	26.49	27.41	29.11
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	4.07	4.73	5.73	8.09	8.76	9.34	10.18	12.15	12.91	14.29	15.07	16.93	17.49	18.69	19.95	21.59	21.23	22.35	23.27	24.97
FAIRHAVEN		Bulkhead/Seawall	Private	3.30	4.28	5.28	7.34	8.00	8.68	9.52	11.64	12.47	13.53	14.31	16.17	16.97	18.18	19.18	21.14	20.46	21.58	22.51	24.21
FAIRHAVEN		Bulkhead/Seawall	Private	3.34	4.47	5.47	7.37	8.03	8.87	9.71	11.67	12.66	13.57	14.34	16.20	17.00	18.44	19.21	21.32	20.49	21.61	22.54	24.24
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	5.09	5.51	6.51	9.15	9.79	9.91	10.80	13.45	13.71	15.35	16.15	17.94	18.26	19.48	20.96	22.30	22.21	23.36	24.26	25.96
FAIRHAVEN		Groin/Jetty	Private	5.27	6.17	7.16	9.38	9.96	10.57	11.46	13.66	14.90	15.56	16.36	18.06	18.85	20.14	21.14	22.94	22.34	23.54	24.44	26.14
FAIRHAVEN		Groin/Jetty	Private	6.93	7.83	8.81	11.04	11.61	12.25	13.13	15.31	15.98	17.20	18.00	19.71	20.48	21.77	22.78	24.58	23.98	25.18	26.08	27.78
FAIRHAVEN		Groin/Jetty	Private	6.67	7.51	8.49	10.78	11.35	11.97	12.85	14.98	15.72	16.94	17.74	19.45	20.22	21.45	22.52	24.32	23.72	24.92	25.82	27.52
FAIRHAVEN		Bulkhead/Seawall	Private	4.08	4.99	5.95	8.25	8.68	9.41	10.25	12.39	13.02	14.23	15.03	16.79	17.49	19.29	19.79	21.59	20.99	22.12	23.09	24.79
FAIRHAVEN		Bulkhead/Seawall	Private	5.31	5.99	6.99	9.62	10.29	11.00	11.89	13.79	14.38	15.80	16.30	18.71	19.79	21.00	21.92	23.71	23.60	24.42	25.21	26.83
FAIRHAVEN		Revetment	Private	6.45	7.36	8.35	10.76	11.43	12.68	13.45	15.22	16.28	16.94	17.44	19.85	21.47	22.68	23.06	25.39	24.74	25.56	26.35	27.97
FAIRHAVEN		Revetment	Private	2.68	3.58	4.58	6.98	7.66	8.41	9.30	11.37	12.01	13.17	13.68	16.08	17.21	18.42	19.29	21.12	20.98	21.79	22.58	24.20
FAIRHAVEN		Bulkhead/Seawall	Private	4.11	4.50	5.49	8.42	9.08	9.65	10.68	12.29	13.26	14.59	15.08	17.50	18.56	19.78	20.71	22.49	22.38	23.20	23.99	25.63
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Revetment	Private	0.00	0.00	0.00	1.14	1.67	2.51	3.32	5.51	6.04	7.21	7.69	10.29	11.19	12.48	13.49	15.14	15.09	15.99	16.69	18.39
NEW BEDFORD		Revetment	Private	3.63	4.65	5.56	8.03	8.53	9.23	10.04	12.35	12.95	14.04	14.55	16.75	17.64	18.92	19.91	21.55	21.30	22.22	23.12	24.91
NEW BEDFORD		Revetment	Private	0.10	1.57	2.48	4.50	5.00	5.69	6.51	8.80	10.81	10.50	11.01	13.20	15.48	16.75	16.34	18.45	17.73	18.66	19.56	21.34
NEW BEDFORD		Groin/Jetty	Private	7.74	8.69	0.00	12.07	12.60	13.31	14.21	16.43	17.01	18.12	18.77	21.07	21.93	23.21	24.15	0.00	25.69	26.60	27.43	29.15
NEW BEDFORD		Groin/Jetty	Private	6.94	8.01	8.99	11.28	11.81	12.52	13.41	15.64	16.34	17.32	17.97	20.27	21.25	22.53	23.35	25.15	24.88	25.80	26.63	28.35
NEW BEDFORD		Groin/Jetty	Private	7.91	8.50	9.45	12.31	12.80	13.46	13.64	16.75	17.34	18.30	18.86	20.96	21.34	22.51	23.93	25.88	25.21	26.25	27.15	28.94
NEW BEDFORD		Bulkhead/Seawall	Private	2.22	2.43	3.40	6.60	7.08	8.32	9.18	10.81	11.38	12.57	13.18	15.19	16.63	17.78	18.18	19.99	19.43	20.51	21.41	23.21
NEW BEDFORD		Bulkhead/Seawall	Private	4.84	4.68	7.67	9.22	9.70	10.33	10.03	14.30	14.87	15.18	15.80	17.81	18.84	20.67	20.80	23.48	22.04	23.12	24.02	25.83
NEW BEDFORD		Groin/Jetty	Private	3.90	4.94	5.91	8.28	8.76	9.44	9.98	12.48	13.05	14.24	14.86	16.86	17.75	18.90	19.86	21.67	21.10	22.18	23.08	24.89
NEW BEDFORD		Revetment	Private	1.79	3.99	4.96	6.17	6.65	8.48	8.73	10.92	11.48	12.13	12.76	14.74	16.80	17.94	17.74	20.11	18.98	20.06	20.96	22.77
NEW BEDFORD		Groin/Jetty	Private	5.08	5.00	5.97	9.46	9.94	9.48	10.53	13.44	14.00	15.42	16.05	18.03	17.80	19.81	21.03	22.64	22.27	23.36	24.26	26.06
NEW BEDFORD		Groin/Jetty	Private	3.85	4.84	5.82	8.23	8.70	0.00	10.18	12.41	12.84	14.18	14.82	16.78	17.64	18.77	19.78	21.61	21.01	22.10	23.01	24.81
NEW BEDFORD		Groin/Jetty	Private	7.00	8.00	8.96	11.37	11.82	12.59	13.29	15.53	16.06	17.29	17.96	19.87	20.76	21.91	22.93	24.76	24.15	25.24	26.14	27.96
NEW BEDFORD		Revetment	Private	2.33	3.32	4.14	6.69	7.15	7.77	8.62	10.87	11.25	12.62	13.28	15.21	16.11	17.10	18.25	20.14	19.48	20.57	21.47	23.28
NEW BEDFORD		Bulkhead/Seawall	Private	0.24	1.26	2.23	4.61	5.08	5.70	6.56	8.80	9.39	10.56	11.20	13.17	14.04	15.17	16.17	17.99	17.40	18.49	19.39	21.20

Coastal Protection Structures

Municipality	Location	Primary Type	Property Type	Category 1				Category 2				Category 3				Category 4				Category 4 Extreme			
Water Level Rise				0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft
NEW BEDFORD		Bulkhead/Seawall	Private	0.33	1.32	2.28	4.69	5.14	5.75	6.59	8.85	9.36	10.60	11.28	13.18	14.11	15.25	16.26	18.08	17.47	18.56	19.46	21.28
NEW BEDFORD		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NEW BEDFORD		Groin/Jetty	Private	6.65	8.12	8.94	10.96	11.37	12.09	12.78	15.07	15.87	16.78	17.57	19.32	20.69	21.88	22.54	24.85	23.75	24.82	25.72	27.58
NEW BEDFORD		Revetment	Private	0.81	1.80	2.74	5.12	5.50	6.11	6.90	9.20	9.62	10.90	11.72	13.41	14.07	15.43	16.52	18.41	17.72	18.73	19.64	21.61
NEW BEDFORD		Revetment	Private	3.50	4.44	5.07	7.80	8.14	8.81	9.54	11.84	11.91	13.54	14.41	16.10	16.53	17.78	19.19	20.73	20.40	21.43	22.39	24.27
NEW BEDFORD		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NEW BEDFORD		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NEW BEDFORD		Revetment	Private	3.55	4.56	5.56	7.86	8.36	9.07	8.66	12.17	11.76	13.96	14.88	17.64	18.93	18.97	19.97	21.57	21.37	22.27	23.17	24.87
NEW BEDFORD		Bulkhead/Seawall	Private	6.21	6.67	8.22	10.52	11.02	11.72	13.41	14.82	15.96	16.62	17.53	20.31	21.60	21.62	22.62	24.22	24.02	24.92	25.82	27.52
NEW BEDFORD		Revetment	Private	3.19	4.27	5.19	7.49	7.99	8.69	9.58	11.80	12.60	13.59	14.50	17.28	18.58	18.59	19.59	21.20	20.99	21.90	22.79	24.50
NEW BEDFORD		Bulkhead/Seawall	Private	1.71	2.71	3.72	6.02	6.52	7.22	7.53	10.32	10.63	12.12	13.02	15.81	17.10	17.12	18.12	19.72	19.52	20.42	21.32	23.02
NEW BEDFORD		Revetment	Private	1.33	2.96	3.46	5.63	6.13	7.86	7.77	9.94	10.74	11.73	12.64	15.42	16.72	16.73	17.74	19.47	19.13	20.04	20.94	22.64
NEW BEDFORD		Bulkhead/Seawall	Private	3.55	4.55	5.55	7.85	8.36	9.06	9.86	12.16	12.96	13.96	14.86	17.65	18.94	18.95	19.96	21.56	21.36	22.26	23.16	24.86
NEW BEDFORD		Revetment	Private	1.62	2.62	3.62	5.92	6.42	7.12	7.92	10.22	11.02	12.02	12.92	15.71	17.01	17.02	18.02	19.62	19.42	20.32	21.22	22.92
NEW BEDFORD		Bulkhead/Seawall	Private	5.90	8.05	9.05	10.20	10.70	12.55	12.20	15.66	15.30	16.30	17.20	19.99	21.29	22.45	22.30	23.90	23.70	24.60	25.50	27.20
NEW BEDFORD		Bulkhead/Seawall	Private	2.42	3.42	4.15	6.72	7.22	7.65	8.46	11.03	11.83	12.82	13.73	16.51	17.81	17.82	18.82	20.16	20.22	21.13	22.02	23.73
NEW BEDFORD		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NEW BEDFORD		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NEW BEDFORD		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NEW BEDFORD		Groin/Jetty	Private	7.28	8.03	9.34	11.58	12.08	12.53	13.34	16.09	16.44	17.69	18.59	21.37	22.42	22.43	23.68	25.29	25.08	25.99	26.88	28.59
NEW BEDFORD		Bulkhead/Seawall	Private	2.53	3.53	4.53	6.83	7.34	8.04	8.84	10.36	11.94	12.94	13.84	16.62	17.92	17.93	18.94	20.54	20.33	21.24	22.14	23.84
NEW BEDFORD		Bulkhead/Seawall	Private	2.12	3.12	4.13	6.43	6.93	7.63	8.44	10.73	11.54	12.53	13.43	16.21	17.51	17.53	18.53	20.13	19.92	20.83	21.73	23.43
NEW BEDFORD		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NEW BEDFORD		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NEW BEDFORD		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NEW BEDFORD		Bulkhead/Seawall	Private	1.03	2.03	3.04	5.34	5.84	6.54	7.35	9.65	10.10	11.44	12.34	15.12	16.06	16.44	17.44	19.04	18.82	19.74	20.64	22.34
NEW BEDFORD		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NEW BEDFORD		Revetment	Private	2.02	2.78	4.02	6.32	6.83	7.29	8.09	10.63	11.19	12.43	13.33	16.09	17.39	17.42	18.41	20.02	19.78	20.72	21.62	23.32
FAIRHAVEN		Revetment	Private	5.64	6.45	7.36	9.46	10.30	10.90	11.70	13.95	14.70	15.90	16.60	18.55	19.50	20.64	21.66	23.59	23.09	24.00	25.05	26.69
FAIRHAVEN		Groin/Jetty	Private	7.44	8.28	9.19	11.30	12.00	12.67	13.44	15.70	15.75	17.60	18.30	20.27	21.17	22.33	23.34	24.56	24.74	25.70	26.70	28.40
FAIRHAVEN		Revetment	Private	5.91	6.75	7.76	9.76	10.47	11.24	12.08	14.34	15.00	16.07	16.77	18.74	19.64	20.80	21.81	23.81	23.21	24.17	25.17	26.87
FAIRHAVEN		Groin/Jetty	Private	6.97	7.79	8.69	10.85	11.54	12.22	12.98	15.19	15.93	17.14	17.84	19.81	20.66	21.80	22.86	24.70	24.26	25.24	26.23	27.94
FAIRHAVEN		Bulkhead/Seawall	Private	5.01	5.89	6.80	8.90	9.59	10.28	11.01	13.29	14.06	15.19	15.89	17.87	18.77	19.89	20.90	22.80	22.29	23.29	24.28	25.99
FAIRHAVEN		Revetment	Private	3.12	4.01	4.92	7.02	7.72	7.38	9.13	11.42	10.46	13.31	14.02	16.00	16.07	18.01	19.02	19.18	20.42	21.41	22.41	24.11
FAIRHAVEN		Groin/Jetty	Private	8.61	9.51	10.41	12.51	13.21	14.48	14.61	16.91	18.02	18.81	19.51	21.51	22.37	23.50	24.51	27.15	25.91	26.91	27.91	29.61
FAIRHAVEN		Revetment	Private	7.37	8.45	9.17	11.28	11.97	12.67	13.38	15.85	16.65	17.57	18.27	20.27	21.17	22.27	23.27	25.35	24.67	25.67	26.67	28.37
FAIRHAVEN		Bulkhead/Seawall	Private	2.52	3.43	4.39	6.69	7.12	7.69	8.69	10.83	13.10	12.66	13.47	15.23	17.59	18.87	18.22	20.02	19.42	20.56	21.52	23.22
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Revetment	Private	2.12	3.02	4.02	6.14	6.81	6.72	8.32	9.71	12.01	12.32	13.20	14.92	15.10	16.58	17.91	19.40	19.12	20.39	21.12	22.81
FAIRHAVEN		Revetment	Private	3.92	4.83	5.83	7.94	8.62	9.82	10.72	12.22	13.61	14.12	15.01	16.72	17.61	18.70	19.71	21.52	20.92	22.20	22.93	24.62
FAIRHAVEN		Bulkhead/Seawall	Private	1.60	2.50	3.50	5.60	6.30	6.90	7.80	11.32	10.70	11.80	12.70	14.40	16.72	17.81	17.40	20.62	18.60	19.90	20.60	22.30

Coastal Protection Structures

Municipality	Location	Primary Type	Property Type	Category 1				Category 2				Category 3				Category 4				Category 4 Extreme			
Water Level Rise				0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft
FAIRHAVEN		Bulkhead/Seawall	Private	5.43	6.32	7.33	9.43	10.13	10.52	11.42	13.52	14.53	15.63	16.53	18.23	18.92	20.02	21.23	22.83	22.43	23.73	24.43	26.13
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	7.43	8.25	9.34	11.44	12.13	12.65	13.55	15.65	16.89	17.64	18.53	20.24	21.05	22.14	23.24	25.39	24.44	25.73	26.44	28.14
FAIRHAVEN		Revetment	Private	0.00	5.63	6.63	0.00	0.00	9.96	10.93	13.03	0.00	0.00	0.00	0.00	18.43	19.53	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Revetment	Private	4.14	5.04	6.04	8.14	8.84	9.09	10.34	12.09	13.24	14.34	15.24	16.94	17.49	18.59	19.94	21.40	21.14	22.44	23.14	24.84
FAIRHAVEN		Revetment	Private	3.52	4.42	5.42	7.52	8.22	8.82	9.72	11.82	12.62	13.72	14.62	16.32	17.22	18.32	19.32	21.12	20.52	21.82	22.52	24.22
FAIRHAVEN		Revetment	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Revetment	Private	5.69	7.57	8.56	9.70	10.39	11.97	12.86	13.99	15.76	15.89	16.78	18.49	20.35	21.46	21.49	24.27	22.70	23.98	24.70	26.40
FAIRHAVEN		Groin/Jetty	Private	7.69	8.59	9.59	11.69	12.39	12.99	13.89	15.99	16.78	17.89	18.78	20.49	21.38	22.48	23.49	25.29	24.69	25.98	26.69	28.39
FAIRHAVEN		Bulkhead/Seawall	Private	4.99	5.89	5.95	9.00	9.69	9.35	11.19	12.35	14.09	15.19	16.09	17.80	18.82	18.84	20.79	22.73	22.00	23.28	24.00	25.70
FAIRHAVEN		Revetment	Private	6.21	6.92	7.92	10.22	10.91	11.39	12.29	14.32	15.19	16.41	17.31	19.02	19.79	20.89	22.01	23.70	23.22	24.51	25.22	26.92
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	1.43	2.42	3.42	5.72	6.16	6.10	7.01	9.01	9.73	11.74	12.55	14.34	14.44	15.14	17.24	19.06	18.46	19.64	20.54	22.22
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.32	1.33	3.57	4.02	4.83	5.68	7.69	8.46	9.60	10.41	12.20	12.97	14.01	15.09	16.96	16.32	17.49	18.40	20.08
FAIRHAVEN		Bulkhead/Seawall	Private	1.36	2.13	3.73	5.64	6.09	7.23	7.75	9.75	10.27	11.66	12.47	14.26	15.37	16.08	17.15	19.36	18.38	19.55	20.46	22.13
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	0.99	1.68	2.69	5.26	5.70	6.18	7.08	9.08	9.80	11.26	12.08	13.86	14.60	15.40	16.75	18.58	17.98	19.15	20.06	21.73
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	7.17	8.07	9.07	11.07	11.87	11.10	13.27	15.57	14.91	17.47	18.17	20.07	21.07	22.17	23.17	25.17	24.67	25.57	26.47	28.17
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	1.16	3.15	4.16	5.38	5.80	6.92	8.08	9.42	11.15	11.26	12.13	13.86	14.64	15.67	16.70	18.57	17.98	19.09	20.06	21.68
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	4.16	5.06	6.07	8.37	8.78	9.48	10.39	12.38	13.02	14.21	15.10	16.81	17.61	18.62	19.62	21.52	20.92	22.02	23.00	24.62
FAIRHAVEN		Bulkhead/Seawall	Private	3.70	4.61	5.61	7.91	8.32	9.02	9.93	11.92	12.56	13.75	14.63	16.35	17.15	18.15	19.16	21.05	20.46	21.56	22.54	24.15
FAIRHAVEN		Revetment	Private	0.98	3.76	4.76	5.18	5.59	8.17	9.08	9.19	11.70	11.01	11.90	13.62	16.29	17.30	16.43	20.20	17.72	18.82	19.81	21.42
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.40	1.41	3.70	4.12	4.81	5.84	7.71	8.34	9.53	10.42	12.13	13.05	14.05	14.94	16.84	16.24	17.34	18.33	19.93
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Revetment	Private	0.00	1.99	1.78	4.07	4.49	6.39	7.30	8.08	9.91	9.89	10.79	12.50	13.29	14.29	15.30	17.20	16.60	17.70	18.69	20.30
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.04	0.93	3.31	3.73	4.43	5.31	7.43	7.96	9.25	10.06	11.83	12.44	13.71	14.81	16.54	16.01	17.14	18.11	19.82
FAIRHAVEN		Bulkhead/Seawall	Private	1.53	2.28	3.23	5.72	6.13	6.83	7.72	9.64	10.35	11.64	12.44	14.23	14.85	16.10	17.19	18.96	18.39	19.50	20.49	22.19
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	3.72	4.66	5.61	7.91	8.32	9.68	10.57	12.02	12.62	13.83	14.63	16.42	17.08	18.33	19.38	21.18	20.58	21.69	22.68	24.38
FAIRHAVEN		Groin/Jetty	Private	5.80	6.75	7.69	9.99	10.41	11.10	11.99	14.10	14.71	15.91	16.72	18.51	19.16	20.40	21.46	23.26	22.66	23.77	24.76	26.46
FAIRHAVEN		Groin/Jetty	Private	6.75	7.77	8.72	10.95	11.35	11.66	12.48	15.05	15.26	16.86	17.66	19.45	20.10	21.34	22.40	24.27	23.60	24.71	25.70	27.40
FAIRHAVEN		Bulkhead/Seawall	Private	1.99	2.94	3.89	6.19	6.59	7.29	8.19	10.29	10.89	12.10	12.90	14.69	15.34	16.59	17.64	19.50	18.84	19.95	20.94	22.65
FAIRHAVEN		Groin/Jetty	Private	2.96	3.77	4.72	7.16	7.56	8.12	9.16	11.39	11.72	13.07	13.87	15.67	16.44	17.68	18.62	20.28	19.82	20.92	21.92	23.62
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Revetment	Private	2.04	2.99	4.61	6.21	6.74	8.07	8.35	10.39	11.14	12.30	13.14	14.90	15.68	16.78	17.83	19.65	19.05	20.27	21.10	22.79
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	2.72	3.68	4.68	6.93	7.42	8.15	9.05	11.08	11.98	13.00	13.82	15.59	16.35	17.70	18.52	20.33	19.73	20.94	21.80	23.48
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Revetment	Private	1.02	2.00	3.26	5.28	5.73	6.49	7.39	9.41	10.13	11.32	12.12	13.91	14.64	15.62	16.82	18.64	18.03	19.23	20.12	21.81
FAIRHAVEN		Bulkhead/Seawall	Private	2.57	3.44	4.43	6.83	7.27	7.93	8.94	10.95	11.68	12.87	13.67	15.46	16.19	17.10	18.37	20.08	19.59	20.78	21.67	23.35
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	2.98	3.81	4.81	7.24	7.68	8.44	9.38	11.39	12.08	13.27	14.08	15.87	16.59	17.69	18.78	20.59	19.99	21.19	22.08	23.76
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Coastal Protection Structures

Municipality	Location	Primary Type	Property Type	Category 1				Category 2				Category 3				Category 4				Category 4 Extreme			
Water Level Rise				0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft
FAIRHAVEN		Revetment	Private	0.94	1.40	2.79	5.09	5.55	5.80	7.09	9.25	9.85	11.11	11.91	13.65	14.34	15.62	16.64	17.99	17.84	19.00	19.94	21.64
FAIRHAVEN		Revetment	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Revetment	Private	0.00	0.00	0.00	0.36	0.85	1.55	2.37	4.72	5.16	6.45	7.25	8.96	9.66	11.09	11.95	13.75	13.15	14.35	15.25	16.95
FAIRHAVEN		Revetment	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Revetment	Private	4.08	4.99	5.90	8.20	8.70	9.40	10.21	12.12	13.01	14.29	15.09	16.80	17.51	18.78	19.79	21.59	20.99	22.20	23.09	24.79
FAIRHAVEN		Revetment	Private	1.63	2.54	3.45	5.75	6.25	6.95	7.77	9.94	10.56	11.84	12.64	14.36	15.06	16.33	17.34	19.14	18.54	19.75	20.64	22.34
FAIRHAVEN		Revetment	Private	1.32	2.23	3.14	5.44	5.94	6.64	7.46	9.63	10.25	11.53	12.33	14.05	14.75	16.02	17.03	18.83	18.24	19.44	20.33	22.03
FAIRHAVEN		Bulkhead/Seawall	Private	5.22	5.86	7.16	9.37	9.91	10.61	11.20	13.56	14.00	15.47	16.31	18.06	18.85	19.96	21.01	22.82	22.22	23.45	24.27	25.97
FAIRHAVEN		Groin/Jetty	Private	7.36	8.28	9.27	11.44	12.04	12.70	13.59	15.67	16.68	17.58	18.44	20.17	21.24	22.36	23.14	24.95	24.35	25.60	26.38	28.07
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	6.36	6.74	7.74	10.40	11.04	11.15	12.04	14.13	14.92	16.56	17.43	19.16	19.49	19.13	22.14	23.43	23.35	24.61	25.37	27.05
FAIRHAVEN		Bulkhead/Seawall	Private	4.59	5.52	6.51	8.69	9.28	9.98	10.88	12.95	13.83	14.82	15.68	17.42	18.39	19.50	20.38	22.23	21.59	22.84	23.63	25.32
FAIRHAVEN		Bulkhead/Seawall	Private	4.44	5.35	6.35	8.48	9.12	9.89	10.79	12.87	13.67	14.65	15.52	17.24	18.24	19.35	20.22	22.14	21.44	22.69	23.45	25.14
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Revetment	Private	4.19	5.10	6.10	8.23	8.88	9.50	10.40	12.49	13.90	14.40	15.27	17.00	17.86	19.58	19.98	21.79	21.19	22.45	23.20	24.89
FAIRHAVEN		Revetment	Private	3.41	4.31	5.31	7.44	8.09	8.73	9.63	11.71	12.51	13.61	14.49	16.21	17.09	18.19	19.19	21.01	20.40	21.67	22.41	24.10
FAIRHAVEN		Bulkhead/Seawall	Private	6.19	6.28	7.27	10.22	10.87	10.68	11.58	14.48	14.46	16.39	17.27	18.99	19.86	20.96	21.97	23.78	23.18	24.45	25.19	26.88
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	6.79	7.69	8.69	10.80	11.49	12.44	13.34	15.44	16.24	16.99	17.88	19.59	20.84	21.93	22.59	24.74	23.79	25.08	25.79	27.49
FAIRHAVEN		Bulkhead/Seawall	Private	4.75	5.53	6.53	8.76	9.45	9.93	10.83	12.92	13.73	14.95	15.85	17.55	18.32	19.41	20.55	22.23	21.75	23.04	23.76	25.45
FAIRHAVEN		Bulkhead/Seawall	Private	7.27	8.17	9.17	11.28	11.96	12.57	13.47	15.56	16.36	17.47	18.36	20.07	20.96	22.05	23.06	24.87	24.27	25.55	26.27	27.96
FAIRHAVEN		Bulkhead/Seawall	Private	4.56	5.53	6.53	8.57	9.25	10.18	11.08	12.93	13.98	14.76	15.65	17.36	18.32	19.34	20.35	22.16	21.56	22.84	23.56	25.26
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	2.72	3.68	4.62	6.93	7.32	7.97	8.87	11.03	11.57	12.83	13.63	15.42	16.07	17.31	18.37	20.17	19.57	20.67	21.67	23.37
FAIRHAVEN		Groin/Jetty	Private	7.19	7.55	8.41	11.39	11.79	12.49	13.39	14.90	16.08	17.29	18.10	19.89	20.54	21.19	22.84	24.63	24.04	25.14	26.14	27.84
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	4.90	5.86	6.81	9.11	9.50	10.42	11.32	13.21	13.80	15.00	15.81	17.60	18.25	19.49	20.55	22.35	21.75	22.85	23.85	25.55
FAIRHAVEN		Bulkhead/Seawall	Private	5.19	6.66	7.61	9.39	9.79	11.00	11.91	13.49	14.60	15.29	16.09	17.89	18.53	20.28	20.83	22.64	22.03	23.13	24.13	25.83
FAIRHAVEN		Groin/Jetty	Private	7.73	8.28	9.23	11.93	12.32	13.02	13.93	15.63	16.62	17.83	18.63	20.42	20.66	21.90	23.37	24.77	24.57	25.66	26.66	28.37
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	3.22	3.63	4.56	7.43	7.81	7.97	8.85	11.52	11.57	13.32	14.12	15.91	15.96	17.18	18.84	20.64	20.04	21.13	22.13	23.84
FAIRHAVEN		Revetment	Private	1.04	2.02	2.94	5.24	5.63	6.33	7.23	9.34	9.78	11.13	11.94	13.73	14.34	15.56	16.65	18.45	17.85	18.94	19.94	21.65
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.36	1.28	4.12	4.50	5.21	6.11	7.67	8.26	10.00	10.81	12.60	12.66	13.87	15.51	16.78	16.71	17.80	18.80	20.51
FAIRHAVEN		Bulkhead/Seawall	Private	1.04	1.86	2.79	5.24	5.63	8.47	7.24	9.34	12.06	11.13	11.94	13.73	14.34	15.39	16.64	18.45	17.84	18.94	19.94	21.64
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	7.78	8.76	9.71	11.98	12.38	13.11	14.01	0.00	16.71	17.89	18.69	20.48	0.00	0.00	23.43	25.26	24.63	25.73	26.73	28.43
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	4.85	5.75	6.75	8.86	9.55	10.15	11.05	13.15	13.57	15.05	15.95	17.65	18.55	19.64	20.65	22.07	21.85	23.15	23.86	25.55
FAIRHAVEN		Bulkhead/Seawall	Private	4.05	5.24	6.24	8.05	8.74	9.63	10.53	12.34	13.43	14.25	15.14	16.85	17.74	18.83	19.84	21.64	21.05	22.34	23.05	24.75
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Bulkhead/Seawall	Private	3.67	4.91	5.91	7.68	8.36	8.97	9.87	11.96	12.77	13.87	14.76	16.47	17.35	18.45	19.46	21.27	20.67	21.95	22.67	24.37
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.56	12.37	14.05	17.80	20.30	21.15	22.44	23.56	25.52	25.22	26.06	26.74	28.58

Government Buildings

Object	Municipality	Owner	Location	Category 1				Category 2				Category 3				Category 4				Category 4 Extreme			
Water Level Rise				0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft
1	Fairhaven	Town of Fairhaven	Arsene St	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71	2.52	3.52	4.52	5.81	7.23	6.76	8.02	8.83	10.43
2	Fairhaven	Town of Fairhaven	Center St	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.73	9.02	10.34	11.60	12.56	14.79	14.36	15.09	16.19	18.13
3	Fairhaven	United States of America	Old Fort Rd.	1.21	2.10	3.11	5.51	6.09	6.89	7.70	9.92	10.49	11.60	12.02	14.62	15.52	16.83	17.82	19.52	19.42	20.32	21.02	22.72
4	Fairhaven	Town of Fairhaven	Causeway Rd	0.00	0.00	0.00	0.00	0.00	0.00	0.83	2.87	3.70	4.80	5.64	7.40	8.24	9.30	10.34	12.17	11.57	12.77	13.60	15.27
5	Acushnet	Town of Acushnet Selectmen	Main St	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	Acushnet	Town of Acushnet Historical Commission	South Main St	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	Acushnet	Town of Acushnet Selectmen	Main St	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Environmental Justice

Census Tract	Population	Category 1				Category 2				Category 3				Category 4				Category 4 Extreme			
Water Level Rise		0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft
650500	2142	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.80	0.00	0.00	6.90	0.00	8.06	8.55	8.79	9.00
654200	772	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.64	3.02	3.04	11.95	14.85	14.84	14.80	14.66	15.06	15.49	16.08	16.49	16.89
650400	1322	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.95	2.29	0.97	15.65	19.16	20.74	21.83	22.62	23.42	24.01	24.66	25.24	26.00
651700	1066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28
650600	767	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.54	0.86	1.41
655200	720	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.34	2.10	1.52	14.10	17.53	18.45	18.99	19.36	19.60	19.81	19.96	20.23	24.09
651200	1119	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.29	2.26	2.32	13.17	17.27	19.21	20.64	21.69	22.68	23.27	24.18	24.94	26.63
650500	960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.00	0.48	11.64	14.65	16.50	17.54	18.24	18.71	18.91	19.23	19.57	19.93
650900	923	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
650900	795	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
651200	1061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	9.09	5.36	5.65	6.20	6.81	7.52	7.28	7.71	8.13	11.08
651002	1112	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
651200	733	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.49	2.43	1.38	12.92	18.11	19.52	20.72	21.70	22.64	22.74	23.41	24.04	27.60
650900	1863	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
652700	1548	4.66	4.82	5.05	7.18	6.40	6.75	7.32	7.44	8.30	8.89	10.05	11.64	12.55	13.88	14.79	16.40	16.30	17.20	18.00	19.75
651002	1041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
651700	1011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
651900	1160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.83	3.19	3.35	3.92	5.01	5.76	6.98	7.82	9.34	9.24	10.10	10.86	12.47
654200	1178	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.12	4.99	5.82	6.68	7.34	7.99	8.40	8.86	9.23	11.12
653203	1044	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56
651700	843	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
651700	780	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
651800	1161	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.17	2.21	1.48	11.43	17.06	17.65	18.58	19.27	21.03	20.68	21.24	21.76	24.54
651900	683	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.98	5.13	5.72	11.54	13.47	14.48	15.85	16.76	18.50	18.36	19.26	19.97	21.89
652200	1279	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.53	1.68	1.85	2.62	3.00	3.19	3.36	4.22	4.17	4.69	5.10	5.97
651900	887	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.28	2.64	2.84	3.42	4.31	4.84	5.65	6.26	7.26	7.20	7.74	8.20	9.10
651200	1335	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.41	1.71	2.00	12.20	17.04	17.65	18.14	18.70	19.19	18.96	19.33	19.71	22.70
651700	564	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
650102	1364	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
651700	1037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.13	0.15	1.79	8.82	11.96	11.58	12.52	13.15	14.62	14.36	14.89	15.23	16.48
650900	1151	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
651500	604	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
651700	609	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
650500	687	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.45	2.72	3.85	4.18	4.48	4.71	4.90	5.04	5.03	5.09
650900	1325	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
650900	799	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
650500	970	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
651900	708	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.27	1.65	2.77	11.71	14.61	15.23	16.37	17.27	19.61	19.03	19.80	20.54	22.38
650500	1316	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
650500	1142	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
650500	670	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.29	10.35	11.16	11.85	12.41	12.93	13.22	13.46	13.81	14.23
651500	737	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
651900	629	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.19	0.51	0.80	1.63
652400	1300	3.41	4.35	5.35	7.71	8.22	8.86	9.67	11.96	12.76	13.82	14.72	17.48	18.72	18.75	19.80	21.35	21.17	22.11	23.00	24.71
651500	701	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
652500	1410	3.00	4.00	4.88	6.84	7.21	7.83	8.60	9.06	10.00	10.60	11.57	13.45	14.53	15.42	16.35	17.96	17.82	18.72	19.55	21.28
650900	917	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
650900	935	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.34
653203	808	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
651900	1259	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.93	5.63	5.80	6.10	7.05	7.77	8.77	9.47	10.90	10.75	11.48	12.05	13.56
651002	906	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
651900	1179	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.24	7.30	7.67	8.71	10.28	11.29	12.61	13.52	15.12	15.02	15.92	16.72	18.43
652700	1295	2.83	3.89	4.70	6.40	6.82	7.41	8.18	6.84	7.58	7.94	8.59	9.81	10.56	11.57	12.35	13.79	13.69	14.55	15.36	17.15
652800	1027	1.35	2.01	2.64	4.01	4.10	4.38	4.37	5.05	5.37	6.12	6.60	7.70	8.34	9.39	10.23	11.68	11.46	12.29	13.03	14.43
652700	1070	4.83	5.18	5.44	7.66	6.46	6.67	7.03	7.31	7.79	8.58	9.16	10.18	10.59	11.56	12.26	13.36	13.24	13.83	14.39	15.47
652700	888	3.69	4.02	4.51	6.64	6.04	6.31	6.78	7.37	7.87	8.42	9.07	10.32	10.99	11.92	12.70	14.10	14.00	14.88	15.68	17.45
650900	2865	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
651700	1140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
650900	951	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
650900	808	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
651500	1168	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
651200	1464	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.95	3.26	3.52	3.83	4.27	4.47	4.58	4.83	5.07	6.29
652000	1392	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.58	5.18	5.46	6.12	6.90	7.37	7.92	8.40	9.49	9.41	10.05	10.39	11.23
650201	1501	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
652700	777	3.54	2.59	3.03	4.27	4.76	5.30	5.86	7.22	8.01	8.44	9.01	10.07	10.71	11.57	12.21	13.34	13.24	13.83	14.34	15.48

Appendix D: Hazus Summary Reports

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 1, 0-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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Hazus Global Summary Report Category 1, 0-foot SLR

General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region .

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B .

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Hazus Global Summary Report Category 1, 0-foot SLR

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	396,672	70.9%
Commercial	89,927	16.1%
Industrial	57,647	10.3%
Agricultural	8,824	1.6%
Religion	4,335	0.8%
Government	764	0.1%
Education	1,665	0.3%
Total	**559,834**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Hazus Global Summary Report Category 1, 0-foot SLR

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
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Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	456,043	73.1%
Commercial	92,424	14.8%
Industrial	58,168	9.3%
Agricultural	8,824	1.4%
Religion	4,335	0.7%
Government	764	0.1%
Education	3,195	0.5%
Total	**623,753**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name: New Bedford, Fairhaven and Acushnet
Scenario Name: Category 1, 2-foot SLR
Return Period Analyzed: Mix0
Analysis Options Analyzed: No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 313 buildings will be at least moderately damaged. This is over 52% of the total number of buildings in the scenario. There are an estimated 2 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	40	12.78	155	49.52	72	23.00	44	14.06	2	0.64
Total	**0**		**40**		**155**		**72**		**44**		**2**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	0	0.00	1	50.00	1	50.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	40	12.86	154	49.52	71	22.83	44	14.15	2	0.64

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	5	0	0	0
Schools	54	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.
(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 12,469 tons of debris will be generated. Of the total amount, Finishes comprises 35% of the total, Structure comprises 40% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 499 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 583 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 1,124 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 57.47 million dollars, which represents 9.21 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 57.36 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 77.79% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	26.49	1.70	0.94	0.64	29.76
	Content	18.18	5.08	1.96	1.72	26.94
	Inventory	0.00	0.11	0.37	0.18	0.66
	Subtotal	**44.67**	**6.89**	**3.27**	**2.54**	**57.36**
Business Interruption						
	Income	0.00	0.03	0.00	0.00	0.03
	Relocation	0.04	0.00	0.00	0.00	0.04
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.03	0.00	0.01	0.04
	Subtotal	**0.04**	**0.05**	**0.00**	**0.01**	**0.11**
ALL	**Total**	**44.71**	**6.95**	**3.27**	**2.55**	**57.47**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 1, 4-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	519,768	74.7%
Commercial	97,884	14.1%
Industrial	58,845	8.5%
Agricultural	9,045	1.3%
Religion	4,843	0.7%
Government	2,142	0.3%
Education	3,195	0.5%
Total	**695,722**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name: New Bedford, Fairhaven and Acushnet

Scenario Name: Category 1, 4-foot SLR

Return Period Analyzed: Mix0

Analysis Options Analyzed: No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 481 buildings will be at least moderately damaged. This is over 66% of the total number of buildings in the scenario. There are an estimated 3 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	26	5.41	204	42.41	147	30.56	101	21.00	3	0.62
Total	**0**		**26**		**204**		**147**		**101**		**3**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	0	0.00	2	50.00	1	25.00	1	25.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	26	5.45	202	42.35	146	30.61	100	20.96	3	0.63

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	5	0	0	0
Schools	54	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 24,150 tons of debris will be generated. Of the total amount, Finishes comprises 30% of the total, Structure comprises 43% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 966 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 711 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 1,435 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 94.07 million dollars, which represents 13.52 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 93.91 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 78.14% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	43.39	2.92	1.68	0.98	48.97
	Content	30.06	7.80	3.59	2.36	43.81
	Inventory	0.00	0.18	0.72	0.24	1.13
	Subtotal	**73.44**	**10.90**	**5.99**	**3.58**	**93.91**
Business Interruption						
	Income	0.00	0.03	0.00	0.00	0.04
	Relocation	0.06	0.00	0.00	0.00	0.07
	Rental Income	0.01	0.00	0.00	0.00	0.01
	Wage	0.00	0.04	0.00	0.01	0.05
	Subtotal	**0.07**	**0.07**	**0.00**	**0.02**	**0.16**
ALL	**Total**	**73.51**	**10.98**	**5.99**	**3.60**	**94.07**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 2, 0-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

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The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	532,058	75.1%
Commercial	98,355	13.9%
Industrial	58,845	8.3%
Agricultural	9,126	1.3%
Religion	4,843	0.7%
Government	2,142	0.3%
Education	3,195	0.5%
Total	**708,564**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	New Bedford, Fairhaven and Acushnet
Scenario Name:	Category 2, 0-foot SLR
Return Period Analyzed:	Mix0
Analysis Options Analyzed:	No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 524 buildings will be at least moderately damaged. This is over 69% of the total number of buildings in the scenario. There are an estimated 6 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	23	4.39	196	37.40	174	33.21	125	23.85	6	1.15
Total	**0**		**23**		**196**		**174**		**125**		**6**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
Masonry	0	0.00	0	0.00	1	25.00	2	50.00	1	25.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	23	4.43	195	37.57	172	33.14	124	23.89	5	0.96

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	5	0	0	0
Schools	54	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 28,128 tons of debris will be generated. Of the total amount, Finishes comprises 29% of the total, Structure comprises 44% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 1,125 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 746 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 1,538 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 104.51 million dollars, which represents 14.75 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 104.33 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 77.92% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	48.07	3.30	1.91	1.15	54.44
	Content	33.29	8.55	4.14	2.63	48.61
	Inventory	0.00	0.20	0.83	0.26	1.29
	Subtotal	**81.36**	**12.05**	**6.89**	**4.04**	**104.33**
Business Interruption						
	Income	0.00	0.04	0.00	0.01	0.04
	Relocation	0.07	0.00	0.00	0.00	0.07
	Rental Income	0.01	0.00	0.00	0.00	0.01
	Wage	0.00	0.04	0.00	0.02	0.05
	Subtotal	**0.07**	**0.08**	**0.00**	**0.02**	**0.18**
ALL	**Total**	**81.43**	**12.13**	**6.89**	**4.06**	**104.51**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 2, 1-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	545,478	75.4%
Commercial	99,540	13.8%
Industrial	58,922	8.1%
Agricultural	9,126	1.3%
Religion	4,843	0.7%
Government	2,142	0.3%
Education	3,195	0.4%
Total	**723,246**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	New Bedford, Fairhaven and Acushnet
Scenario Name:	Category 2, 1-foot SLR
Return Period Analyzed:	Mix0
Analysis Options Analyzed:	No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 583 buildings will be at least moderately damaged. This is over 73% of the total number of buildings in the scenario. There are an estimated 6 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	21	3.60	198	33.96	183	31.39	175	30.02	6	1.03
Total	**0**		**21**		**198**		**183**		**175**		**6**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
Masonry	0	0.00	0	0.00	1	20.00	2	40.00	2	40.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	21	3.64	197	34.14	181	31.37	173	29.98	5	0.87

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	5	0	0	0
Schools	54	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 32,522 tons of debris will be generated. Of the total amount, Finishes comprises 28% of the total, Structure comprises 44% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 1,301 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 786 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 1,632 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 117.23 million dollars, which represents 16.21 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 117.03 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 77.58% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	53.72	3.79	2.23	1.33	61.07
	Content	37.15	9.48	4.93	2.91	54.46
	Inventory	0.00	0.22	1.00	0.28	1.50
	Subtotal	**90.87**	**13.48**	**8.16**	**4.52**	**117.03**
Business Interruption						
	Income	0.00	0.04	0.00	0.01	0.05
	Relocation	0.08	0.00	0.00	0.00	0.08
	Rental Income	0.01	0.00	0.00	0.00	0.01
	Wage	0.00	0.04	0.00	0.02	0.06
	Subtotal	**0.08**	**0.09**	**0.00**	**0.03**	**0.20**
ALL	**Total**	**90.95**	**13.57**	**8.16**	**4.55**	**117.23**

Appendix A: County Listing for the Region

Massachusetts

- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 2, 2-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	558,055	75.7%
Commercial	100,270	13.6%
Industrial	59,084	8.0%
Agricultural	9,126	1.2%
Religion	4,843	0.7%
Government	2,142	0.3%
Education	3,195	0.4%
Total	**736,715**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name: New Bedford, Fairhaven and Acushnet
Scenario Name: Category 2, 2-foot SLR
Return Period Analyzed: Mix0
Analysis Options Analyzed: No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 658 buildings will be at least moderately damaged. This is over 76% of the total number of buildings in the scenario. There are an estimated 7 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	21	3.19	184	27.96	207	31.46	239	36.32	7	1.06
Total	**0**		**21**		**184**		**207**		**239**		**7**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
Masonry	0	0.00	0	0.00	1	14.29	2	28.57	4	57.14	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	21	3.23	183	28.15	205	31.54	235	36.15	6	0.92

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	5	0	0	0
Schools	54	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.
(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 37,969 tons of debris will be generated. Of the total amount, Finishes comprises 27% of the total, Structure comprises 45% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 1,519 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 837 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 1,769 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 132.79 million dollars, which represents 18.02 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 132.58 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 77.04% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	60.50	4.40	2.70	1.53	69.13
	Content	41.71	10.59	6.09	3.24	61.63
	Inventory	0.00	0.26	1.25	0.30	1.81
	Subtotal	**102.22**	**15.25**	**10.05**	**5.06**	**132.58**
Business Interruption						
	Income	0.00	0.04	0.00	0.01	0.05
	Relocation	0.08	0.00	0.00	0.00	0.09
	Rental Income	0.01	0.00	0.00	0.00	0.01
	Wage	0.00	0.04	0.00	0.02	0.06
	Subtotal	**0.09**	**0.09**	**0.00**	**0.03**	**0.22**
ALL	**Total**	**102.31**	**15.34**	**10.05**	**5.09**	**132.79**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars) Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 2, 4-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	1,409,507	63.2%
Commercial	513,925	23.0%
Industrial	254,935	11.4%
Agricultural	14,435	0.6%
Religion	21,979	1.0%
Government	4,241	0.2%
Education	12,182	0.5%
Total	**2,231,204**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name: New Bedford, Fairhaven and Acushnet

Scenario Name: Category 2, 4-foot SLR

Return Period Analyzed: Mix0

Analysis Options Analyzed: No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 1,508 buildings will be at least moderately damaged. This is over 74% of the total number of buildings in the scenario. There are an estimated 24 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	5	18.52	14	51.85	3	11.11	1	3.70	3	11.11	1	3.70
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	3	21.43	6	42.86	1	7.14	3	21.43	1	7.14	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	30	2.03	287	19.46	391	26.51	744	50.44	23	1.56
Total	**8**		**50**		**291**		**395**		**748**		**24**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	1	12.50	0	0.00	0	0.00	7	87.50	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
Masonry	2	1.34	5	3.36	16	10.74	22	14.77	104	69.80	0	0.00
Steel	5	17.24	10	34.48	2	6.90	4	13.79	8	27.59	0	0.00
Wood	1	0.08	31	2.36	264	20.14	367	27.99	626	47.75	22	1.68

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	5	0	0	0
Schools	54	4	0	4

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 76,113 tons of debris will be generated. Of the total amount, Finishes comprises 39% of the total, Structure comprises 37% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 3,045 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 4,360 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 11,720 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 700.66 million dollars, which represents 31.40 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 698.18 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 48.48% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	204.38	72.20	26.34	3.71	306.62
	Content	135.04	157.06	68.47	13.80	374.37
	Inventory	0.00	5.28	11.44	0.48	17.19
	Subtotal	**339.43**	**234.53**	**106.24**	**17.98**	**698.18**
Business Interruption						
	Income	0.01	0.78	0.01	0.02	0.81
	Relocation	0.15	0.26	0.01	0.01	0.43
	Rental Income	0.11	0.19	0.00	0.00	0.30
	Wage	0.02	0.78	0.01	0.13	0.94
	Subtotal	**0.28**	**2.01**	**0.04**	**0.16**	**2.48**
ALL	**Total**	**339.71**	**236.54**	**106.28**	**18.14**	**700.66**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 3, 0-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	1,295,657	65.2%
Commercial	430,036	21.6%
Industrial	216,644	10.9%
Agricultural	12,765	0.6%
Religion	15,954	0.8%
Government	4,241	0.2%
Education	11,846	0.6%
Total	**1,987,143**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name: New Bedford, Fairhaven and Acushnet
Scenario Name: Category 3, 0-foot SLR
Return Period Analyzed: Mix0
Analysis Options Analyzed: No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 1,635 buildings will be at least moderately damaged. This is over 82% of the total number of buildings in the scenario. There are an estimated 44 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	6	33.33	4	22.22	2	11.11	4	22.22	2	11.11
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	1	12.50	2	25.00	1	12.50	1	12.50	3	37.50	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	24	1.49	254	15.78	386	23.98	904	56.15	42	2.61
Total	**1**		**32**		**259**		**389**		**911**		**44**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	10	100.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
Masonry	0	0.00	1	0.60	13	7.74	23	13.69	129	76.79	2	1.19
Steel	1	3.85	7	26.92	3	11.54	3	11.54	11	42.31	1	3.85
Wood	0	0.00	24	1.69	241	16.98	362	25.51	753	53.07	39	2.75

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	5	0	0	0
Schools	54	4	0	4

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 87,273 tons of debris will be generated. Of the total amount, Finishes comprises 37% of the total, Structure comprises 39% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 3,491 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 4,229 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 11,517 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 699.46 million dollars, which represents 35.20 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 697.28 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 52.80% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	223.56	73.30	22.46	3.79	323.11
	Content	145.49	146.38	55.31	12.77	359.94
	Inventory	0.00	5.13	8.61	0.49	14.23
	Subtotal	**369.04**	**224.81**	**86.38**	**17.05**	**697.28**
Business Interruption						
	Income	0.00	0.71	0.00	0.02	0.73
	Relocation	0.16	0.23	0.01	0.00	0.41
	Rental Income	0.11	0.18	0.00	0.00	0.29
	Wage	0.00	0.65	0.01	0.11	0.76
	Subtotal	**0.28**	**1.76**	**0.02**	**0.13**	**2.19**
ALL	**Total**	**369.32**	**226.57**	**86.39**	**17.19**	**699.46**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 3, 1-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	1,527,386	61.0%
Commercial	529,818	21.2%
Industrial	392,890	15.7%
Agricultural	14,684	0.6%
Religion	22,995	0.9%
Government	4,508	0.2%
Education	12,182	0.5%
Total	**2,504,463**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name: New Bedford, Fairhaven and Acushnet
Scenario Name: Category 3, 1-foot SLR
Return Period Analyzed: Mix0
Analysis Options Analyzed: No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 1,856 buildings will be at least moderately damaged. This is over 78% of the total number of buildings in the scenario. There are an estimated 88 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	6	16.22	18	48.65	4	10.81	2	5.41	4	10.81	3	8.11
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	2	13.33	7	46.67	1	6.67	2	13.33	3	20.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	31	1.71	250	13.80	387	21.36	1,059	58.44	85	4.69
Total	**8**		**56**		**255**		**391**		**1,066**		**88**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	1	10.00	0	0.00	0	0.00	9	90.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
Masonry	2	1.05	8	4.21	10	5.26	20	10.53	146	76.84	4	2.11
Steel	5	12.82	14	35.90	4	10.26	3	7.69	11	28.21	2	5.13
Wood	1	0.06	33	2.05	238	14.76	366	22.70	892	55.33	82	5.09

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	5	0	0	0
Schools	54	4	0	4

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 108,718 tons of debris will be generated. Of the total amount, Finishes comprises 35% of the total, Structure comprises 40% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 4,349 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 4,942 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 13,240 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 873.34 million dollars, which represents 34.87 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 870.45 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 48.65% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	256.81	90.60	33.69	5.03	386.13
	Content	167.76	190.44	86.48	18.10	462.78
	Inventory	0.00	6.54	14.42	0.58	21.54
	Subtotal	**424.57**	**287.58**	**134.59**	**23.71**	**870.45**
Business Interruption						
	Income	0.01	0.89	0.01	0.03	0.94
	Relocation	0.19	0.29	0.02	0.01	0.50
	Rental Income	0.13	0.22	0.00	0.00	0.35
	Wage	0.02	0.91	0.02	0.16	1.10
	Subtotal	**0.34**	**2.31**	**0.04**	**0.19**	**2.89**
ALL	**Total**	**424.91**	**289.89**	**134.63**	**23.91**	**873.34**

Appendix A: County Listing for the Region

Massachusetts

- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars) Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 3, 2-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	2,134,832	64.9%
Commercial	647,210	19.7%
Industrial	432,413	13.1%
Agricultural	17,893	0.5%
Religion	31,935	1.0%
Government	8,244	0.3%
Education	16,199	0.5%
Total	**3,288,726**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name: New Bedford, Fairhaven and Acushnet
Scenario Name: Category 3, 2-foot SLR
Return Period Analyzed: Mix0
Analysis Options Analyzed: No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 3,125 buildings will be at least moderately damaged. This is over 86% of the total number of buildings in the scenario. There are an estimated 850 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	4	8.51	4	8.51	8	17.02	17	36.17	14	29.79
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	1	4.55	1	4.55	3	13.64	17	77.27
Religion	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	37	1.21	275	9.00	488	15.97	1,436	47.00	819	26.81
Total	**0**		**42**		**280**		**497**		**1,456**		**850**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	1	7.14	0	0.00	0	0.00	11	78.57	2	14.29
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	4	100.00
Masonry	0	0.00	2	0.72	10	3.61	13	4.69	179	64.62	73	26.35
Steel	0	0.00	3	5.88	4	7.84	7	13.73	20	39.22	17	33.33
Wood	0	0.00	35	1.27	265	9.63	473	17.19	1,236	44.91	743	27.00

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	1	0	1
Hospitals	0	0	0	0
Police Stations	5	0	0	0
Schools	54	9	0	9

If this report displays all zeros or is blank, two possibilities can explain this.
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.
(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 292,035 tons of debris will be generated. Of the total amount, Finishes comprises 25% of the total, Structure comprises 45% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 11,681 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 8,089 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 22,233 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 1,837.92 million dollars, which represents 55.89 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 1,832.69 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 45.45% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	517.43	194.72	102.50	12.80	827.44
	Content	317.22	366.96	231.98	40.95	957.11
	Inventory	0.00	12.41	34.75	0.99	48.14
	Subtotal	**834.65**	**574.09**	**369.22**	**54.73**	**1,832.69**
Business Interruption						
	Income	0.03	1.57	0.02	0.07	1.69
	Relocation	0.31	0.45	0.04	0.02	0.81
	Rental Income	0.23	0.32	0.00	0.00	0.55
	Wage	0.07	1.69	0.04	0.38	2.17
	Subtotal	**0.64**	**4.03**	**0.10**	**0.46**	**5.23**
ALL	**Total**	**835.29**	**578.12**	**369.32**	**55.20**	**1,837.92**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 3, 4-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	2,339,595	65.8%
Commercial	691,946	19.5%
Industrial	435,062	12.2%
Agricultural	18,205	0.5%
Religion	41,933	1.2%
Government	8,244	0.2%
Education	20,851	0.6%
Total	**3,555,836**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name: New Bedford, Fairhaven and Acushnet
Scenario Name: Category 3, 4-foot SLR
Return Period Analyzed: Mix0
Analysis Options Analyzed: No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 3,798 buildings will be at least moderately damaged. This is over 89% of the total number of buildings in the scenario. There are an estimated 1,399 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	2	3.33	6	10.00	7	11.67	2	3.33	10	16.67	33	55.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	1	3.45	5	17.24	23	79.31
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	35	0.94	252	6.79	470	12.67	1,611	43.41	1,343	36.19
Total	**2**		**41**		**259**		**473**		**1,626**		**1,399**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	1	6.67	0	0.00	0	0.00	11	73.33	3	20.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	9	100.00
Masonry	0	0.00	1	0.30	11	3.31	6	1.81	182	54.82	132	39.76
Steel	2	3.13	4	6.25	5	7.81	3	4.69	19	29.69	31	48.44
Wood	0	0.00	33	0.99	240	7.20	463	13.89	1,396	41.87	1,202	36.05

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	1	0	1
Hospitals	0	0	0	0
Police Stations	5	1	0	1
Schools	54	9	0	9

If this report displays all zeros or is blank, two possibilities can explain this.
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.
(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 431,555 tons of debris will be generated. Of the total amount, Finishes comprises 22% of the total, Structure comprises 46% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 17,262 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 9,298 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 25,651 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 2,198.89 million dollars, which represents 61.84 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 2,192.78 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 47.12% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	651.98	249.30	116.96	18.81	1,037.04
	Content	383.28	418.06	254.81	46.95	1,103.08
	Inventory	0.00	13.76	37.80	1.10	52.66
	Subtotal	**1,035.25**	**681.12**	**409.56**	**66.85**	**2,192.78**
Business Interruption						
	Income	0.03	1.85	0.03	0.08	1.99
	Relocation	0.41	0.50	0.04	0.03	0.97
	Rental Income	0.28	0.36	0.00	0.00	0.65
	Wage	0.08	1.94	0.04	0.44	2.50
	Subtotal	**0.80**	**4.66**	**0.11**	**0.55**	**6.11**
ALL	**Total**	**1,036.05**	**685.77**	**409.66**	**67.40**	**2,198.89**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 4, 0-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	2,443,528	66.4%
Commercial	702,480	19.1%
Industrial	436,326	11.9%
Agricultural	18,285	0.5%
Religion	45,724	1.2%
Government	10,618	0.3%
Education	20,972	0.6%
Total	**3,677,933**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	New Bedford, Fairhaven and Acushnet
Scenario Name:	Category 4, 0-foot SLR
Return Period Analyzed:	Mix0
Analysis Options Analyzed:	No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 4,067 buildings will be at least moderately damaged. This is over 90% of the total number of buildings in the scenario. There are an estimated 1,718 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	2	3.28	3	4.92	6	9.84	4	6.56	5	8.20	41	67.21
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	1	3.13	4	12.50	27	84.38
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	27	0.68	232	5.84	445	11.19	1,622	40.79	1,650	41.50
Total	**2**		**30**		**238**		**450**		**1,631**		**1,718**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	11	78.57	3	21.43
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	14	100.00
Masonry	0	0.00	0	0.00	13	3.76	8	2.31	174	50.29	151	43.64
Steel	2	2.99	3	4.48	4	5.97	5	7.46	16	23.88	37	55.22
Wood	0	0.00	26	0.73	218	6.09	437	12.22	1,415	39.56	1,481	41.40

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	1	0	1
Hospitals	0	0	0	0
Police Stations	5	1	0	1
Schools	54	10	1	11

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 486,966 tons of debris will be generated. Of the total amount, Finishes comprises 22% of the total, Structure comprises 46% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 19,479 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 9,793 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 27,019 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 2,343.16 million dollars, which represents 63.71 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 2,336.77 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 48.12% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	715.73	267.58	121.91	21.26	1,126.48
	Content	410.96	433.13	262.95	49.09	1,156.13
	Inventory	0.00	14.14	38.88	1.14	54.16
	Subtotal	**1,126.69**	**714.85**	**423.74**	**71.49**	**2,336.77**
Business Interruption						
	Income	0.03	1.93	0.03	0.09	2.07
	Relocation	0.43	0.52	0.04	0.03	1.02
	Rental Income	0.31	0.37	0.00	0.00	0.69
	Wage	0.08	2.02	0.04	0.47	2.62
	Subtotal	**0.86**	**4.84**	**0.11**	**0.59**	**6.39**
ALL	**Total**	**1,127.55**	**719.69**	**423.85**	**72.08**	**2,343.16**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: mom_80mb1

Flood Scenario: Category 4, 1-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	2,482,489	66.5%
Commercial	706,666	18.9%
Industrial	444,572	11.9%
Agricultural	18,285	0.5%
Religion	46,768	1.3%
Government	10,618	0.3%
Education	20,972	0.6%
Total	**3,730,370**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	New Bedford, Fairhaven and Acushnet
Scenario Name:	Category 4, 1-foot SLR
Return Period Analyzed:	Mix0
Analysis Options Analyzed:	No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 4,291 buildings will be at least moderately damaged. This is over 91% of the total number of buildings in the scenario. There are an estimated 2,016 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	2	3.28	5	8.20	3	4.92	5	8.20	3	4.92	43	70.49
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	1	3.03	4	12.12	28	84.85
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	29	0.69	217	5.17	403	9.60	1,605	38.22	1,945	46.32
Total	**2**		**34**		**220**		**409**		**1,612**		**2,016**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	1	5.88	0	0.00	12	70.59	4	23.53
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	15	100.00
Masonry	0	0.00	0	0.00	10	2.79	9	2.51	156	43.45	184	51.25
Steel	2	2.94	3	4.41	2	2.94	5	7.35	13	19.12	43	63.24
Wood	0	0.00	29	0.77	207	5.48	394	10.44	1,416	37.52	1,728	45.79

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	1	0	1
Hospitals	0	0	0	0
Police Stations	5	1	0	1
Schools	54	10	1	11

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 542,153 tons of debris will be generated. Of the total amount, Finishes comprises 22% of the total, Structure comprises 46% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 21,686 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 10,203 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 28,219 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 2,473.23 million dollars, which represents 66.30 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 2,466.58 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 48.66% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	768.46	287.67	126.35	23.82	1,206.30
	Content	434.17	448.85	270.39	51.14	1,204.54
	Inventory	0.00	14.55	40.02	1.18	55.74
	Subtotal	**1,202.63**	**751.06**	**436.76**	**76.13**	**2,466.58**
Business Interruption						
	Income	0.03	2.00	0.03	0.10	2.16
	Relocation	0.46	0.54	0.04	0.03	1.07
	Rental Income	0.33	0.38	0.00	0.00	0.72
	Wage	0.08	2.09	0.04	0.49	2.71
	Subtotal	**0.91**	**5.01**	**0.11**	**0.62**	**6.65**
ALL	**Total**	**1,203.54**	**756.07**	**436.87**	**76.75**	**2,473.23**

Appendix A: County Listing for the Region

Massachusetts

- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 4, 2-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	2,598,362	67.3%
Commercial	714,835	18.5%
Industrial	448,090	11.6%
Agricultural	18,520	0.5%
Religion	47,350	1.2%
Government	11,023	0.3%
Education	20,972	0.5%
Total	**3,859,152**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name: New Bedford, Fairhaven and Acushnet
Scenario Name: Category 4, 2-foot SLR
Return Period Analyzed: Mix0
Analysis Options Analyzed: No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 4,490 buildings will be at least moderately damaged. This is over 92% of the total number of buildings in the scenario. There are an estimated 2,308 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	2	2.90	6	8.70	2	2.90	4	5.80	5	7.25	50	72.46
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	1	2.94	3	8.82	30	88.24
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	26	0.59	211	4.81	369	8.41	1,555	35.43	2,228	50.76
Total	**2**		**32**		**213**		**374**		**1,563**		**2,308**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	1	5.56	0	0.00	8	44.44	9	50.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	16	100.00
Masonry	0	0.00	2	0.51	10	2.56	10	2.56	143	36.67	225	57.69
Steel	2	2.90	4	5.80	1	1.45	4	5.80	11	15.94	47	68.12
Wood	0	0.00	28	0.71	201	5.09	360	9.12	1,392	35.26	1,967	49.82

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	1	0	1
Hospitals	0	0	0	0
Police Stations	5	1	0	1
Schools	54	10	1	11

If this report displays all zeros or is blank, two possibilities can explain this.
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.
(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 587,252 tons of debris will be generated. Of the total amount, Finishes comprises 21% of the total, Structure comprises 46% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 23,490 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 10,513 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 29,120 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 2,577.01 million dollars, which represents 66.78 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 2,570.16 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 49.04% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	810.41	303.37	130.03	26.09	1,269.90
	Content	452.40	461.04	276.95	52.75	1,243.13
	Inventory	0.00	14.88	41.04	1.22	57.13
	Subtotal	**1,262.81**	**779.28**	**448.02**	**80.05**	**2,570.16**
Business Interruption						
	Income	0.03	2.07	0.03	0.10	2.23
	Relocation	0.48	0.55	0.04	0.03	1.10
	Rental Income	0.34	0.40	0.00	0.00	0.74
	Wage	0.09	2.14	0.04	0.51	2.79
	Subtotal	**0.94**	**5.16**	**0.11**	**0.65**	**6.86**
ALL	**Total**	**1,263.75**	**784.44**	**448.13**	**80.70**	**2,577.01**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars) Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 4, 4-foot SLR

Print Date: Friday, June 06, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	2,632,545	67.5%
Commercial	720,472	18.5%
Industrial	448,458	11.5%
Agricultural	18,584	0.5%
Religion	47,788	1.2%
Government	11,023	0.3%
Education	20,972	0.5%
Total	**3,899,842**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name: New Bedford, Fairhaven and Acushnet
Scenario Name: Category 4, 4-foot SLR
Return Period Analyzed: Mix0
Analysis Options Analyzed: No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 5,672 buildings will be at least moderately damaged. This is over 99% of the total number of buildings in the scenario. There are an estimated 5,429 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	7	100.00
Commercial	0	0.00	2	1.08	0	0.00	0	0.00	0	0.00	183	98.92
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	100.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	3	100.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	5	7.81	59	92.19
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	10	100.00
Residential	0	0.00	1	0.02	16	0.30	37	0.69	182	3.37	5,165	95.63
Total	**0**		**3**		**16**		**37**		**187**		**5,429**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	30	100.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	23	100.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	4	0.73	546	99.27
Steel	0	0.00	2	1.32	0	0.00	0	0.00	5	3.31	144	95.36
Wood	0	0.00	1	0.02	16	0.33	37	0.77	177	3.67	4,592	95.21

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	1	1
Hospitals	0	0	0	0
Police Stations	5	0	1	1
Schools	54	1	10	11

If this report displays all zeros or is blank, two possibilities can explain this.
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.
(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 898,553 tons of debris will be generated. Of the total amount, Finishes comprises 20% of the total, Structure comprises 45% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 35,942 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 11,013 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 30,600 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 3,258.34 million dollars, which represents 83.55 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 3,250.63 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 51.48% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	1,135.25	428.13	154.10	51.62	1,769.10
	Content	540.93	508.96	309.38	59.48	1,418.75
	Inventory	0.00	15.84	45.57	1.38	62.79
	Subtotal	**1,676.18**	**952.93**	**509.04**	**112.48**	**3,250.63**
Business Interruption						
	Income	0.04	2.32	0.03	0.12	2.50
	Relocation	0.55	0.61	0.04	0.04	1.24
	Rental Income	0.39	0.43	0.00	0.00	0.83
	Wage	0.10	2.40	0.04	0.60	3.14
	Subtotal	**1.08**	**5.76**	**0.12**	**0.76**	**7.71**
ALL	**Total**	**1,677.26**	**958.68**	**509.16**	**113.24**	**3,258.34**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 4 (Extreme), 0-foot SLR

Print Date: Friday, June 06, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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Note:
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There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

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Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	2,641,471	67.6%
Commercial	722,026	18.5%
Industrial	448,473	11.5%
Agricultural	18,520	0.5%
Religion	47,564	1.2%
Government	11,023	0.3%
Education	20,972	0.5%
Total	**3,910,049**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	New Bedford, Fairhaven and Acushnet
Scenario Name:	Category 4 (Extreme), 0-foot SLR
Return Period Analyzed:	Mix0
Analysis Options Analyzed:	No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 4,765 buildings will be at least moderately damaged. This is over 92% of the total number of buildings in the scenario. There are an estimated 2,792 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	2	2.60	6	7.79	2	2.60	2	2.60	6	7.79	59	76.62
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	1	2.50	4	10.00	35	87.50
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	22	0.47	199	4.28	321	6.90	1,410	30.32	2,698	58.02
Total	**2**		**28**		**201**		**324**		**1,420**		**2,792**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	4	28.57	10	71.43
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	19	100.00
Masonry	0	0.00	2	0.49	8	1.96	7	1.72	109	26.72	282	69.12
Steel	2	2.63	4	5.26	1	1.32	2	2.63	9	11.84	58	76.32
Wood	0	0.00	24	0.57	191	4.57	314	7.51	1,286	30.74	2,368	56.61

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	1	0	1
Hospitals	0	0	0	0
Police Stations	5	1	0	1
Schools	54	7	4	11

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 658,688 tons of debris will be generated. Of the total amount, Finishes comprises 21% of the total, Structure comprises 47% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 26,348 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 11,048 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 30,692 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 2,745.25 million dollars, which represents 70.21 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 2,738.04 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 49.64% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	880.48	328.50	136.15	30.19	1,375.32
	Content	481.28	479.61	287.29	55.45	1,303.64
	Inventory	0.00	15.28	42.53	1.28	59.08
	Subtotal	**1,361.77**	**823.39**	**465.97**	**86.92**	**2,738.04**
Business Interruption						
	Income	0.04	2.18	0.03	0.11	2.35
	Relocation	0.51	0.57	0.04	0.04	1.16
	Rental Income	0.36	0.41	0.00	0.00	0.77
	Wage	0.09	2.24	0.04	0.55	2.92
	Subtotal	**1.00**	**5.40**	**0.12**	**0.70**	**7.21**
ALL	**Total**	**1,362.77**	**828.79**	**466.08**	**87.61**	**2,745.25**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 4 (Extreme), 1-foot SLR

Print Date: Friday, June 06, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	2,688,948	67.7%
Commercial	729,659	18.4%
Industrial	450,184	11.3%
Agricultural	18,584	0.5%
Religion	49,971	1.3%
Government	11,023	0.3%
Education	20,972	0.5%
Total	**3,969,341**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name: New Bedford, Fairhaven and Acushnet
Scenario Name: Category 4 (Extreme), 1-foot SLR
Return Period Analyzed: Mix0
Analysis Options Analyzed: No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 4,962 buildings will be at least moderately damaged. This is over 92% of the total number of buildings in the scenario. There are an estimated 3,084 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	6	7.59	3	3.80	1	1.27	6	7.59	63	79.75
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	4	8.51	0	0.00	1	2.13	7	14.89	35	74.47
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	22	0.45	197	4.07	319	6.60	1,312	27.13	2,986	61.75
Total	**0**		**32**		**200**		**321**		**1,325**		**3,084**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	1	7.69	12	92.31
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	20	100.00
Masonry	0	0.00	2	0.47	7	1.65	5	1.18	90	21.23	320	75.47
Steel	0	0.00	6	6.90	3	3.45	2	2.30	11	12.64	65	74.71
Wood	0	0.00	24	0.55	189	4.34	313	7.19	1,211	27.82	2,616	60.10

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	1	0	1
Hospitals	0	0	0	0
Police Stations	5	1	0	1
Schools	54	5	6	11

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 696,387 tons of debris will be generated. Of the total amount, Finishes comprises 21% of the total, Structure comprises 47% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 27,855 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 11,359 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 31,551 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 2,843.91 million dollars, which represents 71.65 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 2,836.53 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 49.92% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	920.41	341.90	140.46	32.55	1,435.32
	Content	498.11	489.43	295.78	57.23	1,340.54
	Inventory	0.00	15.47	43.89	1.32	60.67
	Subtotal	**1,418.52**	**846.80**	**480.13**	**91.09**	**2,836.53**
Business Interruption						
	Income	0.04	2.22	0.03	0.11	2.40
	Relocation	0.54	0.58	0.04	0.04	1.20
	Rental Income	0.37	0.42	0.00	0.00	0.79
	Wage	0.09	2.28	0.05	0.57	2.99
	Subtotal	**1.04**	**5.50**	**0.12**	**0.72**	**7.38**
ALL	**Total**	**1,419.55**	**852.30**	**480.25**	**91.81**	**2,843.91**

Appendix A: County Listing for the Region

Massachusetts

- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 4 (Extreme), 2-foot SLR

Print Date: Friday, June 06, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	2,726,340	67.6%
Commercial	746,119	18.5%
Industrial	452,022	11.2%
Agricultural	19,149	0.5%
Religion	49,971	1.2%
Government	11,821	0.3%
Education	27,087	0.7%
Total	**4,032,509**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name: New Bedford, Fairhaven and Acushnet
Scenario Name: Category 4 (Extreme), 2-foot SLR
Return Period Analyzed: Mix0
Analysis Options Analyzed: No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 5,083 buildings will be at least moderately damaged. This is over 92% of the total number of buildings in the scenario. There are an estimated 3,319 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	100.00
Commercial	0	0.00	6	7.50	2	2.50	1	1.25	4	5.00	67	83.75
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	4	9.09	0	0.00	1	2.27	5	11.36	34	77.27
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	24	0.48	193	3.89	311	6.27	1,213	24.47	3,216	64.88
Total	**0**		**34**		**195**		**313**		**1,222**		**3,319**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	1	6.67	14	93.33
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	19	100.00
Masonry	0	0.00	2	0.46	5	1.15	6	1.38	71	16.36	350	80.65
Steel	0	0.00	6	7.06	2	2.35	2	2.35	8	9.41	67	78.82
Wood	0	0.00	26	0.58	186	4.17	304	6.82	1,131	25.36	2,813	63.07

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	1	0	1
Hospitals	0	0	0	0
Police Stations	5	1	0	1
Schools	54	5	6	11

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 726,714 tons of debris will be generated. Of the total amount, Finishes comprises 20% of the total, Structure comprises 47% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 29,069 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 11,636 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 32,330 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 2,926.33 million dollars, which represents 72.57 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 2,918.78 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 50.14% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	954.47	353.37	143.83	34.74	1,486.41
	Content	511.77	497.03	302.61	58.94	1,370.35
	Inventory	0.00	15.66	45.01	1.35	62.02
	Subtotal	**1,466.24**	**866.05**	**491.45**	**95.04**	**2,918.78**
Business Interruption						
	Income	0.04	2.25	0.03	0.12	2.44
	Relocation	0.56	0.59	0.05	0.04	1.23
	Rental Income	0.38	0.42	0.00	0.00	0.81
	Wage	0.10	2.32	0.05	0.61	3.07
	Subtotal	**1.08**	**5.58**	**0.13**	**0.76**	**7.54**
ALL	**Total**	**1,467.32**	**871.64**	**491.58**	**95.80**	**2,926.33**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 4 (Extreme), 4-foot SLR

Print Date: Friday, June 06, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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Hazus Global Summary Report Category 4 (Extreme), 4-foot SLR

General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Hazus Global Summary Report Category 4 (Extreme), 4-foot SLR

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	2,780,618	67.3%
Commercial	788,213	19.1%
Industrial	451,676	10.9%
Agricultural	19,295	0.5%
Religion	53,283	1.3%
Government	11,821	0.3%
Education	27,202	0.7%
Total	**4,132,108**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Hazus Global Summary Report Category 4 (Extreme), 4-foot SLR

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name: New Bedford, Fairhaven and Acushnet

Scenario Name: Category 4 (Extreme), 4-foot SLR

Return Period Analyzed: Mix0

Analysis Options Analyzed: No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 5,480 buildings will be at least moderately damaged. This is over 93% of the total number of buildings in the scenario. There are an estimated 3,830 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
Commercial	0	0.00	4	4.26	3	3.19	2	2.13	2	2.13	83	88.30
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	4	6.78	6	10.17	2	3.39	0	0.00	6	10.17	41	69.49
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
Residential	0	0.00	26	0.49	186	3.49	312	5.85	1,101	20.66	3,704	69.51
Total	**4**		**36**		**191**		**314**		**1,109**		**3,830**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	15	100.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	15	100.00
Masonry	0	0.00	2	0.42	4	0.85	6	1.27	52	10.99	409	86.47
Steel	2	1.98	6	5.94	4	3.96	2	1.98	7	6.93	80	79.21
Wood	0	0.00	26	0.54	180	3.76	305	6.37	1,039	21.69	3,240	67.64

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	1	0	1
Hospitals	0	0	0	0
Police Stations	5	2	0	2
Schools	54	5	8	13

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 790,409 tons of debris will be generated. Of the total amount, Finishes comprises 20% of the total, Structure comprises 46% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 31,616 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 12,252 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 34,211 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 3,121.78 million dollars, which represents 75.55 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 3,113.77 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 50.48% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	1,030.80	381.31	152.28	39.00	1,603.39
	Content	543.90	518.45	319.30	63.40	1,445.04
	Inventory	0.00	15.99	47.95	1.41	65.34
	Subtotal	**1,574.69**	**915.75**	**519.53**	**103.81**	**3,113.77**
Business Interruption						
	Income	0.04	2.35	0.03	0.13	2.55
	Relocation	0.59	0.61	0.05	0.05	1.30
	Rental Income	0.41	0.44	0.01	0.00	0.86
	Wage	0.10	2.47	0.05	0.68	3.30
	Subtotal	**1.15**	**5.86**	**0.14**	**0.86**	**8.01**
ALL	**Total**	**1,575.84**	**921.61**	**519.66**	**104.66**	**3,121.78**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 1, 0-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	396,672	70.9%
Commercial	89,927	16.1%
Industrial	57,647	10.3%
Agricultural	8,824	1.6%
Religion	4,335	0.8%
Government	764	0.1%
Education	1,665	0.3%
Total	**559,834**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	New Bedford, Fairhaven and Acushnet
Scenario Name:	Category 1, 0-foot SLR
Return Period Analyzed:	Mix0
Analysis Options Analyzed:	No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 194 buildings will be at least moderately damaged. This is over 40% of the total number of buildings in the scenario. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	48	24.74	119	61.34	8	4.12	19	9.79	0	0.00
Total	**0**		**48**		**119**		**8**		**19**		**0**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	48	24.87	118	61.14	8	4.15	19	9.84	0	0.00

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	5	0	0	0
Schools	54	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 6,168 tons of debris will be generated. Of the total amount, Finishes comprises 40% of the total, Structure comprises 37% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 247 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 459 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 818 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 34.18 million dollars, which represents 6.11 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 34.11 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 76.44% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	15.61	0.97	0.57	0.40	17.54
	Content	10.50	3.22	1.23	1.20	16.15
	Inventory	0.00	0.06	0.22	0.13	0.42
	Subtotal	**26.11**	**4.25**	**2.03**	**1.73**	**34.11**
Business Interruption						
	Income	0.00	0.02	0.00	0.00	0.02
	Relocation	0.02	0.00	0.00	0.00	0.02
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.02	0.00	0.01	0.03
	Subtotal	**0.02**	**0.04**	**0.00**	**0.01**	**0.07**
ALL	**Total**	**26.13**	**4.29**	**2.03**	**1.74**	**34.18**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 1, 0-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

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Note:
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There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

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Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

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Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
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Commercial	89,927	16.1%
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Agricultural	8,824	1.6%
Religion	4,335	0.8%
Government	764	0.1%
Education	1,665	0.3%
Total	**559,834**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	New Bedford, Fairhaven and Acushnet
Scenario Name:	Category 1, 0-foot SLR
Return Period Analyzed:	Mix0
Analysis Options Analyzed:	No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 194 buildings will be at least moderately damaged. This is over 40% of the total number of buildings in the scenario. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	48	24.74	119	61.34	8	4.12	19	9.79	0	0.00
Total	**0**		**48**		**119**		**8**		**19**		**0**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	48	24.87	118	61.14	8	4.15	19	9.84	0	0.00

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	5	0	0	0
Schools	54	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

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The model estimates that a total of 6,168 tons of debris will be generated. Of the total amount, Finishes comprises 40% of the total, Structure comprises 37% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 247 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 459 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 818 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 34.18 million dollars, which represents 6.11 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 34.11 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 76.44% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

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(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	15.61	0.97	0.57	0.40	17.54
	Content	10.50	3.22	1.23	1.20	16.15
	Inventory	0.00	0.06	0.22	0.13	0.42
	Subtotal	**26.11**	**4.25**	**2.03**	**1.73**	**34.11**
Business Interruption						
	Income	0.00	0.02	0.00	0.00	0.02
	Relocation	0.02	0.00	0.00	0.00	0.02
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.02	0.00	0.01	0.03
	Subtotal	**0.02**	**0.04**	**0.00**	**0.01**	**0.07**
ALL	**Total**	**26.13**	**4.29**	**2.03**	**1.74**	**34.18**

Appendix A: County Listing for the Region

Massachusetts

- Bristol

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	Population	Building Value (thousands of dollars) Residential	Non-Residential	Total
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Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 1, 1-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

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Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	424,734	72.2%
Commercial	90,414	15.4%
Industrial	57,935	9.8%
Agricultural	8,824	1.5%
Religion	4,335	0.7%
Government	764	0.1%
Education	1,665	0.3%
Total	**588,671**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name: New Bedford, Fairhaven and Acushnet
Scenario Name: Category 1, 1-foot SLR
Return Period Analyzed: Mix0
Analysis Options Analyzed: No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 247 buildings will be at least moderately damaged. This is over 45% of the total number of buildings in the scenario. There are an estimated 2 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	47	19.03	142	57.49	28	11.34	28	11.34	2	0.81
Total	**0**		**47**		**142**		**28**		**28**		**2**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	47	19.11	141	57.32	28	11.38	28	11.38	2	0.81

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	5	0	0	0
Schools	54	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.
(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 9,058 tons of debris will be generated. Of the total amount, Finishes comprises 37% of the total, Structure comprises 38% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 362 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 521 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 977 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 44.47 million dollars, which represents 7.55 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 44.38 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 76.97% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	20.34	1.28	0.76	0.50	22.88
	Content	13.86	4.06	1.61	1.44	20.97
	Inventory	0.00	0.08	0.30	0.16	0.53
	Subtotal	**34.20**	**5.42**	**2.67**	**2.10**	**44.38**
Business Interruption						
	Income	0.00	0.02	0.00	0.00	0.03
	Relocation	0.03	0.00	0.00	0.00	0.03
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.02	0.00	0.01	0.03
	Subtotal	**0.03**	**0.05**	**0.00**	**0.01**	**0.09**
ALL	**Total**	**34.23**	**5.47**	**2.67**	**2.10**	**44.47**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 1, 2-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	456,043	73.1%
Commercial	92,424	14.8%
Industrial	58,168	9.3%
Agricultural	8,824	1.4%
Religion	4,335	0.7%
Government	764	0.1%
Education	3,195	0.5%
Total	**623,753**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name: New Bedford, Fairhaven and Acushnet

Scenario Name: Category 1, 2-foot SLR

Return Period Analyzed: Mix0

Analysis Options Analyzed: No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 313 buildings will be at least moderately damaged. This is over 52% of the total number of buildings in the scenario. There are an estimated 2 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	40	12.78	155	49.52	72	23.00	44	14.06	2	0.64
Total	**0**		**40**		**155**		**72**		**44**		**2**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	0	0.00	1	50.00	1	50.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	40	12.86	154	49.52	71	22.83	44	14.15	2	0.64

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	5	0	0	0
Schools	54	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 12,469 tons of debris will be generated. Of the total amount, Finishes comprises 35% of the total, Structure comprises 40% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 499 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 583 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 1,124 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 57.47 million dollars, which represents 9.21 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 57.36 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 77.79% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	26.49	1.70	0.94	0.64	29.76
	Content	18.18	5.08	1.96	1.72	26.94
	Inventory	0.00	0.11	0.37	0.18	0.66
	Subtotal	**44.67**	**6.89**	**3.27**	**2.54**	**57.36**
Business Interruption						
	Income	0.00	0.03	0.00	0.00	0.03
	Relocation	0.04	0.00	0.00	0.00	0.04
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.03	0.00	0.01	0.04
	Subtotal	**0.04**	**0.05**	**0.00**	**0.01**	**0.11**
ALL	**Total**	**44.71**	**6.95**	**3.27**	**2.55**	**57.47**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 1, 4-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	519,768	74.7%
Commercial	97,884	14.1%
Industrial	58,845	8.5%
Agricultural	9,045	1.3%
Religion	4,843	0.7%
Government	2,142	0.3%
Education	3,195	0.5%
Total	**695,722**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	New Bedford, Fairhaven and Acushnet
Scenario Name:	Category 1, 4-foot SLR
Return Period Analyzed:	Mix0
Analysis Options Analyzed:	No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 481 buildings will be at least moderately damaged. This is over 66% of the total number of buildings in the scenario. There are an estimated 3 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	26	5.41	204	42.41	147	30.56	101	21.00	3	0.62
Total	**0**		**26**		**204**		**147**		**101**		**3**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	0	0.00	2	50.00	1	25.00	1	25.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	26	5.45	202	42.35	146	30.61	100	20.96	3	0.63

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	5	0	0	0
Schools	54	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 24,150 tons of debris will be generated. Of the total amount, Finishes comprises 30% of the total, Structure comprises 43% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 966 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 711 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 1,435 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 94.07 million dollars, which represents 13.52 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 93.91 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 78.14% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	43.39	2.92	1.68	0.98	48.97
	Content	30.06	7.80	3.59	2.36	43.81
	Inventory	0.00	0.18	0.72	0.24	1.13
	Subtotal	**73.44**	**10.90**	**5.99**	**3.58**	**93.91**
Business Interruption						
	Income	0.00	0.03	0.00	0.00	0.04
	Relocation	0.06	0.00	0.00	0.00	0.07
	Rental Income	0.01	0.00	0.00	0.00	0.01
	Wage	0.00	0.04	0.00	0.01	0.05
	Subtotal	**0.07**	**0.07**	**0.00**	**0.02**	**0.16**
ALL	**Total**	**73.51**	**10.98**	**5.99**	**3.60**	**94.07**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 2, 0-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	532,058	75.1%
Commercial	98,355	13.9%
Industrial	58,845	8.3%
Agricultural	9,126	1.3%
Religion	4,843	0.7%
Government	2,142	0.3%
Education	3,195	0.5%
Total	**708,564**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	New Bedford, Fairhaven and Acushnet
Scenario Name:	Category 2, 0-foot SLR
Return Period Analyzed:	Mix0
Analysis Options Analyzed:	No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 524 buildings will be at least moderately damaged. This is over 69% of the total number of buildings in the scenario. There are an estimated 6 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	23	4.39	196	37.40	174	33.21	125	23.85	6	1.15
Total	**0**		**23**		**196**		**174**		**125**		**6**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
Masonry	0	0.00	0	0.00	1	25.00	2	50.00	1	25.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	23	4.43	195	37.57	172	33.14	124	23.89	5	0.96

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	5	0	0	0
Schools	54	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 28,128 tons of debris will be generated. Of the total amount, Finishes comprises 29% of the total, Structure comprises 44% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 1,125 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 746 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 1,538 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 104.51 million dollars, which represents 14.75 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 104.33 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 77.92% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	48.07	3.30	1.91	1.15	54.44
	Content	33.29	8.55	4.14	2.63	48.61
	Inventory	0.00	0.20	0.83	0.26	1.29
	Subtotal	**81.36**	**12.05**	**6.89**	**4.04**	**104.33**
Business Interruption						
	Income	0.00	0.04	0.00	0.01	0.04
	Relocation	0.07	0.00	0.00	0.00	0.07
	Rental Income	0.01	0.00	0.00	0.00	0.01
	Wage	0.00	0.04	0.00	0.02	0.05
	Subtotal	**0.07**	**0.08**	**0.00**	**0.02**	**0.18**
ALL	**Total**	**81.43**	**12.13**	**6.89**	**4.06**	**104.51**

Appendix A: County Listing for the Region

Massachusetts

- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars) Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 2, 1-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	545,478	75.4%
Commercial	99,540	13.8%
Industrial	58,922	8.1%
Agricultural	9,126	1.3%
Religion	4,843	0.7%
Government	2,142	0.3%
Education	3,195	0.4%
Total	**723,246**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name: New Bedford, Fairhaven and Acushnet
Scenario Name: 40mb_1_meters
Return Period Analyzed: Mix0
Analysis Options Analyzed: No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 583 buildings will be at least moderately damaged. This is over 73% of the total number of buildings in the scenario. There are an estimated 6 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	21	3.60	198	33.96	183	31.39	175	30.02	6	1.03
Total	**0**		**21**		**198**		**183**		**175**		**6**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
Masonry	0	0.00	0	0.00	1	20.00	2	40.00	2	40.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	21	3.64	197	34.14	181	31.37	173	29.98	5	0.87

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	5	0	0	0
Schools	54	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.
(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 32,522 tons of debris will be generated. Of the total amount, Finishes comprises 28% of the total, Structure comprises 44% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 1,301 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 786 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 1,632 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 117.23 million dollars, which represents 16.21 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 117.03 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 77.58% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	53.72	3.79	2.23	1.33	61.07
	Content	37.15	9.48	4.93	2.91	54.46
	Inventory	0.00	0.22	1.00	0.28	1.50
	Subtotal	**90.87**	**13.48**	**8.16**	**4.52**	**117.03**
Business Interruption						
	Income	0.00	0.04	0.00	0.01	0.05
	Relocation	0.08	0.00	0.00	0.00	0.08
	Rental Income	0.01	0.00	0.00	0.00	0.01
	Wage	0.00	0.04	0.00	0.02	0.06
	Subtotal	**0.08**	**0.09**	**0.00**	**0.03**	**0.20**
ALL	**Total**	**90.95**	**13.57**	**8.16**	**4.55**	**117.23**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars) Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: 40mb_2_meters

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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Hazus Global Summary Report Category 2, 2-foot SLR

General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region .

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B .

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Hazus Global Summary Report Category 2, 2-foot SLR

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	558,055	75.7%
Commercial	100,270	13.6%
Industrial	59,084	8.0%
Agricultural	9,126	1.2%
Religion	4,843	0.7%
Government	2,142	0.3%
Education	3,195	0.4%
Total	**736,715**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Hazus Global Summary Report Category 2, 2-foot SLR

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name: New Bedford, Fairhaven and Acushnet

Scenario Name: Category 2, 2-foot SLR

Return Period Analyzed: Mix0 No What-Ifs

Analysis Options Analyzed:

Building Damage

General Building Stock Damage

Hazus estimates that about 658 buildings will be at least moderately damaged. This is over 76% of the total number of buildings in the scenario. There are an estimated 7 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	21	3.19	184	27.96	207	31.46	239	36.32	7	1.06
Total	**0**		**21**		**184**		**207**		**239**		**7**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
Masonry	0	0.00	0	0.00	1	14.29	2	28.57	4	57.14	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	21	3.23	183	28.15	205	31.54	235	36.15	6	0.92

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	5	0	0	0
Schools	54	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 37,969 tons of debris will be generated. Of the total amount, Finishes comprises 27% of the total, Structure comprises 45% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 1,519 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 837 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 1,769 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 132.79 million dollars, which represents 18.02 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 132.58 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 77.04% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	60.50	4.40	2.70	1.53	69.13
	Content	41.71	10.59	6.09	3.24	61.63
	Inventory	0.00	0.26	1.25	0.30	1.81
	Subtotal	**102.22**	**15.25**	**10.05**	**5.06**	**132.58**
Business Interruption						
	Income	0.00	0.04	0.00	0.01	0.05
	Relocation	0.08	0.00	0.00	0.00	0.09
	Rental Income	0.01	0.00	0.00	0.00	0.01
	Wage	0.00	0.04	0.00	0.02	0.06
	Subtotal	**0.09**	**0.09**	**0.00**	**0.03**	**0.22**
ALL	**Total**	**102.31**	**15.34**	**10.05**	**5.09**	**132.79**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 2, 4-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	1,409,507	63.2%
Commercial	513,925	23.0%
Industrial	254,935	11.4%
Agricultural	14,435	0.6%
Religion	21,979	1.0%
Government	4,241	0.2%
Education	12,182	0.5%
Total	**2,231,204**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name: New Bedford, Fairhaven and Acushnet
Scenario Name: Category 2, 4-foot SLR
Return Period Analyzed: Mix0
Analysis Options Analyzed: No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 1,508 buildings will be at least moderately damaged. This is over 74% of the total number of buildings in the scenario. There are an estimated 24 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	5	18.52	14	51.85	3	11.11	1	3.70	3	11.11	1	3.70
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	3	21.43	6	42.86	1	7.14	3	21.43	1	7.14	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	30	2.03	287	19.46	391	26.51	744	50.44	23	1.56
Total	**8**		**50**		**291**		**395**		**748**		**24**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	1	12.50	0	0.00	0	0.00	7	87.50	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
Masonry	2	1.34	5	3.36	16	10.74	22	14.77	104	69.80	0	0.00
Steel	5	17.24	10	34.48	2	6.90	4	13.79	8	27.59	0	0.00
Wood	1	0.08	31	2.36	264	20.14	367	27.99	626	47.75	22	1.68

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	5	0	0	0
Schools	54	4	0	4

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 76,113 tons of debris will be generated. Of the total amount, Finishes comprises 39% of the total, Structure comprises 37% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 3,045 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 4,360 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 11,720 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 700.66 million dollars, which represents 31.40 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 698.18 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 48.48% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	204.38	72.20	28.34	3.71	306.62
	Content	135.04	157.06	68.47	13.80	374.37
	Inventory	0.00	5.28	11.44	0.48	17.19
	Subtotal	**339.43**	**234.53**	**106.24**	**17.98**	**698.18**
Business Interruption						
	Income	0.01	0.78	0.01	0.02	0.81
	Relocation	0.15	0.26	0.01	0.01	0.43
	Rental Income	0.11	0.19	0.00	0.00	0.30
	Wage	0.02	0.78	0.01	0.13	0.94
	Subtotal	**0.28**	**2.01**	**0.04**	**0.16**	**2.48**
ALL	**Total**	**339.71**	**236.54**	**106.28**	**18.14**	**700.66**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 3, 0-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	1,295,657	65.2%
Commercial	430,036	21.6%
Industrial	216,644	10.9%
Agricultural	12,765	0.6%
Religion	15,954	0.8%
Government	4,241	0.2%
Education	11,846	0.6%
Total	**1,987,143**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	New Bedford, Fairhaven and Acushnet
Scenario Name:	Category 3, 0-foot SLR
Return Period Analyzed:	Mix0
Analysis Options Analyzed:	No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 1,635 buildings will be at least moderately damaged. This is over 82% of the total number of buildings in the scenario. There are an estimated 44 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	6	33.33	4	22.22	2	11.11	4	22.22	2	11.11
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	1	12.50	2	25.00	1	12.50	1	12.50	3	37.50	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	24	1.49	254	15.78	386	23.98	904	56.15	42	2.61
Total	**1**		**32**		**259**		**389**		**911**		**44**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	10	100.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
Masonry	0	0.00	1	0.60	13	7.74	23	13.69	129	76.79	2	1.19
Steel	1	3.85	7	26.92	3	11.54	3	11.54	11	42.31	1	3.85
Wood	0	0.00	24	1.69	241	16.98	362	25.51	753	53.07	39	2.75

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	5	0	0	0
Schools	54	4	0	4

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 87,273 tons of debris will be generated. Of the total amount, Finishes comprises 37% of the total, Structure comprises 39% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 3,491 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 4,229 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 11,517 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 699.46 million dollars, which represents 35.20 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 697.28 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 52.80% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	223.56	73.30	22.46	3.79	323.11
	Content	145.49	146.38	55.31	12.77	359.94
	Inventory	0.00	5.13	8.61	0.49	14.23
	Subtotal	**369.04**	**224.81**	**86.38**	**17.05**	**697.28**
Business Interruption						
	Income	0.00	0.71	0.00	0.02	0.73
	Relocation	0.16	0.23	0.01	0.00	0.41
	Rental Income	0.11	0.18	0.00	0.00	0.29
	Wage	0.00	0.65	0.01	0.11	0.76
	Subtotal	**0.28**	**1.76**	**0.02**	**0.13**	**2.19**
ALL	**Total**	**369.32**	**226.57**	**86.39**	**17.19**	**699.46**

Appendix A: County Listing for the Region

Massachusetts

- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 3, 1-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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Note:
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There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

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Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	1,527,386	61.0%
Commercial	529,818	21.2%
Industrial	392,890	15.7%
Agricultural	14,684	0.6%
Religion	22,995	0.9%
Government	4,508	0.2%
Education	12,182	0.5%
Total	**2,504,463**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name: New Bedford, Fairhaven and Acushnet
Scenario Name: Category 3, 1-foot SLR
Return Period Analyzed: Mix0
Analysis Options Analyzed: No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 1,856 buildings will be at least moderately damaged. This is over 78% of the total number of buildings in the scenario. There are an estimated 88 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	6	16.22	18	48.65	4	10.81	2	5.41	4	10.81	3	8.11
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	2	13.33	7	46.67	1	6.67	2	13.33	3	20.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	31	1.71	250	13.80	387	21.36	1,059	58.44	85	4.69
Total	**8**		**56**		**255**		**391**		**1,066**		**88**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	1	10.00	0	0.00	0	0.00	9	90.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
Masonry	2	1.05	8	4.21	10	5.26	20	10.53	146	76.84	4	2.11
Steel	5	12.82	14	35.90	4	10.26	3	7.69	11	28.21	2	5.13
Wood	1	0.06	33	2.05	238	14.76	366	22.70	892	55.33	82	5.09

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	5	0	0	0
Schools	54	4	0	4

If this report displays all zeros or is blank, two possibilities can explain this.
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.
(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 108,718 tons of debris will be generated. Of the total amount, Finishes comprises 35% of the total, Structure comprises 40% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 4,349 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 4,942 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 13,240 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 873.34 million dollars, which represents 34.87 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 870.45 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 48.65% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	256.81	90.60	33.69	5.03	386.13
	Content	167.76	190.44	86.48	18.10	462.78
	Inventory	0.00	6.54	14.42	0.58	21.54
	Subtotal	**424.57**	**287.58**	**134.59**	**23.71**	**870.45**
Business Interruption						
	Income	0.01	0.89	0.01	0.03	0.94
	Relocation	0.19	0.29	0.02	0.01	0.50
	Rental Income	0.13	0.22	0.00	0.00	0.35
	Wage	0.02	0.91	0.02	0.16	1.10
	Subtotal	**0.34**	**2.31**	**0.04**	**0.19**	**2.89**
ALL	**Total**	**424.91**	**289.89**	**134.63**	**23.91**	**873.34**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars) Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 3, 2-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	2,134,832	64.9%
Commercial	647,210	19.7%
Industrial	432,413	13.1%
Agricultural	17,893	0.5%
Religion	31,935	1.0%
Government	8,244	0.3%
Education	16,199	0.5%
Total	**3,288,726**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name: New Bedford, Fairhaven and Acushnet

Scenario Name: Category 3, 2-foot SLR

Return Period Analyzed: Mix0

Analysis Options Analyzed: No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 3,125 buildings will be at least moderately damaged. This is over 86% of the total number of buildings in the scenario. There are an estimated 850 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	4	8.51	4	8.51	8	17.02	17	36.17	14	29.79
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	1	4.55	1	4.55	3	13.64	17	77.27
Religion	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	37	1.21	275	9.00	488	15.97	1,436	47.00	819	26.81
Total	**0**		**42**		**280**		**497**		**1,456**		**850**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	1	7.14	0	0.00	0	0.00	11	78.57	2	14.29
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	4	100.00
Masonry	0	0.00	2	0.72	10	3.61	13	4.69	179	64.62	73	26.35
Steel	0	0.00	3	5.88	4	7.84	7	13.73	20	39.22	17	33.33
Wood	0	0.00	35	1.27	265	9.63	473	17.19	1,236	44.91	743	27.00

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	1	0	1
Hospitals	0	0	0	0
Police Stations	5	0	0	0
Schools	54	9	0	9

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 292,035 tons of debris will be generated. Of the total amount, Finishes comprises 25% of the total, Structure comprises 45% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 11,681 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 8,089 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 22,233 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 1,837.92 million dollars, which represents 55.89 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 1,832.69 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 45.45% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	517.43	194.72	102.50	12.80	827.44
	Content	317.22	366.96	231.98	40.95	957.11
	Inventory	0.00	12.41	34.75	0.99	48.14
	Subtotal	**834.65**	**574.09**	**369.22**	**54.73**	**1,832.69**
Business Interruption						
	Income	0.03	1.57	0.02	0.07	1.69
	Relocation	0.31	0.45	0.04	0.02	0.81
	Rental Income	0.23	0.32	0.00	0.00	0.55
	Wage	0.07	1.69	0.04	0.38	2.17
	Subtotal	**0.64**	**4.03**	**0.10**	**0.46**	**5.23**
ALL	**Total**	**835.29**	**578.12**	**369.32**	**55.20**	**1,837.92**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 3, 4-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	2,339,595	65.8%
Commercial	691,946	19.5%
Industrial	435,062	12.2%
Agricultural	18,205	0.5%
Religion	41,933	1.2%
Government	8,244	0.2%
Education	20,851	0.6%
Total	**3,555,836**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	New Bedford, Fairhaven and Acushnet
Scenario Name:	Category 3, 4-foot SLR
Return Period Analyzed:	Mix0
Analysis Options Analyzed:	No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 3,798 buildings will be at least moderately damaged. This is over 89% of the total number of buildings in the scenario. There are an estimated 1,399 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	2	3.33	6	10.00	7	11.67	2	3.33	10	16.67	33	55.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	1	3.45	5	17.24	23	79.31
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	35	0.94	252	6.79	470	12.67	1,611	43.41	1,343	36.19
Total	**2**		**41**		**259**		**473**		**1,626**		**1,399**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	1	6.67	0	0.00	0	0.00	11	73.33	3	20.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	9	100.00
Masonry	0	0.00	1	0.30	11	3.31	6	1.81	182	54.82	132	39.76
Steel	2	3.13	4	6.25	5	7.81	3	4.69	19	29.69	31	48.44
Wood	0	0.00	33	0.99	240	7.20	463	13.89	1,396	41.87	1,202	36.05

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	1	0	1
Hospitals	0	0	0	0
Police Stations	5	1	0	1
Schools	54	9	0	9

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 431,555 tons of debris will be generated. Of the total amount, Finishes comprises 22% of the total, Structure comprises 46% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 17,262 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 9,298 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 25,651 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 2,198.89 million dollars, which represents 61.84 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 2,192.78 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 47.12% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	651.98	249.30	116.96	18.81	1,037.04
	Content	383.28	418.06	254.81	46.95	1,103.08
	Inventory	0.00	13.76	37.80	1.10	52.66
	Subtotal	**1,035.25**	**681.12**	**409.56**	**66.85**	**2,192.78**
Business Interruption						
	Income	0.03	1.85	0.03	0.08	1.99
	Relocation	0.41	0.50	0.04	0.03	0.97
	Rental Income	0.28	0.36	0.00	0.00	0.65
	Wage	0.08	1.94	0.04	0.44	2.50
	Subtotal	**0.80**	**4.66**	**0.11**	**0.55**	**6.11**
ALL	**Total**	**1,036.05**	**685.77**	**409.66**	**67.40**	**2,198.89**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 4, 0-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

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Note:
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There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

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Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
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Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	2,443,528	66.4%
Commercial	702,480	19.1%
Industrial	436,326	11.9%
Agricultural	18,285	0.5%
Religion	45,724	1.2%
Government	10,618	0.3%
Education	20,972	0.6%
Total	**3,677,933**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	New Bedford, Fairhaven and Acushnet
Scenario Name:	Category 4, 0-foot SLR
Return Period Analyzed:	Mix0
Analysis Options Analyzed:	No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 4,067 buildings will be at least moderately damaged. This is over 90% of the total number of buildings in the scenario. There are an estimated 1,718 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	2	3.28	3	4.92	6	9.84	4	6.56	5	8.20	41	67.21
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	1	3.13	4	12.50	27	84.38
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	27	0.68	232	5.84	445	11.19	1,622	40.79	1,650	41.50
Total	**2**		**30**		**238**		**450**		**1,631**		**1,718**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	11	78.57	3	21.43
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	14	100.00
Masonry	0	0.00	0	0.00	13	3.76	8	2.31	174	50.29	151	43.64
Steel	2	2.99	3	4.48	4	5.97	5	7.46	16	23.88	37	55.22
Wood	0	0.00	26	0.73	218	6.09	437	12.22	1,415	39.56	1,481	41.40

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	1	0	1
Hospitals	0	0	0	0
Police Stations	5	1	0	1
Schools	54	10	1	11

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 486,966 tons of debris will be generated. Of the total amount, Finishes comprises 22% of the total, Structure comprises 46% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 19,479 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 9,793 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 27,019 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 2,343.16 million dollars, which represents 63.71 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 2,336.77 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 48.12% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	715.73	267.58	121.91	21.26	1,126.48
	Content	410.96	433.13	262.95	49.09	1,156.13
	Inventory	0.00	14.14	38.88	1.14	54.16
	Subtotal	**1,126.69**	**714.85**	**423.74**	**71.49**	**2,336.77**
Business Interruption						
	Income	0.03	1.93	0.03	0.09	2.07
	Relocation	0.43	0.52	0.04	0.03	1.02
	Rental Income	0.31	0.37	0.00	0.00	0.69
	Wage	0.08	2.02	0.04	0.47	2.62
	Subtotal	**0.86**	**4.84**	**0.11**	**0.59**	**6.39**
ALL	**Total**	**1,127.55**	**719.69**	**423.85**	**72.08**	**2,343.16**

Appendix A: County Listing for the Region

Massachusetts

- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 4, 1-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	2,482,489	66.5%
Commercial	706,666	18.9%
Industrial	444,572	11.9%
Agricultural	18,285	0.5%
Religion	46,768	1.3%
Government	10,618	0.3%
Education	20,972	0.6%
Total	**3,730,370**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name: New Bedford, Fairhaven and Acushnet
Scenario Name: Category 4, 1-foot SLR
Return Period Analyzed: Mix0
Analysis Options Analyzed: No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 4,291 buildings will be at least moderately damaged. This is over 91% of the total number of buildings in the scenario. There are an estimated 2,016 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	2	3.28	5	8.20	3	4.92	5	8.20	3	4.92	43	70.49
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	1	3.03	4	12.12	28	84.85
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	29	0.69	217	5.17	403	9.60	1,605	38.22	1,945	46.32
Total	**2**		**34**		**220**		**409**		**1,612**		**2,016**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	1	5.88	0	0.00	12	70.59	4	23.53
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	15	100.00
Masonry	0	0.00	0	0.00	10	2.79	9	2.51	156	43.45	184	51.25
Steel	2	2.94	3	4.41	2	2.94	5	7.35	13	19.12	43	63.24
Wood	0	0.00	29	0.77	207	5.48	394	10.44	1,416	37.52	1,728	45.79

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	1	0	1
Hospitals	0	0	0	0
Police Stations	5	1	0	1
Schools	54	10	1	11

If this report displays all zeros or is blank, two possibilities can explain this.
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.
(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 542,153 tons of debris will be generated. Of the total amount, Finishes comprises 22% of the total, Structure comprises 46% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 21,686 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 10,203 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 28,219 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 2,473.23 million dollars, which represents 66.30 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 2,466.58 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 48.66% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	768.46	287.67	126.35	23.82	1,206.30
	Content	434.17	448.85	270.39	51.14	1,204.54
	Inventory	0.00	14.55	40.02	1.18	55.74
	Subtotal	**1,202.63**	**751.06**	**436.76**	**76.13**	**2,466.58**
Business Interruption						
	Income	0.03	2.00	0.03	0.10	2.16
	Relocation	0.46	0.54	0.04	0.03	1.07
	Rental Income	0.33	0.38	0.00	0.00	0.72
	Wage	0.08	2.09	0.04	0.49	2.71
	Subtotal	**0.91**	**5.01**	**0.11**	**0.62**	**6.65**
ALL	**Total**	**1,203.54**	**756.07**	**436.87**	**76.75**	**2,473.23**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars) Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 4, 2-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	2,598,362	67.3%
Commercial	714,835	18.5%
Industrial	448,090	11.6%
Agricultural	18,520	0.5%
Religion	47,350	1.2%
Government	11,023	0.3%
Education	20,972	0.5%
Total	**3,859,152**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name: New Bedford, Fairhaven and Acushnet

Scenario Name: Category 4, 2-foot SLR

Return Period Analyzed: Mix0

Analysis Options Analyzed: No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 4,490 buildings will be at least moderately damaged. This is over 92% of the total number of buildings in the scenario. There are an estimated 2,308 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	2	2.90	6	8.70	2	2.90	4	5.80	5	7.25	50	72.46
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	1	2.94	3	8.82	30	88.24
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	26	0.59	211	4.81	369	8.41	1,555	35.43	2,228	50.76
Total	**2**		**32**		**213**		**374**		**1,563**		**2,308**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	0	0.00	1	5.56	0	0.00	8	44.44	9	50.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	16	100.00
Masonry	0	0.00	2	0.51	10	2.56	10	2.56	143	36.67	225	57.69
Steel	2	2.90	4	5.80	1	1.45	4	5.80	11	15.94	47	68.12
Wood	0	0.00	28	0.71	201	5.09	360	9.12	1,392	35.26	1,967	49.82

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	1	0	1
Hospitals	0	0	0	0
Police Stations	5	1	0	1
Schools	54	10	1	11

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 587,252 tons of debris will be generated. Of the total amount, Finishes comprises 21% of the total, Structure comprises 46% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 23,490 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 10,513 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 29,120 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 2,577.01 million dollars, which represents 66.78 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 2,570.16 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 49.04% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	810.41	303.37	130.03	26.09	1,269.90
	Content	452.40	461.04	276.95	52.75	1,243.13
	Inventory	0.00	14.88	41.04	1.22	57.13
	Subtotal	**1,262.81**	**779.28**	**448.02**	**80.05**	**2,570.16**
Business Interruption						
	Income	0.03	2.07	0.03	0.10	2.23
	Relocation	0.48	0.55	0.04	0.03	1.10
	Rental Income	0.34	0.40	0.00	0.00	0.74
	Wage	0.09	2.14	0.04	0.51	2.79
	Subtotal	**0.94**	**5.16**	**0.11**	**0.65**	**6.86**
ALL	**Total**	**1,263.75**	**784.44**	**448.13**	**80.70**	**2,577.01**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 4, 4-foot SLR

Print Date: Friday, June 06, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	2,632,545	67.5%
Commercial	720,472	18.5%
Industrial	448,458	11.5%
Agricultural	18,584	0.5%
Religion	47,788	1.2%
Government	11,023	0.3%
Education	20,972	0.5%
Total	**3,899,842**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	New Bedford, Fairhaven and Acushnet
Scenario Name:	Category 4, 4-foot SLR
Return Period Analyzed:	Mix0
Analysis Options Analyzed:	No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 5,672 buildings will be at least moderately damaged. This is over 99% of the total number of buildings in the scenario. There are an estimated 5,429 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	7	100.00
Commercial	0	0.00	2	1.08	0	0.00	0	0.00	0	0.00	183	98.92
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	100.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	3	100.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	5	7.81	59	92.19
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	10	100.00
Residential	0	0.00	1	0.02	16	0.30	37	0.69	182	3.37	5,165	95.63
Total	**0**		**3**		**16**		**37**		**187**		**5,429**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	30	100.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	23	100.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	4	0.73	546	99.27
Steel	0	0.00	2	1.32	0	0.00	0	0.00	5	3.31	144	95.36
Wood	0	0.00	1	0.02	16	0.33	37	0.77	177	3.67	4,592	95.21

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	1	1
Hospitals	0	0	0	0
Police Stations	5	0	1	1
Schools	54	1	10	11

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 898,553 tons of debris will be generated. Of the total amount, Finishes comprises 20% of the total, Structure comprises 45% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 35,942 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 11,013 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 30,600 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 3,258.34 million dollars, which represents 83.55 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 3,250.63 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 51.48% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	1,135.25	428.13	154.10	51.82	1,769.10
	Content	540.93	508.96	309.38	59.48	1,418.75
	Inventory	0.00	15.84	45.57	1.38	62.79
	Subtotal	**1,676.18**	**952.93**	**509.04**	**112.48**	**3,250.63**
Business Interruption						
	Income	0.04	2.32	0.03	0.12	2.50
	Relocation	0.55	0.61	0.04	0.04	1.24
	Rental Income	0.39	0.43	0.00	0.00	0.83
	Wage	0.10	2.40	0.04	0.80	3.14
	Subtotal	**1.08**	**5.76**	**0.12**	**0.76**	**7.71**
ALL	**Total**	**1,677.26**	**958.68**	**509.16**	**113.24**	**3,258.34**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 4 (Extreme), 0-foot SLR

Print Date: Friday, June 06, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	2,641,471	67.6%
Commercial	722,026	18.5%
Industrial	448,473	11.5%
Agricultural	18,520	0.5%
Religion	47,564	1.2%
Government	11,023	0.3%
Education	20,972	0.5%
Total	**3,910,049**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name: New Bedford, Fairhaven and Acushnet
Scenario Name: Category 4 (Extreme), 0-foot SLR
Return Period Analyzed: Mix0
Analysis Options Analyzed: No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 4,765 buildings will be at least moderately damaged. This is over 92% of the total number of buildings in the scenario. There are an estimated 2,792 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	2	2.60	6	7.79	2	2.60	2	2.60	6	7.79	59	76.62
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	1	2.50	4	10.00	35	87.50
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	22	0.47	199	4.28	321	6.90	1,410	30.32	2,698	58.02
Total	**2**		**28**		**201**		**324**		**1,420**		**2,792**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	4	28.57	10	71.43
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	19	100.00
Masonry	0	0.00	2	0.49	8	1.96	7	1.72	109	26.72	282	69.12
Steel	2	2.63	4	5.26	1	1.32	2	2.63	9	11.84	58	76.32
Wood	0	0.00	24	0.57	191	4.57	314	7.51	1,286	30.74	2,368	56.61

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	1	0	1
Hospitals	0	0	0	0
Police Stations	5	1	0	1
Schools	54	7	4	11

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 658,688 tons of debris will be generated. Of the total amount, Finishes comprises 21% of the total, Structure comprises 47% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 26,348 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 11,048 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 30,692 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 2,745.25 million dollars, which represents 70.21 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 2,738.04 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 49.64% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	880.48	328.50	136.15	30.19	1,375.32
	Content	481.28	479.61	287.29	55.45	1,303.64
	Inventory	0.00	15.28	42.53	1.28	59.08
	Subtotal	**1,361.77**	**823.39**	**465.97**	**86.92**	**2,738.04**
Business Interruption						
	Income	0.04	2.18	0.03	0.11	2.35
	Relocation	0.51	0.57	0.04	0.04	1.16
	Rental Income	0.36	0.41	0.00	0.00	0.77
	Wage	0.09	2.24	0.04	0.55	2.92
	Subtotal	**1.00**	**5.40**	**0.12**	**0.70**	**7.21**
ALL	**Total**	**1,362.77**	**828.79**	**466.08**	**87.61**	**2,745.25**

Appendix A: County Listing for the Region

Massachusetts

- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars) Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 4 (Extreme), 1-foot SLR

Print Date: Friday, June 06, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

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Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	2,688,948	67.7%
Commercial	729,659	18.4%
Industrial	450,184	11.3%
Agricultural	18,584	0.5%
Religion	49,971	1.3%
Government	11,023	0.3%
Education	20,972	0.5%
Total	**3,969,341**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name: New Bedford, Fairhaven and Acushnet
Scenario Name: Category 4 (Extreme), 1-foot SLR
Return Period Analyzed: Mix0
Analysis Options Analyzed: No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 4,962 buildings will be at least moderately damaged. This is over 92% of the total number of buildings in the scenario. There are an estimated 3,084 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	6	7.59	3	3.80	1	1.27	6	7.59	63	79.75
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	4	8.51	0	0.00	1	2.13	7	14.89	35	74.47
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	22	0.45	197	4.07	319	6.60	1,312	27.13	2,986	61.75
Total	**0**		**32**		**200**		**321**		**1,325**		**3,084**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	1	7.69	12	92.31
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	20	100.00
Masonry	0	0.00	2	0.47	7	1.65	5	1.18	90	21.23	320	75.47
Steel	0	0.00	6	6.90	3	3.45	2	2.30	11	12.64	65	74.71
Wood	0	0.00	24	0.55	189	4.34	313	7.19	1,211	27.82	2,616	60.10

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	1	0	1
Hospitals	0	0	0	0
Police Stations	5	1	0	1
Schools	54	5	6	11

If this report displays all zeros or is blank, two possibilities can explain this.
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.
(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 696,387 tons of debris will be generated. Of the total amount, Finishes comprises 21% of the total, Structure comprises 47% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 27,855 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 11,359 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 31,551 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 2,843.91 million dollars, which represents 71.65 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 2,836.53 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 49.92% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	920.41	341.90	140.46	32.55	1,435.32
	Content	498.11	489.43	295.78	57.23	1,340.54
	Inventory	0.00	15.47	43.89	1.32	60.67
	Subtotal	**1,418.52**	**846.80**	**480.13**	**91.09**	**2,836.53**
Business Interruption						
	Income	0.04	2.22	0.03	0.11	2.40
	Relocation	0.54	0.58	0.04	0.04	1.20
	Rental Income	0.37	0.42	0.00	0.00	0.79
	Wage	0.09	2.28	0.05	0.57	2.99
	Subtotal	**1.04**	**5.50**	**0.12**	**0.72**	**7.38**
ALL	**Total**	**1,419.55**	**852.30**	**480.25**	**91.81**	**2,843.91**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars) Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 4 (Extreme), 2-foot SLR

Print Date: Friday, June 06, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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Hazus Global Summary Report Category 4 (Extreme), 2-foot SLR

General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Hazus Global Summary Report Category 4 (Extreme), 2-foot SLR

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	2,726,340	67.6%
Commercial	746,119	18.5%
Industrial	452,022	11.2%
Agricultural	19,149	0.5%
Religion	49,971	1.2%
Government	11,821	0.3%
Education	27,087	0.7%
Total	**4,032,509**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Hazus Global Summary Report Category 4 (Extreme), 2-foot SLR

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name: New Bedford, Fairhaven and Acushnet
Scenario Name: Category 4 (Extreme), 2-foot SLR
Return Period Analyzed: Mix0
Analysis Options Analyzed: No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 5,083 buildings will be at least moderately damaged. This is over 92% of the total number of buildings in the scenario. There are an estimated 3,319 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	100.00
Commercial	0	0.00	6	7.50	2	2.50	1	1.25	4	5.00	67	83.75
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	4	9.09	0	0.00	1	2.27	5	11.36	34	77.27
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	24	0.48	193	3.89	311	6.27	1,213	24.47	3,216	64.88
Total	**0**		**34**		**195**		**313**		**1,222**		**3,319**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	1	6.67	14	93.33
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	19	100.00
Masonry	0	0.00	2	0.46	5	1.15	6	1.38	71	16.36	350	80.65
Steel	0	0.00	6	7.06	2	2.35	2	2.35	8	9.41	67	78.82
Wood	0	0.00	26	0.58	186	4.17	304	6.82	1,131	25.36	2,813	63.07

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	1	0	1
Hospitals	0	0	0	0
Police Stations	5	1	0	1
Schools	54	5	6	11

If this report displays all zeros or is blank, two possibilities can explain this.
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.
(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 726,714 tons of debris will be generated. Of the total amount, Finishes comprises 20% of the total, Structure comprises 47% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 29,069 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 11,636 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 32,330 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 2,926.33 million dollars, which represents 72.57 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 2,918.78 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 50.14% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	954.47	353.37	143.83	34.74	1,486.41
	Content	511.77	497.03	302.61	58.94	1,370.35
	Inventory	0.00	15.66	45.01	1.35	62.02
	Subtotal	**1,466.24**	**866.05**	**491.45**	**95.04**	**2,918.78**
Business Interruption						
	Income	0.04	2.25	0.03	0.12	2.44
	Relocation	0.56	0.59	0.05	0.04	1.23
	Rental Income	0.38	0.42	0.00	0.00	0.81
	Wage	0.10	2.32	0.05	0.61	3.07
	Subtotal	**1.08**	**5.58**	**0.13**	**0.76**	**7.54**
ALL	**Total**	**1,467.32**	**871.64**	**491.58**	**95.80**	**2,926.33**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 4 (Extreme), 4-foot SLR

Print Date: Friday, June 06, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	2,780,618	67.3%
Commercial	788,213	19.1%
Industrial	451,676	10.9%
Agricultural	19,295	0.5%
Religion	53,283	1.3%
Government	11,821	0.3%
Education	27,202	0.7%
Total	**4,132,108**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name: New Bedford, Fairhaven and Acushnet
Scenario Name: Category 4 (Extreme), 4-foot SLR
Return Period Analyzed: Mix0
Analysis Options Analyzed: No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 5,480 buildings will be at least moderately damaged. This is over 93% of the total number of buildings in the scenario. There are an estimated 3,830 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
Commercial	0	0.00	4	4.26	3	3.19	2	2.13	2	2.13	83	88.30
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	4	6.78	6	10.17	2	3.39	0	0.00	6	10.17	41	69.49
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00
Residential	0	0.00	26	0.49	186	3.49	312	5.85	1,101	20.66	3,704	69.51
Total	**4**		**36**		**191**		**314**		**1,109**		**3,830**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	15	100.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	15	100.00
Masonry	0	0.00	2	0.42	4	0.85	6	1.27	52	10.99	409	86.47
Steel	2	1.98	6	5.94	4	3.96	2	1.98	7	6.93	80	79.21
Wood	0	0.00	26	0.54	180	3.76	305	6.37	1,039	21.69	3,240	67.64

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	1	0	1
Hospitals	0	0	0	0
Police Stations	5	2	0	2
Schools	54	5	8	13

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 790,409 tons of debris will be generated. Of the total amount, Finishes comprises 20% of the total, Structure comprises 46% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 31,616 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 12,252 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 34,211 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 3,121.78 million dollars, which represents 75.55 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 3,113.77 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 50.48% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	1,030.80	381.31	152.28	39.00	1,603.39
	Content	543.90	518.45	319.30	63.40	1,445.04
	Inventory	0.00	15.99	47.95	1.41	65.34
	Subtotal	**1,574.69**	**915.75**	**519.53**	**103.81**	**3,113.77**
Business Interruption						
	Income	0.04	2.35	0.03	0.13	2.55
	Relocation	0.59	0.61	0.05	0.05	1.30
	Rental Income	0.41	0.44	0.01	0.00	0.86
	Wage	0.10	2.47	0.05	0.68	3.30
	Subtotal	**1.15**	**5.86**	**0.14**	**0.86**	**8.01**
ALL	**Total**	**1,575.84**	**921.61**	**519.66**	**104.66**	**3,121.78**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name: New Bedford, Fairhaven and Acushnet
Scenario Name: Category 1, 0-foot SLR
Return Period Analyzed: Mix0
Analysis Options Analyzed: No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 194 buildings will be at least moderately damaged. This is over 40% of the total number of buildings in the scenario. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	48	24.74	119	61.34	8	4.12	19	9.79	0	0.00
Total	**0**		**48**		**119**		**8**		**19**		**0**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	48	24.87	118	61.14	8	4.15	19	9.84	0	0.00

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	5	0	0	0
Schools	54	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.
(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.
(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 6,168 tons of debris will be generated. Of the total amount, Finishes comprises 40% of the total, Structure comprises 37% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 247 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 459 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 818 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 34.18 million dollars, which represents 6.11 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 34.11 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 76.44% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	15.61	0.97	0.57	0.40	17.54
	Content	10.50	3.22	1.23	1.20	16.15
	Inventory	0.00	0.06	0.22	0.13	0.42
	Subtotal	**26.11**	**4.25**	**2.03**	**1.73**	**34.11**
Business Interruption						
	Income	0.00	0.02	0.00	0.00	0.02
	Relocation	0.02	0.00	0.00	0.00	0.02
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.02	0.00	0.01	0.03
	Subtotal	**0.02**	**0.04**	**0.00**	**0.01**	**0.07**
ALL	**Total**	**26.13**	**4.29**	**2.03**	**1.74**	**34.18**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 1, 0-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social

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The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	396,672	70.9%
Commercial	89,927	16.1%
Industrial	57,647	10.3%
Agricultural	8,824	1.6%
Religion	4,335	0.8%
Government	764	0.1%
Education	1,665	0.3%
Total	**559,834**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	New Bedford, Fairhaven and Acushnet
Scenario Name:	Category 1, 0-foot SLR
Return Period Analyzed:	Mix0
Analysis Options Analyzed:	No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 194 buildings will be at least moderately damaged. This is over 40% of the total number of buildings in the scenario. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	48	24.74	119	61.34	8	4.12	19	9.79	0	0.00
Total	**0**		**48**		**119**		**8**		**19**		**0**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	48	24.87	118	61.14	8	4.15	19	9.84	0	0.00

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	5	0	0	0
Schools	54	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 6,168 tons of debris will be generated. Of the total amount, Finishes comprises 40% of the total, Structure comprises 37% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 247 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 459 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 818 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 34.18 million dollars, which represents 6.11 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 34.11 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 76.44% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	15.61	0.97	0.57	0.40	17.54
	Content	10.50	3.22	1.23	1.20	16.15
	Inventory	0.00	0.06	0.22	0.13	0.42
	Subtotal	**26.11**	**4.25**	**2.03**	**1.73**	**34.11**
Business Interruption						
	Income	0.00	0.02	0.00	0.00	0.02
	Relocation	0.02	0.00	0.00	0.00	0.02
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.02	0.00	0.01	0.03
	Subtotal	**0.02**	**0.04**	**0.00**	**0.01**	**0.07**
ALL	**Total**	**26.13**	**4.29**	**2.03**	**1.74**	**34.18**

Appendix A: County Listing for the Region

Massachusetts
- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 1, 1-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

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The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 38,601 buildings in the region which have an aggregate total replacement value of 9,268 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%
Agricultural	31,872	0.3%
Religion	115,972	1.3%
Government	47,795	0.5%
Education	49,602	0.5%
Total	**9,268,189**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	424,734	72.2%
Commercial	90,414	15.4%
Industrial	57,935	9.8%
Agricultural	8,824	1.5%
Religion	4,335	0.7%
Government	764	0.1%
Education	1,665	0.3%
Total	**588,671**	**100.00%**

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds.
There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	New Bedford, Fairhaven and Acushnet
Scenario Name:	Category 1, 1-foot SLR
Return Period Analyzed:	Mix0
Analysis Options Analyzed:	No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 247 buildings will be at least moderately damaged. This is over 45% of the total number of buildings in the scenario. There are an estimated 2 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	47	19.03	142	57.49	28	11.34	28	11.34	2	0.81
Total	**0**		**47**		**142**		**28**		**28**		**2**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	47	19.11	141	57.32	28	11.38	28	11.38	2	0.81

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	3	0	0	0
Hospitals	0	0	0	0
Police Stations	5	0	0	0
Schools	54	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 9,058 tons of debris will be generated. Of the total amount, Finishes comprises 37% of the total, Structure comprises 38% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 362 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 521 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 977 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 44.47 million dollars, which represents 7.55 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 44.38 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 76.97% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	20.34	1.28	0.76	0.50	22.88
	Content	13.86	4.06	1.61	1.44	20.97
	Inventory	0.00	0.08	0.30	0.16	0.53
	Subtotal	**34.20**	**5.42**	**2.67**	**2.10**	**44.38**
Business Interruption						
	Income	0.00	0.02	0.00	0.00	0.03
	Relocation	0.03	0.00	0.00	0.00	0.03
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.02	0.00	0.01	0.03
	Subtotal	**0.03**	**0.05**	**0.00**	**0.01**	**0.09**
ALL	**Total**	**34.23**	**5.47**	**2.67**	**2.10**	**44.47**

Appendix A: County Listing for the Region

Massachusetts

- Bristol

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars) Residential	Non-Residential	Total
Massachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
Total	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**
Total Study Region	**120,088**	**6,754,711**	**2,513,478**	**9,268,189**

Hazus-MH: Flood Event Report

Region Name: New Bedford, Fairhaven and Acushnet

Flood Scenario: Category 1, 2-foot SLR

Print Date: Thursday, June 05, 2014

Disclaimer:

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There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.

Appendix E: Municipality-specific Recommendations

Summary Recommendations for the City of New Bedford

The following is a summary of recommendations that describe potential climate adaptation actions for the City of New Bedford in order to better address vulnerabilities to combined sewer outfalls (CSOs), wastewater treatment plant, and pump station infrastructures The assessed vulnerabilities and recommendations are based on the results of the Climate Change Vulnerability Assessment and Adaptation Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet, which assessed the potential for damage and loss of function from modeled inundation scenarios using a combination of hurricane parameters and sea level rise projections.

The project team developed recommendations for CSOs, wastewater treatment facilities, and pump stations based on two inundation scenarios.

Typical wastewater design recommendations are to protect wastewater infrastructure against the 500-year flood. Furthermore, FEMA guidance provides an additional benchmark for quantifying risk to critical facilities, such as water quality infrastructure:

> *Under Executive Order 11988, Floodplain Management, Federal agencies funding and/or permitting critical facilities are required to avoid the 0.2% (500-year) floodplain or protect the facilities to the 0.2% chance flood level.*

Following the standard of protecting critical facilities against damages from a 500-year storm, we chose the two scenarios based on the 2009 FEMA floodplain projections for a 500-year storm. The inundation scenario from the team's modeling approach that most closely resembled the FEMA 500-year storm floodplain was the Category 3 hurricane with baseline (no SLR) water level scenario. We used this scenario, as well as the Category 3 hurricane with 4-foot (SLR) scenario to evaluate vulnerability for each CSO, wastewater treatment facility, and pump station, and to make recommendations based on each feature's vulnerability.

After meeting with town officials and reviewing site-specific studies, we assessed the vulnerability of the water quality infrastructure based on information provided to the team. We also performed a visual evaluation of each pump station using Google Earth imagery to assess whether there were structural features or characteristics that put them at higher or lower risk of damage from inundation. This provided only a cursory engineering review that does not replace a more detailed site specific inspection and evaluation that will be required to be conducted in a future phase of this project.

CSOs

The City of New Bedford has 23 CSOs. CSO discharges are controlled by regulators, many of which are already below MSL (mean sea level) and MHW (mean high water) (Figure 27). This means that there are likely to be additional regulators, sets of controls and/or storage available that would prevent the system from flooding during normal operation. Additionally, 15 of these outfalls have a tide gate that would preserve system storage. The project team understands that several regulators currently flood with water from the river and/or bay during storms and other extreme tide events resulting in in situ

river/bay water draining to the treatment plant. This inflow into the system unnecessarily impacts the system hydraulic loads and likely negatively impacts the waste water treatment system performance. Sea level rise will only exacerbate these flooding issues. However, it is not currently possible to quantify the extent of these impacts beyond understanding that increased sea level rise will add backflow to the existing CSO outfalls and reduce their hydraulic performance.

In the short-term, the team recommends that the City of New Bedford pursue smaller adjustments and repairs to CSOs, where possible; however, more information is needed as to whether increased water levels at discharge locations would prevent regulators from functioning properly. As such, we suggest that assessing the impacts of storm surges will require hydraulic modeling of the system, which answers questions about the storage capacity of the system and its ability to drain. In general, the hydraulic modeling would need to assess the ability of the system to temporarily store water during target evaluation storms and then release that water as tides recede for sea level rise scenarios. In terms of priority study activities, we recommend that CSO hydraulics should be modeled for those CSOs where regulator weir elevations are below sea level rise elevations for specific sea level rise scenarios (Table 8). This study modeled flooding from hurricane events, however, in the long term, if there is more than 1 – 2 feet of SLR, there will be limited abilities to make any changes to individual CSOs that will prevent overflows. Under these projected SLR scenarios, dramatic and costly changes will have to be made to sewer infrastructure to prevent saltwater intrusion and to eliminate CSOs due to seawater intrusion into the system. Once these sea levels are reached, it will be necessary to devote substantial resources to increase overall sewer capacity.

Pump stations

The City of New Bedford has 26 pump stations, 4 of which are in the flood plain in a Category 3 storm with no SLR. These are given a high risk ranking in the table below. 5 additional pump stations are located in the floodplain when 4-foot SLR is added to the Category 3 storm scenario. These are given a medium risk ranking in the table below. The infrastructure housed at pump stations, including motors, electrical service and electronic controls, generators, buried compressors and fuel tanks, and manholes can all influence a pump station's ability to operate during flooding events. In addition, access to many structures will not be possible except by boat during the inundation scenarios evaluated. Generally the pump stations are above ground on level ground near the shoreline and are very exposed. A few are below ground.

Adaptation actions should prioritize structures that fall within the Category 3 floodplain at current water levels, and focus secondarily on those which are at risk during Category 3 storms with 4-foot SLR. In the table below, we rank priority sites and provide specific recommendations based on information provided by the City of New Bedford; however, this does not replace the need for site-specific evaluations. In general, site-specific evaluations should be performed to make a detailed assessment of potential risks to a facility. Individual assessments of each structure should be performed to determine the following:

- Whether the structure has already been floodproofed
- To confirm elevations of possible points of entry for water (e.g. vents, door sills, windows)
- The vulnerability of critical infrastructure within each pump station
- What would be required to flood-proof

– Whether the facility is currently able to operate during flood conditions (e.g. equipped with generator, ability to remote operate)

Once potential risks to a facility are understood, potential mitigation measures should be identified and more accurate opinions of costs can be developed to retrofit existing facilities.

Wastewater treatment plants

The City of New Bedford has one wastewater treatment facility. The Category 3 storms at both baseline water levels and 4-foot SLR levels show over ground flooding of the wastewater treatment plant location. Future studies should assess the storm scenarios that the treatment facility should be protected from and focus on thorough evaluations of the flood control system and critical infrastructure for those scenarios to ensure they are protected during these flood events. Ideally, flood controls should keep the entire site dry for the specified inundation scenario but some limited flooding could be acceptable if the site can be kept operational throughout these events.

The New Bedford facility is protected by an existing levee; however, there is the potential for inundation around this levee in the Category 3 storm scenarios. The ability to enhance the existing flood control system around these structures should be assessed as part of any consideration to providing further flood protection for this structure.

The team recommends a detailed, site-specific assessment of the facility's vulnerability to flooding. This would include a site visit to determine point of entry and where flood waters could damage equipment/structures and a survey to identify actual elevations of critical points to compare with target flood elevations. Once potential risks to a facility are understood, potential mitigation measures should be identified and more accurate opinions of costs can be developed to retrofit existing facilities.

Summary Table of Vulnerability and Recommendations

We have assessed risk based on the point location of each pump station and treatment plant, and the water levels at that point for the two inundation scenarios described above and categorized these risks in the table below. Facilities that are not in the floodplain in either scenario are colored in green (low risk). Facilities that are in the floodplain in the Category 3, 4-foot SLR scenario only are colored in orange (medium risk), and facilities that are in the floodplain for both Category 3 scenarios are colored in red (high risk). This table contains recommendations based on available information; however, we recommend that site-specific evaluations be performed for each feature to further determine vulnerability and refine adaptation measures.

Structure Location in New Bedford	Inundation depth (NAVD88 ft) for Category 3 Hurricane with no SLR	Inundation depth (NAVD 88 ft) for Category 3 Hurricane with 4-ft SLR	Preliminary Recommendations	Comments
Belleville Avenue	0	17.73	Require floodproof doors for entries and loading dock as well as floodproofing electrical vault and air intakes. Also, incoming sewer manholes will need to have covers bolted and gasketed. Controlling water levels above roof line likely not feasible. Potential cost range is $25,000 to $200,000.	 Above ground brick structure. Door and loading dock landing is about 3.3' above ground. Air intake or exhaust is about 3' above ground. Below grade electrical vault will be vulnerable to flooding. Equipped with SCADA and telemetry so can be remote operated. Generator is located on-site.
MacArthur Drive	0	13.27	Potentially require floodproof door, generator and floodproofing of vaults that could be points of entry. Potential buoyancy of building should also be assessed. Controlling water levels above roof line likely not feasible. Potential cost range is $100,000 to $250,000	 Above ground brick structure. First floor is at about 3.1' above ground at entry door landing. Several buried concrete vaults are adjacent or nearby the structure. Contents of those vaults are not known but likely points of entry into pump station. The vaults may be inlet works, wet wells or electrical vaults.Site is not equipped with a generator and pigtail connection is at door sill elevation. Some electrical service enters building from ground. Facility will be equipped with SCADA and telemetry to allow remote operation.

Structure Location in New Bedford	Inundation depth (NAVD88 ft) for Category 3 Hurricane with no SLR	Inundation depth (NAVD 88 ft) for Category 3 Hurricane with 4-ft SLR	Preliminary Recommendations	Comments
Wamsutta Street	0	23.53	Potentially require floodproof doors as well as floodproofing at-grade entryway and building penetrations. Generator will also need to be protected likely with wall system. Potential buoyancy of building should also be assessed. Controlling water levels above roof line likely not feasible. Potential cost range is $75,000 to $250,000.	 Above ground structure with brick construction. Door sill is close to ground. No generator, likely pigtail
Rowe Street	0	0		

Structure Location in New Bedford	Inundation depth (NAVD88 ft) for Category 3 Hurricane with no SLR	Inundation depth (NAVD 88 ft) for Category 3 Hurricane with 4-ft SLR	Preliminary Recommendations	Comments
Coggeshall Street	0	16.66	Floodproofing of doors, windows and vaults will be required. Existing vents will need to be raised. Electrical infrastructure such as services, generators and transformers will either need to be raised or protected with floodwall system with flashboards for access. Structure and vaults should be checked for buoancy. Controlling water levels above roof line likely not feasible. Potential cost range is $150,000 to $350,000.	 Above ground brick structure with brick construction. Door sill is about 0.8' above ground. Window sills are about 4.7' above ground. Several concrete vaults with hatches or accessways exist below grade that likely provide pathway for flooding inside of building. A vent to one of the vaults also has a low point at about the same elevation of the window sills. Two other vents also exist at a lower elevation. Building electrical service is below inundation levels. A transformer adjacent to the site and generator is on right at grade.
Peckham Road	0	0		
Sassaquin Avenue	0	0		
Pequot Street	0	0		

Structure Location in New Bedford	Inundation depth (NAVD88 ft) for Category 3 Hurricane with no SLR	Inundation depth (NAVD 88 ft) for Category 3 Hurricane with 4-ft SLR	Preliminary Recommendations	Comments
Phillips Road	0	0		
Marlborough Street	0	0		
Forbes Street	0	0		
Hanover Street	0	0		
Welby Road	0	0		
Church Street	0	0		
Joyce Street	0	0		
Aviation Way	0	0		
Shawmut Avenue	0	0		
Howard Avenue	0.53	23.44	Require floodproof doors and windows including accessways to below grade vaults. Above ground tank will have to be anchored and vaults checked for buoyancy. Generator should be provided for site. Controlling water levels above roof line likely not feasible. Potential cost range is $150,000 to $350,000.	 Above ground structure with brick construction. Two stainless steel doors have sills at grade. Window sills are as low as 2.7' above ground. Below grade vaults exist with hatches or grates providing access to the vaults. Above ground storage tank exists at grade. Generator transfer switch and connection are located about 3.2' above grade. A below grade electrical vault also exists on this site. bove ground structure with brick construction. Two stainless steel doors have sills at grade. Window sills are as low as 2.7' above ground. Below grade vaults exist with hatches or grates providing access to the vaults. Above ground storage tank exists at grade.

Structure Location in New Bedford	Inundation depth (NAVD88 ft) for Category 3 Hurricane with no SLR	Inundation depth (NAVD 88 ft) for Category 3 Hurricane with 4-ft SLR	Preliminary Recommendations	Comments
Valley View Drive	0	0		
Joy Street	0	0		
Hathaway Road	0	0		
Apple Tree Lane	0	0		
Merrimac Street	0	0		
Popes Island	0	16.69	Access hatch to pump station will need to be floodproofed. Electrical service and control panels will need to be raised and floodproofed. Ability to operate pump station remotely will need to be confirmed. Generator should also be provided that will need to be protected as well. Potential cost range is $100,000 to $250,000.	 Below ground pump station. Electrical service and control panels are at about 2.8' above grade. Vent is about 4.25' above grade. No generator
South Water Street	6.82	15.12	Potentially require floodproof door and flood proof windows. Generator and electrical service will likely need to be raised or protected. Little information available for this site to identify other needs. Potential cost range is $100,000 to $250,000.	 Above ground structure. Door sill is just above ground. Generator is reportedly located on site

Structure Location in New Bedford	Inundation depth (NAVD88 ft) for Category 3 Hurricane with no SLR	Inundation depth (NAVD 88 ft) for Category 3 Hurricane with 4-ft SLR	Preliminary Recommendations	Comments
East Rodney French Boulevard	11.39	15.74	Floodproof doors and windows. Vents will need to be protected with cutoff wall. Electrical service will need to be raised and gas service needs to be evaluated. Controlling water levels above roof line likely not feasible. Potential cost range is $25,000 to $150,000.	 One door sill and vent are located 3.6' above grade. One door sill is 1.8' above grade. Ground elevations vary at both doors. Electrical service meter box located 2.3' above grade. Electrical junction boxes appear to be as low as 0.8' above grade. Intake/exhaust vents for generator are about 1.8' above grade. Gas service is at grade for backup generator.
Cove Road	11.89	15.12	Floodproof existing doors. Electrical service should be raised and floodproofed with transformer protected as well. Generator vent should be protected with cut off wall. Gas service needs to be assessed. Controlling water levels above roof line likely not feasible. Potential cost range is $50,000 to $250,000.	 Protected by existing levee; The ability to enhance the existing flood control system around this structure should be assessed as part of any consideration to providing further flood protection for this structure. First floor 4' above grade with two stainless steel doors providing access. Electrical box is located 3' above grade. Transformer is located at grade. Gas service is also located at grade. Generator intake/exhaust vents is located 4.4' above grade. Odor control system is located outdoors but is not critical to system operation and would not be required to be protected. Generator is on site in building.

Structure Location in New Bedford	Inundation depth (NAVD88 ft) for Category 3 Hurricane with no SLR	Inundation depth (NAVD 88 ft) for Category 3 Hurricane with 4-ft SLR	Preliminary Recommendations	Comments
Wastewater Treatment Plant				
South Rodney French Boulevard	1.38	5.40		Protected by existing levee; The ability to enhance the existing flood control system around these structure should be assessed as part of any consideration to providing further flood protection for this structure.

Summary Recommendations for the Town of Acushnet

The following is a summary of recommendations that describe potential climate adaptation actions for the Town of Acushnet in order to better address vulnerabilities to wastewater treatment plant, and pump station infrastructures. The assessed vulnerabilities and recommendations are based on the results of the Climate Change Vulnerability Assessment and Adaptation Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet, which evaluated the potential for damage and loss of function from modeled inundation scenarios using a combination of hurricane parameters and sea level rise (SLR) projections.

Typical wastewater design recommendations are to protect wastewater infrastructure against the 500-year flood. Furthermore, FEMA guidance provides an additional benchmark for quantifying risk to critical facilities, such as water quality infrastructure:

> *Under Executive Order 11988, Floodplain Management, Federal agencies funding and/or permitting critical facilities are required to avoid the 0.2% (500-year) floodplain or protect the facilities to the 0.2% chance flood level.*

Following the standard of protecting critical facilities against damages from a 500-year storm, we chose two modeled hurricane inundation scenarios based on the 2009 FEMA floodplain projections for a 500-year storm. The inundation scenario from the team's modeling approach that most closely resembled the FEMA 500-year storm floodplain was the Category 3 hurricane with baseline water levels (no SLR). We used this scenario, as well as the Category 3 hurricane with 4-foot SLR scenario to evaluate water quality infrastructure, and to make recommendations for individual water quality infrastructure features where possible.

After meeting with town officials and reviewing site-specific studies, we assessed the vulnerability of the water quality infrastructure based on information provided to the team. We also performed a visual evaluation of each pump station using Google Earth imagery to assess whether there were structural features or characteristics that put them at higher or lower risk of damage from inundation. This provided only a cursory engineering review that does not replace a more detailed site specific inspection and evaluation that will be required to be conducted in a future phase of this project. The following paragraphs summarize findings and general recommendations for pump stations. The summary table ranks individual pump station vulnerability and provides preliminary, site-specific recommendations.

Pump station recommendations

The Town of Acushnet has 3 pump stations, 1 of which is in the floodplain of the Category 3 scenario with no SLR. This is given a high risk ranking in the table below. An additional pump station is in the floodplain when 4-foot SLR is added to the Category 3 scenario. This is given a medium risk ranking in the table. The infrastructure housed at pump stations, including motors, electrical service and electronic controls, generators, buried compressors and fuel tanks, and manholes can all influence a pump station's ability to operate during flooding events. In addition, access to many structures will not be possible except by boat during the inundation scenarios evaluated. Generally the pump stations are above ground on level ground near the shoreline and are very exposed. A few are below ground.

Adaptation actions should prioritize structures that fall within the Category 3 floodplain at current water levels, and focus secondarily on those which are at risk during Category 3 storms with 4-foot SLR. In the table below, we identify priority sites and provide specific recommendations based on information provided by the Town of Acushnet; however, this does not replace the need for site-specific evaluations. In general, site-specific evaluations should be performed to make a detailed assessment of potential risks to a facility. Individual assessments of each structure should be performed to determine the following:

- Whether the structure has already been floodproofed
- To confirm elevations of possible points of entry for water (e.g. vents, door sills, windows)
- The vulnerability of critical infrastructure within each pump station
- What would be required to flood-proof
- Whether the facility is currently able to operate during flood conditions (e.g. equipped with generator, ability to remote operate)

Once potential risks to a facility are understood, potential mitigation measures should be identified and more accurate opinions of costs can be developed to retrofit existing facilities.

Summary Table of Vulnerability and Recommendations

We have assessed risk based on the point location of each pump station and the water levels at that point for the two inundation scenarios described above and categorized these risks in the table below. Facilities that are not in the floodplain in either scenario are colored in green (low risk). Facilities that are in the floodplain in the Category 3, 4-foot SLR scenario only are colored in orange (medium risk), and facilities that are in the floodplain both scenarios are colored in red (high risk). This table contains recommendations based on available information; however, we recommend that site-specific evaluations be performed for each feature to further evaluate vulnerability and refine adaptation measures.

Structure Location in Acushnet	Inundation depth (NAVD88 ft) for Category 3 Hurricane with no SLR	Inundation depth (NAVD88 ft) for Category 3 Hurricane with 4-ft SLR	Preliminary Recommendations	Comments
Blueberry Drive	0	0	None	
Allen Street	0	4.74	Consider berm or wall with weir boards for access. Need for generator is unknown. Potential cost range is $25,000 to $75,000	 Above ground structure type unknown, likely pre-manufactured housing for pump station. If so, likely cannot be floodproofed and earthen berm will be required.
Slocum Street	.85	23.84	Add flood proof door and extend vents. Potential cost range is $10,000 to $25,000. On-site generator will be expensive and not included in these costs. Controlling water levels above roof line likely not feasible.	 Below ground structure. Vents likely could be flooded with SLR scenario.

Summary Recommendations for the Town of Fairhaven

The following is a summary of recommendations that describe potential climate adaptation actions for the Town of Fairhaven in order to better address vulnerabilities to wastewater treatment plant, and pump station infrastructures. The assessed vulnerabilities and recommendations are based on the results of the Climate Change Vulnerability Assessment and Adaptation Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet, which evaluated the potential for damage and loss of function from modeled inundation scenarios using a combination of hurricane parameters and sea level rise (SLR) projections.

Typical wastewater design recommendations are to protect wastewater infrastructure against the 500-year flood. Furthermore, FEMA guidance provides an additional benchmark for quantifying risk to critical facilities, such as water quality infrastructure:

> *Under Executive Order 11988, Floodplain Management, Federal agencies funding and/or permitting critical facilities are required to avoid the 0.2% (500-year) floodplain or protect the facilities to the 0.2% chance flood level.*

Following the standard of protecting critical facilities against damages from a 500-year storm, we chose two modeled hurricane inundation scenarios based on the 2009 FEMA floodplain projections for a 500-year storm. The inundation scenario from the team's modeling approach that most closely resembled the FEMA 500-year storm floodplain was the Category 3 hurricane with baseline (no SLR) water level scenario. We used this scenario, as well as the Category 3 hurricane with 4-foot SLR scenario to evaluate water quality infrastructure, and to make recommendations for individual water quality infrastructure features where possible.

After meeting with town officials and reviewing site-specific studies, we assessed the vulnerability of the water quality infrastructure based on information provided to the team. We also performed a visual evaluation of each pump station using Google Earth imagery to assess whether there were structural features or characteristics that put them at higher or lower risk of damage from inundation. This provided only a cursory engineering review that does not replace a more detailed site-specific inspection and evaluation that will be required to be conducted in a future phase of this project. The following paragraphs summarize findings and general recommendations for pump stations and wastewater treatment facilities. The summary table ranks individual water quality infrastructure feature vulnerability and provides preliminary, site-specific recommendations.

Pump stations

The Town of Fairhaven has 19 pump stations, 10 of which are in the floodplain during the Category 3 scenario with no SLR. These are given a high risk ranking in the table below. 5 additional pump stations are in the floodplain when 4-foot SLR is added to the Category 3 scenario. These are given a medium risk ranking in the table below. The pump stations at Causeway Rd., Bernese St., and South St. pump water from upstream pump stations. These require additional consideration as they would render the other

pump stations useless if they were to malfunction. Because these and some additional pump stations are reportedly not operated during flooding events, adaptations to allow pump station to operate during the flood events are likely not required. However, adaptations to these structures may still be required in order to protect key infrastructure in the facilities (e.g. motors and electrical service) and allow the facilities to be able to operate after the storm. The infrastructure housed at pump stations, including motors, electrical service and electronic controls, generators, buried compressors and fuel tanks, and manholes can all influence a pump station's ability to operate during flooding events. In addition, access to many structures will not be possible except by boat during the inundation scenarios evaluated. Generally the pump stations are above ground on level ground near the shoreline and are very exposed. A few are below ground. Older structures which fall behind the hurricane barrier may be more vulnerable to flooding events as they may not have been built using current standards. These structures will also require further evaluation.

Adaptation actions should prioritize structures that fall within the Category 3 floodplain at current water levels, and focus secondarily on those which are at risk during Category 3 storms with 4-foot SLR. In the table below, we rank priority sites and provide specific recommendations based on information provided by the Town of Fairhaven; however, this does not replace the need for site-specific evaluations. In general, site-specific evaluations should be performed to make a detailed assessment of potential risks to a facility. Individual assessments of each structure should be performed to determine the following:

- Whether the structure has already been floodproofed
- To confirm elevations of possible points of entry for water (e.g. vents, door sills, windows)
- The vulnerability of critical infrastructure within each pump station
- What would be required to flood-proof
- Whether the facility is currently able to operate during flood conditions (e.g. equipped with generator, ability to remote operate)

Once potential risks to a facility are understood, potential mitigation measures should be identified and more accurate opinions of costs can be developed to retrofit existing facilities.

Wastewater treatment plants

The Town of Fairhaven has two wastewater treatment facilities; however, neither facility is at risk from flooding during either of these scenarios. Future studies should assess the storm scenarios that the treatment facility should be protected from and focus on thorough evaluations of the flood control system and critical infrastructure for those scenarios to ensure they are protected during these flood events. Ideally, flood controls should keep the entire site dry for the specified inundation scenario but some limited flooding could be acceptable if the site can be kept operational throughout these events.

Summary Table of Vulnerability and Recommendations

We have assessed risk based on the point location of each pump station and treatment plants, and the water levels at that point for the two inundation scenarios described above and categorized these risks in the table below. Facilities that are not in the floodplain in either scenario are colored in green (low risk). Facilities that are in the floodplain in the Category 3, 4-foot SLR scenario only are colored in orange (medium risk), and facilities that are in the floodplain for both Category 3 scenarios are colored in red (high risk). This table contains recommendations based on available information; however, we recommend that site-specific evaluations be performed for each feature to further evaluate vulnerability and refine adaptation measures.

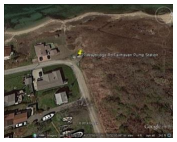
Structure Location in Fairhaven	Inundation depth (NAVD88 ft) for Category 3 Hurricane with no SLR	Inundation depth (NAVD 88 ft) for Category 3 Hurricane with 4-ft SLR	Preliminary Recommendations	Comments
Taber Street*	0	20.73	Potentially require flood proof door. Potential cost range is $10,000 to $250,000.	 Above ground structure with brick construction. Door sill is close to ground.
Pilgrim Avenue*	0	20.65	Potentially require flood proof door as remote controls. Structure should be checked for buoyancy. Potential cost range is $10,000 to $250,000.	 Above ground brick structure, first floor within 2-3 ft of ground. Generator on site

Structure Location in Fairhaven	Inundation depth (NAVD88 ft) for Category 3 Hurricane with no SLR	Inundation depth (NAVD 88 ft) for Category 3 Hurricane with 4-ft SLR	Preliminary Recommendations	Comments
Bridge Street*	0	18.05	Potentially require floodproof door as well as generator and remote controls. Structure should be checked for buoyancy. Potential cost range is $10,000 to $250,000.	 Above ground brick structure, first floor within 2-3 ft of ground. No longer a pump station; used for odor control only
Arsene Street	0	0		Unknown
South Street	0	11.74	Potentially require floodproof door as well as generator and remote controls. Structure should be checked for buoyancy. Potential cost range is $10,000 to $250,000.	 Above ground structure with brick construction. Door sill is close to ground. Pumps water from downstream pump stations.
Rivard Street	0	0		
Marguerite Street	0	0		
Pine Grove Road	0	0		

Structure Location in Fairhaven	Inundation depth (NAVD88 ft) for Category 3 Hurricane with no SLR	Inundation depth (NAVD 88 ft) for Category 3 Hurricane with 4-ft SLR	Preliminary Recommendations	Comments
Middle Street*	0	18.82	This is a drainage (not sewer) pump station and therefore should be assessed to determine how essential it is to operate during coastal floods. Potential cost range is $10,000 to $50,000.	 Above ground structure. Door sill is 1 to 2 feet above ground.
Causeway Road**	3.93	7.66	Structure would require complete reconstruction. Potential cost range is $200,000 to $500,000	 Above ground wood structure. Door sill is just above ground. Generator onsite. Pumps water from upstream pump stations.
Rocky Point Road**	7.44	11.25		No image available

Structure Location in Fairhaven	Inundation depth (NAVD88 ft) for Category 3 Hurricane with no SLR	Inundation depth (NAVD 88 ft) for Category 3 Hurricane with 4-ft SLR	Preliminary Recommendations	Comments
Camel Street**	8.04	11.66	Below ground pump station. Flood door for vault required and on site generator should be considered. Potential cost range is $50,000 - $250,000	 Town has indicated that a portable generator is used during storms; however, access to site would be limited during projected inundation scenarios.
Manhattan Avenue**	8.71	12.49	Minimum likely requirement is flood-proofing doors. Potential cost range is $10,000 to $250,000	 Above ground structure with pump station on site. Doors are elevated 15 feet.

Structure Location in Fairhaven	Inundation depth (NAVD88 ft) for Category 3 Hurricane with no SLR	Inundation depth (NAVD 88 ft) for Category 3 Hurricane with 4-ft SLR	Preliminary Recommendations	Comments
Bernese Street**	8.73	12.59	None	 Generator on-site with elevated doors. Pumps water from upstream pump stations.
Shore Drive**	12.18	15.98	Floodproof access hatch and provide on-site generator. Potential cost range is $100,000 - $250,000	 Below grade pump station with no generator

Structure Location in Fairhaven	Inundation depth (NAVD88 ft) for Category 3 Hurricane with no SLR	Inundation depth (NAVD 88 ft) for Category 3 Hurricane with 4-ft SLR	Preliminary Recommendations	Comments
Abbey Street**	12.50	16.75	None	 Has on-site generator
Waybridge Road**	12.59	16.40	On-site generator recommended. Potential cost range is $10,000 to $250,000	 Aboveground pump station with elevated first floor, which is 10-12" above grade. Town has indicated that a portable generator is used during storms; however, access to site would be limited during projected inundation scenarios.
Seaview Avenue**	12.81	16.59	On-site with above ground structure. Potential cost range is $10,000 to $250,000	

Structure Location in Fairhaven	Inundation depth (NAVD88 ft) for Category 3 Hurricane with no SLR	Inundation depth (NAVD 88 ft) for Category 3 Hurricane with 4-ft SLR	Preliminary Recommendations	Comments
Boulder Park**	13.20	17.33	Needs elevation	
Treatment Plants				
Arsene Street	0	0	None	
West Island	0	0	None	

* Town has indicated that these pump stations, which are behind the hurricane barrier, may be older structures therefore more vulnerable in the event of flooding at that location.
** This facility reportedly is not operated during flooding events. As a result, adaptations to allow pump station to operate during the flood events are likely not required. However, adaptations to these structures may still be required in order to protect key infrastructure in the facilities (e.g. motors and electrical service) and allow the facilities to be able to operate after the storm.